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SC Court of Appeals

STATE OF SOUTH CAROLINA
In the Court of Appeals

APPEAL FROM RICHLAND COUNTY
Court of Common Pleas

The Honorable Jocelyn Newman
Circuit Court Judge
2019-CP-40-04185

Case No. 2024-000548

CRYSTAL GOODWIN AND
JAMES GOODWIN..…… Respondents,

v.

MIDLANDS ORTHOPEDICS AND
NEUROSURGERY AND
DR. THOMAS J. HOLBROOK, M.D...……Appellants.

RECORD ON APPEAL
VOLUME V

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I certify that this Designation does not contain any matters which are irrelevant to this appeal.

Nursing Documentation

DOCUMENT NAME:	SN PreOp Assessment
SERVICE DATE/TIME:	7/22/2016 08:34 EDT
RESULT STATUS:	Modified
PERFORM INFORMATION:	Wegrzyn RN,Pamela C (7/22/2016 08:34 EDT)
ELECTRONICALLY SIGNED BY:	Wegrzyn RN,Pamela C (7/22/2016 09:26 EDT); Wegrzyn RN,Pamela C (7/22/2016 08:34 EDT)

SN PreOp Assessment Entered On: 07/22/2016 08:44
Performed On: 07/22/2016 08:34 by Wegrzyn RN, Pamela C

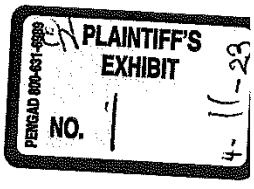
Vital Signs- PAT
Temperature Oral : 98 DegF
Peripheral Pulse Rate : 86 bpm
Pulse Equipment : Dinamap
Resp. Rate : 20 br/min
Pulse Ox Sat : 97 %
Systolic : 156 mmHg
Diastolic : 92 mmHg
NIBP Cuff Site : Right arm
NIBP Position : Sitting
NIBP Equipment : Automatic

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Height & Weight
Dosing Weight : 119.5 kg
Dosing Height : 162 cm
Dosing BMI : 45.53 kg/m2
Scale Type : Stand up
Patient Stated Weight : 119.5 kg(Converted to: 263 lb 7 oz, 263.45 lb)
Patient Stated Height/Length : 162 cm(Converted to: 5 ft 4 in, 5.31 ft, 63.78 in)
Body Mass Index Calc Patient Stated : 45.53 kg/m2
Ideal Body Weight Calculated : 54.193 kg

Wegrzyn RN, Pamela C - 07/22/2016 08:34

General Information
Chief Complaint : numbness and tinglin g bilateral legs with letf leg weakness
Reason for Admission : posterior thoracic laminectomy for decompression t9- t12
Mode of Arrival : Ambulatory
Admitted From : Home
Primary Care Provider : No
Other Physicians : DR D FISHER-hx
holbrook
Actively Enrolled in a Clinical Trial : No
Information Source-Admission : Patient
Contact Numbers : HUSBAND IN WR DOS
james goodwin 803-477-5460
Orientation : Unit



Nursing Documentation

Who Was Oriented : Patient
Type of Housing : Home
Lives With : Family, Spouse
Patient's Preferred Language: : English
Literacy : Can Read and Write
Modes of Communication : Verbal
Communication Barriers : None

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Advanced Directives
Advanced Directives : No Living Will, No Health Care Power of Attorney, Info Offered/Pt Refused

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Allergies
Latex Sensitivity General : No
Latex Sensitivity Food : No
Allergy Information : Allergy Information Complete

Wegrzyn RN, Pamela C - 07/22/2016 08:34
(As Of: 7/22/2016 8:44:05 EDT)

Allergies (Active)

NKA — *Estimated Onset Date:* Unspecified ; *Created By:* Maldonado, Linda T; *Reaction Status:* Active ; *Category:* Drug Allergy ; *Substance:* NKA ; *Type:* Allergy ; *Updated By:* Maldonado, Linda T; *Reviewed Date:* 07/22/2016 08:38

Psychosocial-Cultural
Cultural-Religious Practices : NONE
Religion: : None
Religion : Baptist
Body Piercing(s) : Yes
Body Piercing(s) Comment : ears

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Social History
Social History

(As Of: 7/22/2016 9:27:37 EDT)

Tobacco:

Never smoker (Last Updated: 7/22/2016 8:38:32 EDT by Wegrzyn RN, Pamela C)

Alcohol:

Denies Alcohol Use (Last Updated: 7/22/2016 8:38:39 EDT by Wegrzyn RN, Pamela C)

Health History- PAT
Current Procedures-Treatments : None
History of Positive PPD : No
History of Active TB : No
History of Treatment : No

Nursing Documentation

Assistive Devices : None
Implantable Devices : Caps/Crowns
Anesthesia History : No Anesthesia Complications

Wegrzyn RN, Pamela C - 07/22/2016 08:34

ID Travel Screen
Symptomatic After Exposure to Contagion : No
Symptomatic After Travel High-Risk Area : No

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Problem History

(As Of: 7/22/2016 9:27:37 EDT)

Problems(Active)

Arthritis (SNOMED CT :13ED4849-4C1C-40A2-8F9C-EFF7C070C626)	*Name of Problem:* Arthritis ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* 13ED4849-4C1C-40A2-8F9C-EFF7C070C626 ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:27 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT
Back pain (SNOMED CT :2646370015)	*Name of Problem:* Back pain ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* 2646370015 ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:27 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT
Hypertension (SNOMED CT :64176011)	*Name of Problem:* Hypertension ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* 64176011 ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:26 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT
Pre-diabetes (SNOMED CT :D53A029B-437F-4029-A1CB-5E7C4CE4FCFF)	*Name of Problem:* Pre-diabetes ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* D53A029B-437F-4029-A1CB-5E7C4CE4FCFF ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:27 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT

Procedure History

Procedure History

(As Of: 7/22/2016 9:27:37 EDT)

Anesthesia Minutes: 0 ; *Procedure Name:* Thoracic back surgery x2 ; *Procedure Minutes:* 0 ; *Last Reviewed Dt/Tm:* 7/22/2016 9:27:33 EDT

Anesthesia Minutes: 0 ; *Procedure Name:* lap tubal ligation ; *Procedure Minutes:* 0 ; *Last Reviewed Dt/Tm:* 7/22/2016 9:27:33 EDT

Anesthesia Minutes: 0 ; *Procedure Name:* vaginal delivery x3 ; *Procedure Minutes:* 0 ; *Last Reviewed Dt/Tm:* 7/22/2016 9:27:33 EDT

Family History
Family History

(As Of: 7/22/2016 8:44:06 EDT)

Father: *Relation:* Father ; *Gender:* Male ;

Nomenclature: Hypertension ; *Value:* Positive

Nomenclature: Acute myocardial infarction ; *Value:* Positive

Mother: *Relation:* Mother ; *Gender:* Female ;

Nomenclature: Hypertension ; *Value:* Positive

SN System History Part 1
Respiratory : No Significant Findings, Bronchitis
Cardiovascular : Hypertension, Heart Murmur
Endocrine : Other: prediabetes on metformin
Hematological-Immunological : No Significant Findings
Neurological-Musculoskeletal : Alert & Oriented Times Three, Arthritis, Numbness & Tingling, Back Problems/Surgery
Psychological : No Significant Findings

Wegrzyn RN, Pamela C - 07/22/2016 08:34

SN System History Part 2
EENT : No Significant Findings
Gastroenterological : No Significant Findings
Genito-Urinary : No Significant Findings
Gynecological Status : Reproductive Age, Tubal Ligation
Pregnant? : No
LMP Date : 7/18/2016
Hepatic : No Significant Findings
Integumentary : No Significant Findings

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Ancillary Referrals
Referral Functional : No Referral Indicated
Referral Nutrition : No Referral Indicated
Referral Spiritual Care : No Referral Indicated

Nursing Documentation

Referral Case Mgmt-Social History : No Referral Indicated

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Pain Evaluation
Primary Pain Location : Back
Laterality : Bilateral
Quality : Aching
Primary Pain Onset : Gradual
Primary Pain Time Pattern : Constant
Self Report Pain Tool : Numeric rating scale

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Numeric/FACES Pain Scale
Numeric Pain Scale : 4
Numeric Pain Score : 4

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Image 1 - Images currently included in the form version of this document have not been included in the text rendition version of the form.

DOCUMENT NAME:	Braden Scale
SERVICE DATE/TIME:	7/28/2016 06:22 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Foster RN,Rebecca E (7/28/2016 06:22 EDT)
ELECTRONICALLY SIGNED BY:	

Braden Scale
07/28/16 06:22 EDT Performed by Foster RN, Rebecca E
Entered on 07/28/16 06:23 EDT

Braden	
Sensory Perception	No Impairment (4)
Moisture	Rarely moist (4)
Activity	Walks frequently (4)
Mobility Braden	No limitations (4)
Nutrition	Adequate (3)
Friction and Shear	No apparent problem (3)
Braden Score	22

DOCUMENT NAME:	Admission History
SERVICE DATE/TIME:	7/28/2016 20:15 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Moore RN,Chari R (7/28/2016 22:32 EDT)
ELECTRONICALLY SIGNED BY:	Moore RN,Chari R (7/28/2016 22:32 EDT)

Admission History Entered On: 07/28/2016 22:32
Performed On: 07/28/2016 20:15 by Moore RN, Chari R

Nursing Documentation

Height & Weight
Dosing Weight : 118.18 kg
Dosing Height : 162 cm
Dosing BMI : 45.03 kg/m2
Patient Stated Weight : 118.18 kg(Converted to: 260 lb 9 oz, 260.54 lb)
Patient Stated Height/Length : 162 cm(Converted to: 5 ft 4 in, 5.31 ft, 63.78 in)
Body Mass Index Calc Patient Stated : 45.03 kg/m2
Ideal Body Weight Calculated : 54.193 kg

Moore RN, Chari R - 07/28/2016 22:23

General Information
Reason for Admission : posterior thoracic laminectomy for decompression t9- t12
Mode of Arrival : Stretcher
Admitted From : OR/PACU
Primary Care Provider : No
Other Physicians : DR D FISHER-hx
holbrook
Actively Enrolled in a Clinical Trial : No
Information Source-Admission : Patient
Contact Numbers : HUSBAND IN WR DOS
james goodwin 803-477-5460
Orientation : Unit, Room, Orientation Packet, Patient rights-responsibilities
Who Was Oriented : Patient
Type of Housing : Home
Lives With : Family, Spouse
Patient's Preferred Language: : English
Literacy : Can Read and Write
Modes of Communication : Verbal
Communication Barriers : None

Moore RN, Chari R - 07/28/2016 22:23

Learning Preferences Grid
Patient Learning Preferences: : Demonstration, Printed materials, Verbal explanation

Moore RN, Chari R - 07/28/2016 22:23

Advanced Directives
Advanced Directives : No Living Will, No Health Care Power of Attorney, Info Offered/Pt Refused
Treatment Restrictions : No Restrictions

Moore RN, Chari R - 07/28/2016 22:23

Allergies
Latex Sensitivity General : No
Latex Sensitivity Food : No
Allergy Information : Allergy Information Complete

Moore RN, Chari R - 07/28/2016 22:23
(As Of: 7/28/2016 22:32:33 EDT)

Allergies (Active)
NKA — *Estimated Onset Date:* Unspecified ; *Created By:* Maldonado, Linda T; *Reaction Status:* Active ; *Category:* Drug Allergy ;

* Auth (Verified) *

Palmetto Health Baptist
PRE-ANESTHESIA EVALUATION

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536
03/02/1978 38Y F
HOLBROOK, THOMAS J

Date 7-28-16 Time 0845

Proposed Operation Decompress T9-T12

Age 38 NPO I 99° P 100 BP 160/99 Ht 162cm Wt 120kg OSAT% 99%

BMI=45

Allergies Ø

NO	YES	PERTINENT HISTORY AND PHYSICAL FINDINGS
☐	☑	CARDIOVASCULAR (MI, Angina, CHF, PVD, (High BP) Arrhythmia)
☑	☐	PULMONARY DISEASE (Asthma, COPD, OSA, Tobacco)
☐	☑	CNS, NEUROMUSCULAR (CVA, Seizures, Dementia) Back Surg x2 - CLBP, thoracic stenosis
☑	☐	RENAL DISEASE (ESRD, CRI)
☑	☐	HEPATIC DISEASE (Hepatitis, Cirrhosis)
☑	☐	GASTROINTESTINAL (Hiatal Hernia, Obesity, GERD) Exam: Co-PRL Others
☐	☑	ENDOCRINE (Diabetes, Thyroid) lvg-clear
☑	☐	GYNECOLOGICAL (HCG (-))
☑	☐	HEMATOLOGICAL (Anemia, Sickle Cell Disease or Trait, Bleeding Disorder)
☐	☐	ORAL CAVITY (Loose Teeth, Dentures, Difficult Airway) Ø Loose, Clear
☐	☐	PREVIOUS PROBLEMS WITH ANESTHESIA (MH, PONV) denies
☐	☐	CURRENT MEDICATIONS Metformin, HCTZ, Lisinopril ✓ stopped today
	☐	PAIN SCORE 4 / 10
		OTHER FBS - 91

PERTINENT LAB:

12 / 36 / 335 | 3.7 | Cr. 7 | BUN 91 | EKG | B. S. | CXR

As A PHYSICAL STATUS: CLASS (2) 3, 4, 5, E

RISK, BENEFITS, AND ALTERNATIVES DISCUSSED WITH PATIENT

PATIENT CONSENT TO PLAN OF Gas 7/28/16 M.D.

28203Bmr 8/12/02 r 6/08 r 11/10 r 7/11

BMG 91 @ 0620
7-28-16

28203B

PLAINTIFF'S EXHIBIT NO. 2 4-11-23

PENGAD 800-631-6989

[redacted]

PLAINTIFF'S EXHIBIT NO. 3

PENGAD 800-631-6989

GOODWIN, CRYSTAL JAQUAY
B0907901287
MR 000275536
03/02/1978 31Y F
HARRELL, RHONA M
930 01

Palmetto Health Baptist Anesthesia Record

Continuous Anesthesia Start Time: 721	Continuous Anesthesia End Time: 940 Date: 3/26/09
ASA 1 2 3 4 5 E	Surgeon: Holbrook
Anesthetic: ☐ Local ☐ MAC ☐ General ☐ Spinal ☐ Epidural	Anesthesiologist:
☐ Type of Block	CRNA: [illegible] Bedingfield CRNA
Block By	Arrival 0830-0845 Recliner
Post Op Analgesia	Diagnosis: T9-T10 Cord Compression
Post op Epidural by:	Procedure: thoracic laminectomy T9-T10
Art Line by:	
Central Line by:	

Time → 726 730 8 30 9 30 1000

Legend: BP ▼▲ · Pulse ● · Start Anes ✖ · Start Op ◉ · End Anes ⊗

Respirations: Spontaneous ○ · Assisted ⊘ · Controlled ⊗

Preinduction: BP 139/89 · P 114 · RR · O_2

Pre-anesthetic Checklist
OR # 15
☑ Pt. I.D
☑ PL Chart
☐ Consent
☐ Anes. Equip
☐ Anes. Machine
NPO after 25

Induction
☑ Pre-O_2
☐ IV routine
☑ IV with Sellick
☐ Inhalation
☐ See Comments

Position
☐ Supine
☑ Prone
☐ Lithotomy
☐ Lateral R/L
☑ Arms Padded < 90° Secured
☐ Axillary Roll

Airway Maintenance
☐ Nasal Cannula
☐ Mask
☐ Oral Airway
☐ Nasal Airway
☐ LMA #
Intubation
☑ Endotracheal
Size 7.0 mm
☐ Endobronchial R/L
Size
☑ Oral Nasal
☐ ETT 4.0
☐ Stylet
☐ DL x 1
☐ Fiberoptic Laryng
☐ Smooth
☐ Difficult
Secured at 22 cm
Tube position confirmed by:
☑ BS-B
☑ ETCO$_2$
☐ Fiberoptic

Monitors
☑ EKG
☑ B/P Cuff R/A
☑ Arm ☐ Leg
☑ Pulse Oximeter
☑ ETCO$_2$
☑ Temp S ☐ R
☐ Precordial Steth
☑ Esoph Steth
☐ O_2 Analyzer
☐ Discon. Alarm
☐ PNS

Invasive Monitors
☐ Arterial Line
☐ CVP

Eye Care
☐ Lacritube ☑ Tape
☐ Optiguard
☐ Left ☐ Right

☐ NG Tube. ___ Fr
☐ OG Tube. ___ Fr
☑ Foley

Warming Equipment
☐ Hot line
☑ Bair Hugger Upper
☑ Bair Hugger Lower
☐ Bair Hugger Peds
☐ Level 1
☐ HME Filter

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the induction as planned.

Signature

Oxygen L/M	10-3 1- 1- 1- 1- 1- 1 1- 1-10
N_2O / Air L/M	1- 1- 1- 1- 1- 1- 1- 1-10
% D / S	1- 2- 2.1 2.1 2.1 2.2 2.2 2.2 2.0
Nem / SUX	3 120
Propofol / Pentothal	180
Versed (mg)	1
Fentanyl / Sufenta	100 50 50 50 50
Narcan	5 5
Decadron	10
Zofran	4
Neostigmine/Robinul	5/1.0

EKG	ST ST ST ST ST ST SR SR SR SR
ETCO$_2$	+ 32 30 30 30 32 32 32 32
SAO$_2$	100 99 99 100 100 100 100 100 100 100
FIO$_2$	1.0 1.0 .5 .5 .5 .5 .5 .5 .5 1.0
Temp E - R - S	35.8 35.8 35.4 36.1
TOF	4/4 4/4 0/4 1/4
Extra Neuromuscular	✓ ✓ ✓ ✓ ✓

LR 1000	1 1 2 1 1400
Blood	
EBL - Interval/Total	100
Urine-Interval/Total	300

Antibiotic: Ancef 1gm IVPB 724
↑ 724 ↓ 800 Incision 810
Surgeon Ordered Y N ; Orders Changed Y N

PRE MEDS: Versed 2mg IV, NS 7mm. Reglan 10mg IVPB @ 705
Fentanyl 100 mg IV 7mm

COMMENTS:
Induction
726 OR Monitors Pre O2 SIVI intubated Pronos diff
928 EOS 100% O2 to 940
Supine Reversed extubated
936 PACU 2 NC

OR In Time: 726

Post Anesthesia Evaluation: OR Out Time: 936
Patient Taken to: ☑ PACU ☐ OP Rec
BP: 129/78 LOC: ☑ AW ☐ AR ☐ NAR
Pulse: 95 Airway: ☐ Oral ☐ Nasal ☐ Intubated
Resp: 20
SaO_2: 99 O_2 by: ☐ Mask ☐ N/C ☐ Room Air
Temp: 97.4
☐ No Anesthetic Complications Noted
Time: Signed:

Page 1 of __

2820IBMR R 6/99, 5/05, 7/07

5750/1619 Prisma Health Baptist 003130

ROA_2049

* Auth (Verified) *

Palmetto Health Baptist Anesthesia Record

Continuous Anesthesia Start Time: 0949	Continuous Anesthesia End Time: 1355 Date: 9/11/11
ASA 1 2 3 4 5 E	Surgeon: Holbrook
Anesthetic: ☐ Local ☐ MAC ☑ General ☐ Spinal ☐ Epidural	Anesthesiologist:
☐ Type of Block:	CRNA: Cat
Block By:	Diagnosis: Back Pain, Radiculopath B. lateral Leg S
Post Op Analgesia	Procedure: Redo thoracic decompression T8-9 T9-10
Post op Epidural by:	
Art Line by:	
Central Line by: KH	

1

GOODWIN, CRYSTAL JAQUAY
B1121701597
MR 000275536 HOLBROOK, THOMAS J
03/02/1978 33Y F

Time → 1000 1030 1100 1130 1200 1230 1300

Legend: BP X; Pulse •; Start Anes ✖; Start Op ◉; End Anes ⊗

Respirations: Spontaneous ○ Assisted · ⊘ Controlled ⊗

Preinduction VS: BP 162/97; P 96; RR 20; O_2 97%

9 9 97

Pre-anesthetic Checklist — OR # 7
☑ Pt. I.D. ☑ Pt. Chart ☑ Consent ☑ Anes. Equip ☑ Anes. Machine
NPO after 0700 AM

Induction
☑ O_2 ☐ IV routine ☑ IV with Sellick ☐ Inhalation ☐ See Comments

Position
☑ Supine ☐ Prone ☐ Lithotomy ☐ Lateral R/L ☑ Arms Padded ☑ < 90° Secured ☐ Axillary Roll

Airway Maintenance
☐ Nasal Cannula ☐ Mask ☐ Oral Airway ☐ Nasal Airway ☐ LMA #
Intubation
☑ Endotracheal Size 7.0 mm ☐ Endobronchial R/L Size Fr ☐ Oral Blade MAC3 ☐ Nasal ☐ LTA ☑ Stylet ☑ DL # 1 ☐ Fiberoptic Laryng ☐ Smooth ☐ Difficult Secured @ 21 cm
Tube position confirmed by: ☑ BS=B ☑ $ETCO_2$ ☐ Fiberoptic

Monitors
☑ EKG ☑ NIBP Cuff R/L ☑ Arm ☐ Leg ☑ Pulse Oximeter ☑ $ETCO_2$ ☑ Temp ☑ E R ☐ Precordial Sscth ☐ Esoph Steth ☑ Anslyzer ☑ Disconn. Alarm ☐ PNS
Invasive Monitors
☐ Arterial Line ☐ CVP
Eye Care
☐ Lacrilube ☑ Tape ☐ Opriguard ☐ Left ☐ Right
☐ NG Tube: Fr ☐ OG Tube. Fr ☑ Foley

Warming Equipment
☑ Hot line ☑ Bair Hugger Upper ☐ Bair Hugger Lower ☐ Bair Hugger Pads ☐ Level I ☑ IME Filter

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the anesthetic as planned.
Signature

IV Antibiotic: Ancef 1g IV
↑ 1047 ↓ 1103 Incision 1100
Surgeon Ordered Y ⓝ; Orders Changed Y ⓝ CWBIC

PRE MEDS: Versed 2 mg Ketorol 0.2 Reglan 10 mg IV Ea

COMMENTS: Zantac 150mg PO at 9:35 and IM. OR. minimal blood loss. Foley placed. TLC placed by Dr. Fowler on 1st attempt. All lines drawn back. KH

(1) Sux, atracurium, intubation, start. pt turned Prone, Prone set in use, TLC placed by K. Pandit on 1st attempt. BIx3. pt turned prone, head in neutral position, Prone set in use, Eyes secure, pad Prone set in use, PPP — ⓑ 65 occurred 12:45 66 BP

Procedure Ended @ 1142 OR In Time: 0954

Oxygen L/M	10	1	1	1	1	1	1	1	1	1	1
N_2O / Air L/M		1	1	1	1	1	1	1	1	1	1
% D F ⓢ		1:2	.7	.7	.7	.7	.7	.9	.96	.78	.78
Roc / SUX	4/10										
Propofol / Brevital	200										
Versed (mg)	2										
Fentanyl / Sufenta	10	5	5	5	5			5	5	5	
Decadron						10					4
Zofran											

EKG	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
$ETCO_2$	4	40	37	35	34	33	33	32	33	32	33
SAO_2	100	100	100	100	100	100	100	100	100	100	100
FIO_2	1.0	0.5	0.4	0.6	0.5	0.5	0.5	0.5b	0.52	0.52	0.52
Temp: E - R -											
Eyes	✓		ok	o/c	o/c	ok	ok	ok	OK	OK	OK	ok

LR #20 @											
LR #18 @											
Blood											
EBL - Interval/Total											
Urine-Interval/Total											

Post Anesthesia Evaluation: OR Out Time: 1350
Patient Taken to: ☑ PACU ☐ OP Rec. LOC: ☑ AW ☐ AR ☐ NAR
BP: 140 / 94 Airway: ☐ Oral ☐ Nasal ☐ Intubated
Pulse: 98 Resp: 25
SaO_2: 95 O_2 by: ☐ Mask ☑ NC ☐ Room Air
Temp: 97.9
☑ No Anesthetic Complication ☐ Complication:
Time: 1400 Signed:

28201BMR R 6/99, 5/05, 7/07 r 8/09 R 12/09 R 4/10

All meds are IV unless noted.

28201B

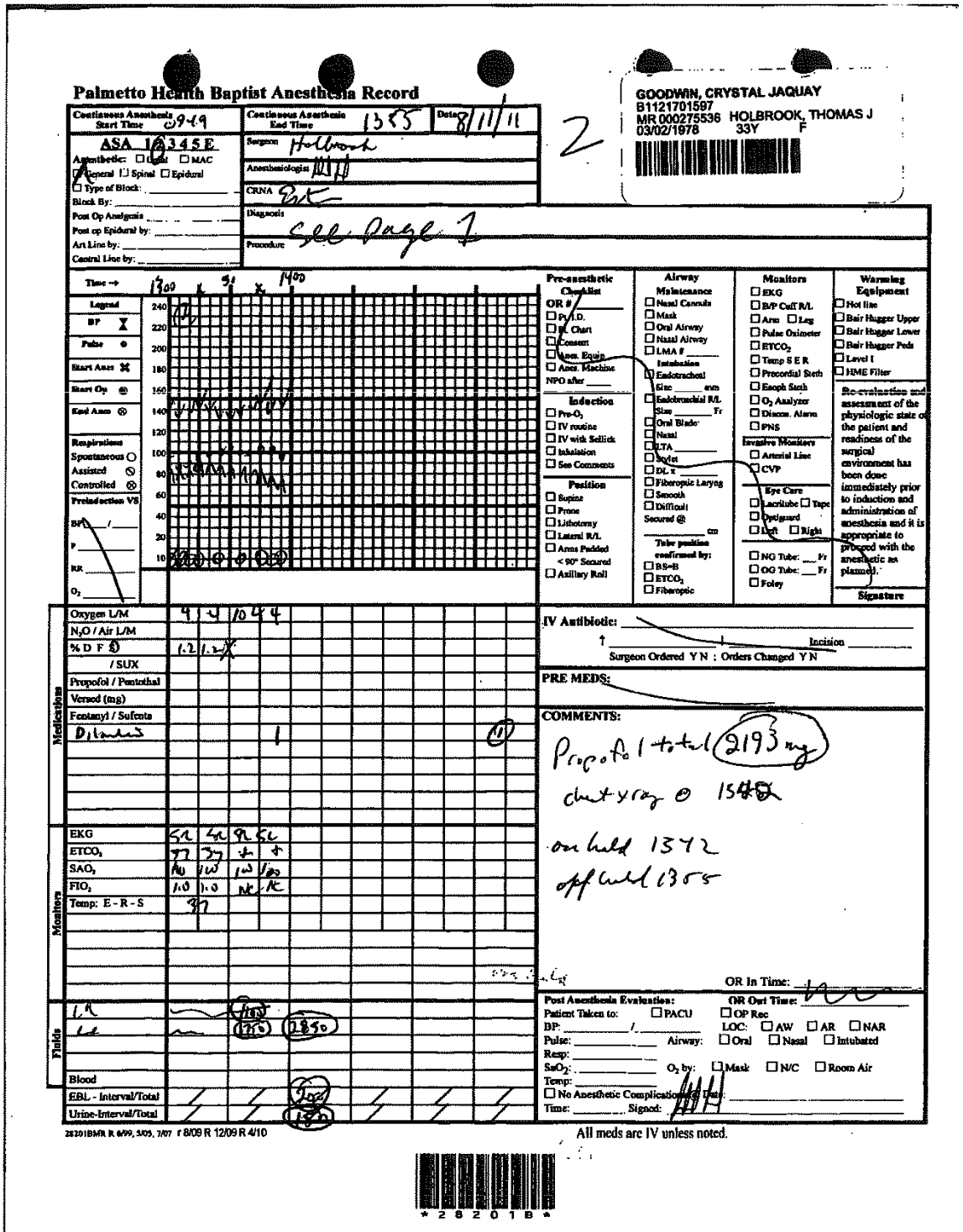
1150 - Edwards lunch relief

PLAINTIFF'S EXHIBIT NO. 4 — PENGAD 800-631-6989

DE

ROA_2050

* Auth (Verified) *



Palmetto Health Baptist Anesthesia Record

GOODWIN, CRYSTAL JAQUAY
B1121701597
MR 000275536 HOLBROOK, THOMAS J
03/02/1978 33Y F

Continuous Anesthesia Start Time 0949 | Continuous Anesthesia End Time 1355 | Date 8/11/11

ASA 1 2 3 4 5 E

Anesthetic: ☐ Local ☐ MAC ☐ General ☐ Spinal ☐ Epidural ☐ Type of Block: ☐ Block By: ☐ Post Op Analgesia ☐ Post op Epidural by: ☐ Art Line by: ☐ Central Line by: ☐

Surgeon Holbrook | Anesthesiologist [illegible] | CRNA Eat

Diagnosis | Procedure See Page 1

2

Time → 1300 1400

Legend: BP X | Pulse ● | Start Anes ✕ | Start Op ⊕ | End Anes ⊗

Respirations: Spontaneous ○ Assisted ⊘ Controlled ⊗

Preinduction VS: BP ___/___ P ___ RR ___ O_2 ___

Pre-anesthetic Checklist: OR # ☐ Pt I.D. ☐ H&P Chart ☐ Consent ☐ Anes. Equip. ☐ Anes. Machine ☐ NPO after ___

Induction: ☐ Pre-O_2 ☐ IV routine ☐ IV with Sellick ☐ Inhalation ☐ See Comments

Position: ☐ Supine ☐ Prone ☐ Lithotomy ☐ Lateral R/L ☐ Arms Padded < 90° Secured ☐ Axillary Roll

Airway Maintenance: ☐ Nasal Cannula ☐ Mask ☐ Oral Airway ☐ Nasal Airway ☐ LMA # ___ Intubation ☐ Endotracheal Size ___ mm ☐ Endobronchial R/L Size ___ Fr ☐ Oral Blade ☐ Nasal ☐ ETA ___ ☐ Stylet ☐ DL ☐ Fiberoptic Laryng ☐ Smooth ☐ Difficult Secured @ ___ cm Tube position confirmed by: ☐ BS=B ☐ $ETCO_2$ ☐ Fiberoptic

Monitors: ☐ EKG ☐ BP Cuff R/L ☐ Arm ☐ Leg ☐ Pulse Oximeter ☐ $ETCO_2$ ☐ Temp S E R ☐ Precordial Steth ☐ Esoph Steth ☐ O_2 Analyzer ☐ Disconn. Alarm ☐ PNS

Invasive Monitors: ☐ Arterial Line ☐ CVP

Eye Care: ☐ Lacrilube ☐ Tape ☐ Opticguard ☐ Left ☐ Right

☐ NG Tube: ___ Fr ☐ OG Tube: ___ Fr ☐ Foley

Warming Equipment: ☐ Hot line ☐ Bair Hugger Upper ☐ Bair Hugger Lower ☐ Bair Hugger Peds ☐ Level I ☐ HME Filter

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the anesthetic as planned.

Signature

Medications	9	4	10	4	4
Oxygen L/M					
N_2O / Air L/M					
% D F S	1.2	1.2	X		
/ SUX					
Propofol / Pentothal					
Versed (mg)					
Fentanyl / Sufenta					
Dilaudid			1		(1)

Monitors					
EKG	SR	SR	SR	SR	
$ETCO_2$	37	37	↓	↓	
SAO_2	RA	1W	1W	1W	
FIO_2	1.0	1.0	NC	RC	
Temp: E - R - S	97				

Fluids					
LR			(1000)		
LR			1000	0850	
Blood					
EBL - Interval/Total				100	
Urine-Interval/Total				150	

IV Antibiotic: ___ ↑ ___ Incision ___

Surgeon Ordered Y N ; Orders Changed Y N

PRE MEDS:

COMMENTS:

Propofol total 2193 mg

chest xray @ 1548

on hold 1342

off hold 1355

OR In Time: [illegible]

Post Anesthesia Evaluation: OR Out Time: ___

Patient Taken to: ☐ PACU ☐ OP Rec

BP: ___/___ LOC: ☐ AW ☐ AR ☐ NAR

Pulse: ___ Airway: ☐ Oral ☐ Nasal ☐ Intubated

Resp: ___

SaO_2: ___ O_2 by: ☐ Mask ☐ N/C ☐ Room Air

Temp: ___

☐ No Anesthetic Complication Total: ___

Time: ___ Signed: [illegible]

28201BMR R 6/99, 5/05, 7/07 r 8/09 R 12/09 R 4/10

All meds are IV unless noted.

28201B

* Auth (Verified) *

NICA

PH Baptist Anesthesia Record

Continuous Anesthesia Start Time	Continuous Anesthesia End Time	Date
0720	1156	7-28-16

ASA 1 2 3 4 5 E

Anesthetic: ☐ Local ☐ MAC ☒ General ☐ Spinal ☐ Epidural

☐ Type of Block: _____

Block By: _____

Post Op Analgesia _____

Post op Epidural by: _____

Art Line by: _____

Central Line by: _____

Surgeon: Holbrook

Anesthesiologist: [illegible]

CRNA: [illegible]

Diagnosis: spinal stenosis T9-T12

Procedure:

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536
03/02/1978 38Y F
HOLBROOK, THOMAS J

Pre-anesthetic Checklist
OR # _____
☐ Pt. I.D.
☐ Pt. Chart
☐ Consent
☐ Anes. Equip
☐ Anes. Machine
INFO after Pre-op

Induction
☐ Pre-O2
☐ IV routine
☐ IV with Sellick
☐ Inhalation
☐ See Comments

Position
☐ Supine
☐ Prone
☐ Lithotomy
☐ Lateral R/L
☐ Arms Padded
☐ < 90° Secured
☐ Axillary Roll

Airway Maintenance
☐ Nasal Cannula
☐ Mask
☐ Oral Airway
☐ Nasal Airway
☐ LMA # _____

Intubation
☐ Endotracheal
Size 7.0 mm
☐ Endobronchial R/L
Size _____ Fr
☐ Oral Blade: Mac/S
☐ Nasal
☐ LTA _____
☐ Stylet
☐ DL # 1
☐ Fiberoptic Laryng
☐ Smooth
☐ Difficult
Secured @ 21 cm
Tube position confirmed by:
☐ BS-B
☐ ETCO2
☐ Fiberoptic

Monitors
☐ EKG
☐ BP Cuff R/L
☐ Arm ☐ Leg
☐ Pulse Oximeter
☐ ETCO2
☐ Temp S E R
☐ Precordial Steth
☐ Esoph Steth
☐ O2 Analyzer
☐ Discon. Alarm
☐ PNS

Invasive Monitors
☐ Arterial Line
☐ CVP

Eye Care
☐ Lacribe ☐ Tape
☐ Opticgard
☐ Left ☐ Right

☐ NG Tube: ___ Fr
☐ OG Tube: ___ Fr
☐ Foley

Warming Equipment
☐ Hot Line
☐ Bair Hugger Upper
☐ Bair Hugger Lower
☐ Bair Hugger Pads
☐ Level 1
☐ HME Filter

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the anesthetic as planned.

Signature

Time → 0715 0730 0745 0800 0815 0830 0845 0900 0915 1000

Legend: BP X; Pulse •; Start Anes ✖; Start Op ◉; End Anes ⊗

Respirations: Spontaneous ○; Assisted ⊘; Controlled ⊗

Preinduction VS: BP 160/99; P 100; RR ____; O_2 99

99.0

Oxygen L/M	10	8	1.5	1.5	1.5	1.5	1.5	1.5	4	1.5	1.5	1.5	
N_2O / Air L/M			1.5	1.5	1.5	1.5	1.5	1.5	2	1.5	1.5	1.5	
% D F	0.9	0.5	1.5	1.0	1.0	1	1	1	1.0	1.0	1.0	1.0	
Rocuronium / SUX	4	50	34					25					
Propofol / Ketamine	200	50	50 mg		100								
Versed (mg)													
Fentanyl / Sufenta	10	10	10			10		10	10			10	
Ketamine		20				10			10				
Dexmed												10	

EKG	SR	ST	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
$ETCO_2$	40	34	32	32	33	34	34	33	36	36	36	35	
SAO_2	100	100	100	100	100	99	99	100	100	100	100	100	
FIO_2	100	0.6	0.6	0.6	.6	.6	.6	.6	100	.6	.6	.6	
Temp: E - R - S	—	35.6	—	35.7	35.7	35.7	35.9	35.4	—	35.7			
		✓	✓	✓	✓	✓	✓	✓					
BP / P.I.P	530	/35	544	/36	550	/36	548	/36	576	/35	574	/35	
RR / Peep	R	/+5	19	/+5	10	/5	10	/5	9	/+5	9	/+5	

Fluids: LR 2.5L BSS 1L

Blood													
EBL - Interval/Total							50		50	100			
Urine-Interval/Total									40				

IV Antibiotic: Ancef 1g IV
↑ 0745 ↓ 0759 Incision 0808
Surgeon Ordered (N) ; Orders Changed Y (N)

PRE MEDS: 0700 Reglan 10 MG IVP's-RN
alka Seltzer 2 tabs PO & 30cc H20-RN
0718 Versed 2mg IV, Robinul 0.2mg IV-RN

COMMENTS:
0648 Zantac 150mg PO-RN
① SVI at counter suction
Doctor initiate check clear — turned prone on
Prone on Foam rest Eyes Gel Nose free & prone
Head neck neutral
② pt biting ETT, Roc 25mg, IV, Solucort 10, Cefazolin 2g given, foot NAD to heels, Prone on foam pillow, eyes OK, head neck neutral. Jaw loosened with Propofol, oral airway placed, head repositioned on foam pillow, eyes OK, head neck neutral. SpO2 100%

Preoperative: Pre-anesthes a Exam/Eval Performed; Anesthesia Plan Prescribed; Qualified Anesthetist:

Intra/Preoperative: Participated in Most Demanding; Frequent Interval's Monitored; Physically Present & Available; Post-Anesthesia Care Provided

Procedure Verified in Grid

OR In Time: 0724

Post Anesthesia Evaluation:
Patient Taken to: ☐ PACU ☐ OP Rec
OR Out Time: _____
BP: _____ / _____
Pulse: _____ Airway: ☐ Oral ☐ Nasal ☐ Intubated
Resp: _____
SaO_2: _____ O_2 by: ☐ Mask ☐ N/C ☐ Room Air
Temp: _____
LOC: ☐ AW ☐ AR ☐ NAR
☐ No Anesthetic Complications @ Date: _____
Time: _____ Signed: _____

85c Break Dura Stick ✓ 0410
All meds are IV unless noted.

28201Bmr r6/99 r5/05 r7/07 r8/09 r12/09 r4/10 r7/15

28201B

PLAINTIFF'S EXHIBIT NO. 5 4-11-23
PENGAD 800-631-6989

* Auth (Verified) *

PH Baptist Anesthesia Record

Continuous Anesthesia Start Time: 0723 | Continuous Anesthesia End Time: 1155 | Date: 7/23/16

ASA 1 2 3 4 5 E

Anesthetic: ☐ Local ☐ MAC ☒ General ☐ Spinal ☐ Epidural

☐ Type of Block: _____

Block By: _____

Post Op Analgesia _____

Post op Epidural by: _____

Art Line by: _____

Central Line by: _____

Surgeon: Holbrook

Anesthesiologist: JR

CRNA: [illegible]

Diagnosis: _____

Procedure: See Page 1

GOODWIN, CRYSTAL JAQUAY 942 01
B1620200813
MR 000275536 HOLBROOK, THOMAS .
03/02/1978 38Y F

Time → 1055 1100 1130

Legend: BP X; Pulse •; Start Anes ✖; Start Op ⊜; End Anes ⊗

Respirations: Spontaneous ○ Assisted ⊘ Controlled ⊗

Preinduction VS: BP ___/___ P ___ RR ___ O_2 ___

Pre-anesthetic Checklist
OR # ___
☐ Pt. I.D.
☐ Pt. Chart
☐ Consent
☐ Anes. Equip
☐ Anes. Machine
NPO after ____

Induction
☐ Pre-O_2
☐ IV routine
☐ IV with Sellick
☐ Inhalation
☐ See Comments

Position
☐ Supine
☐ Prone
☐ Lithotomy
☐ Lateral R/L
☐ Arms Padded < 90° Secured
☐ Axillary Roll

Airway Maintenance
☐ Nasal Cannula
☐ Mask
☐ Oral Airway
☐ Nasal Airway
☐ LMA # ____
Intubation
☐ Endotracheal Size ___ cm
☐ Endobronchial Tube Size ___ Fr
☐ Oral Blade
☐ Nasal
☐ LTA ____
☐ Stylet
☐ DL x ____
☐ Fiberoptic Laryng
☐ Smooth
☐ Difficult
Secured @ ____ cm
Tube position confirmed by:
☐ BS=B
☐ $ETCO_2$
☐ Fiberoptic

Monitors
☐ EKG
☐ B/P Cuff R/L
☐ Arm ☐ Leg
☐ Pulse Oximeter
☐ $ETCO_2$
☐ Temp S E R
☐ Precordial Steth
☐ Esoph Steth
☐ O_2 Analyzer
☐ Disconn. Alarm
☐ NS
Invasive Monitors
☐ Arterial Line
☐ CVP
Eye Care
☐ Lacrilube ☐ Tape
☐ Opticlude
☐ Left ☐ Right
☐ NG Tube: ___ Fr
☐ OG Tube: ___ Fr
☐ Foley

Warming Equipment
☐ Hot line
☐ Bair Hugger Upper
☐ Bair Hugger Lower
☐ Bair Hugger Pods
☐ Level 1
☐ IIME Filter

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the anesthetic as planned.

Signature

Medications	1055	1100	1130
Oxygen L/M	1.5	1.5	1.5
N_2O / Air L/M	1.5	1.5	1.5
% D F ISO	1.5	1.5	1.5
/ SUX	125		
Propofol / Brevital			
Versed (mg)			
Fentanyl / Sufenta			
Ketamine	10		
Zofran	4		
Ancef / Rocephin			
Decadron			
TAP			

Propofol: 2500 mg gtt + 200 = 3200 mg Sup 1.0

Monitors	1055	1100	1130
EKG	SR	SR	SR
$ETCO_2$	33	33	36
SAO_2	99	99	99
FIO_2	0.6	0.6	0.6
Temp: E - R - C	35.0		
EYE	✓	✓	✓
NC/P.P	111	125	
M/Pap	79	75	

Fluids	1055	1100	1130
LL (3)			
Blood			
EBL - Interval/Total	100		
Urine-Interval/Total	400		

1055: 1.5 / 1.5 / 1.5 / 10 / 10 / 10
1100: 1.5 / 1.5 / 1.5 / 4
1130: 1.5 / 1.5 / 1.5 / 4

IV Antibiotic: _____ ↑ _____ ↓ _____ Incision _____

Surgeon Ordered Y N ; Orders Changed Y N 1115

PRE MEDS: _____

COMMENTS:

Preoperative: Initials
Pre-anesthesia Exam/Eval Performed ____
Anesthesia Plan Prescribed ____
Qualified Anesthetist ____

(R) forearm with axillary palsy
bilateral b/g pt during surgery.
Pt to PACU, placed on T piece breathing well VSS;

OR in Time: _____

Intraoperative: Initials
Participated in Pre-Procedure Discussion ____
Sponge, Sharp, Instrument Count Correct ____
Physician Present & Available ____
Post-Anesthesia Care Provided ____

Post Anesthesia Evaluation:
Patient Taken to: ☒ PACU ☐ OP Rec
BP: 135 / 65
Pulse: 79
Resp: 20
SaO_2: 100
Temp: 97.9
☒ No Anesthetic Complications @ Date: _____
Time: 1149 Signed: _____

OR Out Time: 1147
LOC: ☐ AW ☒ AR ☐ NAR
Airway: ☐ Oral ☐ Nasal ☒ Intubated T-PIECE
O_2 by: ☐ Mask ☐ N/C ☐ Room Air

All meds are IV unless noted.

28201Bmr r6/99 r5/05 r7/07 r8/09 r12/09 r4/10 r7/15

* 2 8 2 0 1 B *

Spine Surgery

VOLUME 13 ■ NUMBER 8 ■ AUGUST 2012

Intraoperative Neuromonitoring in Spine Surgery

Keith W. Michael, MD, and Scott D. Boden, MD

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LEARNING OBJECTIVES: After participating in this CME activity, the spine surgeon should be better able to:

1. Evaluate the indications for, limitations of, and clinical evidence associated with each available form of intraoperative monitoring.
2. Identify the anatomy monitored by each modality.
3. Create an intraoperative monitoring plan tailored to the needs of a case.

Intraoperative neurologic injury is a complication feared by patients and spine surgeons alike. Postoperative neurologic deficits occur in 1% of spine surgeries, with slightly higher rates in more complex operations or revision surgeries.[1] The Stagnara wake-up test[2] was one of the earliest forms of intraoperative neuromonitoring but required awakening the patient during surgery. Along with developments in spine surgery instrumentation, techniques, and approaches, there have been parallel developments in intraoperative monitoring (IOM). It is possible to monitor the sensory and motor tracts in the spinal cord and nerve roots using electromyography (EMG). Monitoring the neurologic elements without direct visualization has fostered the development of percutaneous pedicle screw placement and numerous minimally invasive fusion techniques. IOM can make traditional procedures such as deformity corrections, tumors, and spinal cord decompression safer.

Although the benefits are numerous, IOM introduces a number of new challenges. First, it can place restrictions on neuromuscular blockade and inhalational agents for anesthesia (Table 1). Second, the surgeon must understand the indications and limitations of each type of IOM to ensure the desired monitoring goal is achieved. Finally, learning how to respond to intraoperative triggers or alerts from the IOM is paramount.

Triggers can represent evidence of neurologic embarrassment, changes in patient temperature, blood pressure, anesthesia, or may represent false-positive results. Determining the etiology of these triggers during the case may delay or alter the surgical plan, which may be unnecessary in the setting of a false-positive trigger. IOM has the potential to facilitate intraoperative recognition of impending neurologic embarrassment, but to maximize its efficacy, it requires a team effort among the neurophysiology, anesthesia, and surgical teams.

The goal of this article is to review the indications, limitations, and clinical evidence for each form of IOM and to review management of intraoperative alerts. This will allow the surgical team to tailor the types of IOM specifically to each case to maximize clinical benefit.

INTRAOPERATIVE AWAKE NEUROMONITORING TECHNIQUES

The Stagnara wake-up test,[2] named after one of the original authors in 1973, is the gold standard for awake neuromonitoring. Anesthesia is lightened intraoperatively until the patient is able to demonstrate lower extremity movement on command. Patient-driven respiratory effort confirms that chemical paralysis has resolved sufficiently to allow active motor function. Upper extremity movement serves as a positive control, reducing the chance of a false result from oversedation. Benefits of the Stagnara wake-up test include direct confirmation of motor function, low cost, and the absence of complex technology with the potential for failure. Drawbacks include single-point-in-time testing because this procedure is usually performed only once during the case, typically after the deformity is corrected.

This test introduces a delay into the procedure while the patient is gradually lightened from and then returned to general anesthesia. In addition, it requires patient cooperation and sufficient mental capacity to understand the exercise. Patient pain during the awakening or dislodgment of provisionally fixed hardware, which were initial concerns, have not been observed. Most patients are amnestic to the events,

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PLAINTIFF'S EXHIBIT 10

PENGAD 800-631-6989

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with only approximately 12% of patients reporting any recollection.[3]

Hall et al[3] and Dorgan et al[4] collectively reported 268 scoliosis cases monitored with the Stagnara wake-up test. Seven intraoperative neurologic deficits were identified; 6 resolved fully with release of distraction on the Harrington rod. There was a single case of an intraoperative deficit from which the patient did not fully recover, despite intraoperative attempts at correction. The authors concluded that the Stagnara wake-up test was safe and reliable, and had the potential to reduce postoperative neurologic deficits by facilitating intraoperative recognition.

The ankle clonus test, reported by Hoppenfeld in 1997,[5] is another method of IOM that requires gradually awakening the patient. The test takes advantage of progressive levels of anesthesia depth. As anesthesia is lightened, cortical and upper motor neuron function are suppressed to a greater degree than lower motor neuron function. An intact reflex is indicated by the presence of clonus with rapid forced dorsiflexion at the ankle at a specific time during emergence from anesthesia. This tests both sensory and motor pathways, including the upper and lower motor neurons. Testing in 1006 instrumented spinal fusion cases and 115 controls resulted in 100% sensitivity and 99.7% specificity.[5]

The ankle clonus test is highly dependent on timing the correct anesthesia stage, which is typically at the end of the case just after the patient is extubated. The absence of clonus may indicate neurologic deficit or may indicate inappropriate timing relative to the level of anesthesia. Today most surgeons prefer the intraoperative Stagnara wake-up test to obtain earlier and more concrete confirmation. The ankle clonus test never gained popularity, and in 2005, Ewen and colleagues[6] reported significant decreases in specificity and sensitivity when the primary anesthetic agent included isoflurane or sevoflurane, limiting its use.

Among the awake neuromonitoring tests, the Stagnara wake-up test remains the gold standard for IOM. Today it can be used to evaluate a patient's motor function in the setting of an intraoperative alert from motor evoked potentials (MEPs).

SOMATOSENSORY EVOKED POTENTIALS

Somatosensory evoked potentials (SSEPs) were the first form of intraoperative neuromonitoring used in spine surgery and remain the most commonly used method.[7] Neurologically intact patients with changes in SSEP signals that correlated with application and release of distraction with Harrington rods suggested that IOM had the potential to identify neurologic deficits without awakening the patient.[7,8]

SSEPs monitor the somatosensory cortex and the dorsomedial tracts in the spinal cord, which carry proprioceptive signals from the peripheral nerves. Although motor deficits resulted in greater morbidity than proprioceptive deficits, SSEPs were initially chosen because the dorsal tracts had the closest proximity to direct damage from wires and surgical instruments.[9] It was thought that SSEPs served as a proxy for overall spinal cord function, including the motor tracts. With time, reports surfaced describing patients with postoperative motor deficits in the setting of unchanged SSEP signals.[10] In the presence of anterior spinal artery occlusion, it is possible to have an ischemia-induced motor deficit that may not be detected by SSEPs. The dorsomedial tracts are supplied by the radicular arteries, so focal ischemic from the anterior spinal artery may be not detected. This increased understanding of the limitations

This continuing education activity is intended for orthopaedic and neurologic surgeons and other physicians with an interest in spine surgery.

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Table 1. Anatomy, Advantages, Disadvantages, and Anesthesia Restrictions for Intraoperative Monitoring Modalities

Monitoring Modality	Anatomy Monitored	Advantages	Disadvantages	Anesthesia Limitations
Stagnara wake-up test	Voluntary motor pathway including upper and lower motor neurons	No monetary cost, reliable results	Single point-in-time testing, patients need to be prepared and able to follow commands, operative delay, prolonged anesthetic time	No specific restrictions, but short reversal times are beneficial
Clonus test	Motor and sensory, upper and lower motor neurons	No monetary cost, simple, tests motor and sensory functions	Narrow timing window at end of case, results can be effected by anesthesia	Unreliable with isoflurane or sevoflurane
SSEP	Somatosensory cortex, brainstem, dorsomedial tracts, peripheral sensory nerves	Continuous monitoring without patient movement, can be used with neuromuscular blockade	Does not monitor motor tracts or anterior spinal cord, alerts delayed compared with MEPs	Signals diminished with high concentrations of inhalational gases or nitrous oxide greater than 50%
MEP	Motor cortex, anterior corticospinal tracts, upper and lower motor neurons	Reliable motor function monitoring with high sensitivity and specificity	Restricted anesthesia, no neuromuscular blockade for CMAPs, run only at requested intervals, patient moves during testing	Ideally, requires total IV anesthesia, no neuromuscular blockade
EMG	Nerve roots at select levels	Real-time results, high sensitivity, facilitates minimally invasive surgery	Low sensitivity with sEMG	tEMG is reliable with up to 80% neuromuscular blockade

CMAP, compound motor action potential; EMG, electromyography; sEMG, spontaneous EMG; tEMG, triggered EMG; MEP, motor evoked potential; SSEP, somatosensory evoked potential.

of SSEPs contributed to an increase in use of MEPs and multimodal IOM (MIOM).

SSEP signals are measured by stimulating the peripheral nerve in the extremity. Most commonly, the posterior tibial nerve is stimulated at the medial malleolus. The peroneal or sural nerves may also be used.[8] The signal travels from the peripheral nerve to the dorsomedial tract in the spinal cord, through the brainstem, terminating in the somatosensory cortex. Signals are measured centrally in the cortical or subcortical region. Subcortical recordings allow for greater muscle relaxation and are less susceptible to inhalational anesthetics. Typically, a decrease in amplitude of 50% or latency of 10% is considered a threshold for an alert.[9] An additional lead is commonly placed in the popliteal fossa as a control. Loss of a signal in the popliteal fossa suggests a peripheral problem, ruling out a spinal etiology.

SSEPs have several advantages over other IOM modalities. First, SSEPs place fewer restrictions on anesthesia. Although SSEPs can be measured with total IV anesthesia (TIVA), it is not required. The most common anesthetic used with SSEPs is a low-dose inhalational agent with IV narcotics and sedatives.[11] A concentration up to 50% of nitrous oxide can be used with low-dose inhalation agents without signal degradation.[12] Propofol provides deeper hypnosis and improved cortical SSEPs when compared with a combination of low-dose isoflurane and nitrous oxide.[13] SSEPs can be monitored while the patient is paralyzed by muscle relaxants, which may help to reduce signal interference. Because signals are run continuously without patient movement, detection of an alert is not dependent on the proximity to the last time the case was paused and signals were tested, as is the case for other modalities. Although temperature and blood pressure can affect SSEP results, physiologic temperature and mean arterial pressure greater than 60 mm Hg are compatible with normal SSEPs.

The disadvantages of SSEPs are the delay in signal detection, isolated monitoring of the dorsal sensory tract, and overall sensitivity and specificity. Although signals are monitored continuously with SSEPs, the results are summed over time. There can be a delay in the detection of the neurologic insult, which has been estimated at between 5 and 33 minutes.[14,15] There are neurologic insults that may not be detected by SSEPs, such as those caused by occlusion of the anterior spinal artery that result in ischemia in the anterior two thirds of the spinal cord, as discussed earlier. Sometimes the infarct is global enough to be detected by SSEPs. SSEP sensitivity and specificity vary in the literature from 0% to 100% and 27% to 100%, respectively.[16] Many of the reports of sensitivity and specificity relate to postoperative motor deficits because they are most clinically significant. SSEPs will only detect motor deficits when the injury extends into the dorsomedial tract of the spinal cord. Additional modalities should be employed if monitoring of the motor tracts is desired.

In 2004, SSEP monitoring was available to 95% of surgeons in the United States and was the most common modality for the spinal cord monitoring.[17] In Canada in 2010, SSEP monitoring was available to only 65% of respondents.[18] Availability and usage may have evolved in the intervening time. Dawson et al[19] in 1991 reported SSEP results from 2 groups consisting of 60,366 and 33,000 cases, respectively. The rate of neurologic

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injury was 1.6%. This was identified intraoperatively by SSEPs 72% of the time. There were 26 false negatives and 248 false positives reported in the 33,000 case subgroup. Although decreases of 50% in amplitude and 10% change in latency are common thresholds for alerts, the average in this study group was a 44.3% decrease in amplitude and 10.9% change in latency since multiple protocols were combined. Altering thresholds will change specificity and sensitivity.[19] Isolated use of SSEPs in patients with neuromuscular scoliosis has less favorable results. Somatosensory cortical evoked potentials (SCEPs) had lower amplitudes and higher variability in patients with neuromuscular conditions, specifically spastic cerebral palsy, myelomeningocele, Friedreich ataxia, and peripheral neurologic deficits.[20] Reportedly, in 28% of neuromuscular cases, reliable SCEP tracings were not obtainable.[21] Later studies in this population suggested that the use of multiple recording sites for SSEPs significantly improved reliability, as did the addition of MEPs[22] or the use of epidural recording electrodes.[23]

Overall, SSEPs are one of the most commonly used IOM modalities. They allow less restrictive anesthesia protocols, are monitored continuously, and do not interrupt the flow of surgery. However, SSEPs only monitor the dorsomedial spinal tract, so multimodal monitoring is recommended if there is need for motor tract monitoring.

MOTOR EVOKED POTENTIALS

There is an emphasis on the ability to monitor motor tracts because motor deficits have a greater clinical morbidity than do sensory deficits. Initially, MEPs presented a number of challenges including stimulation, recording, and anesthetic restrictions. Advancements have significantly improved the use of MEP monitoring. In 1980, Merton and Morton[24] reported a method using high voltage to stimulate the motor cortex transcranially. Before this discovery, it was difficult to stimulate the motor cortex selectively without a craniotomy. The discovery enabled clinical use of transcranial MEPs (tcMEPs). Still, this single high-voltage spike was difficult to detect peripherally as a compound motor action potential (CMAP) because it degraded in the presence of inhalational anesthetics and neuromuscular blockade. Detection was limited to monitoring of the D-wave, the initial transmitted spike, over the spinal cord using an epidural electrode. These restrictions reduced enthusiasm for early MEPs. The development of total IV anesthesia and the practice of delivering a short train of 5 to 7 electrical pulses transcranially made CMAP measurement possible, dramatically increasing use of MEP monitoring.

A variation of MEPs called neurogenic MEP (NMEP) monitoring initially seemed promising. NMEPs produce reliable signals with complete neuromuscular blockade so that monitoring can proceed without patient movement.[25] NMEPs require direct stimulation of the spinal cord, so there was debate over whether sensory, motor, or both tracts were monitored. Although initial studies[25,26] suggested that the motor tracts were monitored with NMEP, later reports of postoperative motor deficits in the setting of unchanged NMEP signals raised further uncertainty.[27] Although NMEP monitoring places fewer restrictions on anesthesia, tcMEPs are now generally preferred to ensure direct monitoring of the motor tracts.[28]

As opposed to SSEPs, MEPS are stimulated proximally and recorded distally. There are 2 methods for transcranial motor cortex stimulation: magnetic or electrical. Magnetic stimulation is performed with a coil positioned over the motor cortex. Electrical stimulation using a subdermal corkscrew electrode is commonly used today. The signal can be detected using an electrode over the spinal cord (D-wave) or peripherally as CMAP, similar to EMG readings. Although D-waves can be detected during muscle paralysis and place fewer restrictions on anesthesia, measurement of CMAPs require TIVA and the absence of chemical muscle paralysis. Usually an upper extremity control is recorded in the abductor pollicis brevis, whereas the lower extremity signal can be recorded in the adductor hallucis brevis or tibialis anterior.[29]

The biggest advantage of MEPs is the ability to monitor the motor tracts directly. Typically, they detect intraoperative neurologic compromise faster than SSEPs, giving the surgical team a better chance at reversing the injury. Compared with SSEPs, they consistently perform at higher sensitivities and specificities, both ranging from 81% to 100%.[16]

Although MEPs are powerful, there are a number of drawbacks. First, there are significant restrictions on anesthesia. Most recommend TIVA when MEPs are performed because inhalational agents degrade signals. This may require special training for the anesthesia team. Short-acting inhalational agents and paralytics can be used during induction, but must clear quickly because baseline MEPs are typically acquired just before or shortly after positioning. MEPs are not run continuously like SSEPs. When CMAPs are measured, MEPs cause the patient to move on the operative table. Therefore the test is performed only at discrete time intervals, typically on request of the surgical team. This may result in decreased frequency of monitoring, and changes in MEPs can only be detected as frequently as the test is performed. Finally, MEPs are contraindicated in patients with seizure disorders, pace-dependent cardiac conditions, brain lesions, or cranial defects.[28]

Langeloo et al[30] reported a series of 142 patients monitored with tcMEP to compare the use of monitoring 2 versus 6 muscle groups. Using a decrease in amplitude of 80% in 1 of the 6 leads as the criterion for an alert resulted in a sensitivity of 100%, specificity of 91%, positive predictive value (PPV) of 61%, and negative predictive value (NPV) of 100% in detecting a postoperative neurologic deficit. Using the same criterion when only 2 recording sites were used yielded a sensitivity of 88%, specificity of 95%, PPV of 70%, and NPV of 98%. The recommendation was made for 6-lead monitoring for tcMEP.[30]

A number of studies have compared the performance of MEPs and SSEPs in detecting neurologic deficits. Hilibrand et al compared SSEPs with MEPs in 427 patients treated with cervical spine surgery. Twelve motor alerts occurred, 10 of which completely reversed after intraoperative adjustments. Of the 2 patients with postoperative motor deficits, 1 triggered a SSEP alert 33 minutes after the MEP alert, but in the other patient SSEPs never met the criteria for an alert. Reportedly, tcMEP

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sensitivity and specificity were 100%, whereas SSEP monitoring was 25% sensitive and 100% specific for postoperative motor deficits.[15]

Kim et al[31] evaluated the factors that contributed to high false-positive rates in tcMEP in cervical myelopathy. Although MEPs detected only the new postoperative deficit in the series of 52 consecutive patients, there were 5 additional false-positive tcMEP alerts. Sensitivity and specificity of tcMEP were both 100% but the PPV was only 17%. Obesity and prolonged operative time correlated with an increased risk of false-positive alerts. False positives are not innocuous. They delay the case and may unnecessarily alter the operative plan. This study highlights the importance of distinguishing true versus false tcMEP alerts intraoperatively.[31]

Schwartz et al[14] reported 1121 patients with adolescent idiopathic scoliosis treated with surgery monitored with both SSEPs and MEPs. Using 65% amplitude loss in MEP and 50% amplitude loss of SEP, 38 patients (3.4%) met the criteria for an alert. Of the 38 alerts, 17 were MEPs alone, whereas the remaining 21 met both the MEP and SEP criteria. The sensitivity was 100% for MEPs and 43% for SSEPs in detecting motor deficits. Although technically true, SSEPs monitor the sensory tracts in the posterior column, though some use them as a surrogate for overall spinal cord health and motor deficits. Clamping segmental vessels resulted in 3 of the MEP alerts without SEP alerts. Although this matches perfusion patterns of the spinal cord, it illustrates the need for MEPs in monitoring anterior cord perfusion. As in this study, a 65% decrease in MEP amplitude is a commonly used cutoff criterion for triggering an alert as sensitivity remains at 100%.[14]

IOM using tcMEP can be challenging in patients with neuromuscular scoliosis. Eighty-six percent of patients with neuromuscular scoliosis unrelated to cerebral palsy (CP) had recordable MEPs. Only 63% of patients with mild to moderate CP had recordable MEPs compared with 39% of those with severe CP. Seizure disorders, common in patients with severe CP, are a contraindication to tcMEP monitoring. In the study by DiCindio et al,[32] the only postoperative neurologic deficit was identified by tcMEPs 5 minutes before SSEP, suggesting tcMEPs and SSEPs can be used reliably in neuromuscular scoliosis.

MEPs are the preferred method for monitoring the motor tracts of the spinal cord. Impending motor deficits are typically identified faster and with greater accuracy with MEPs than with SSEPs. Use of tcMEP places additional restrictions on anesthesia by requiring TIVA. In addition to deformity correction and intradural spinal tumors, the data suggest that MEPs are reliable in myelopathy and neuromuscular scoliosis.

ELECTROMYOGRAPHY

With the popularization of segmental pedicle screw fixation, especially percutaneous placement, EMG monitoring is the primary method for monitoring selective nerve roots intraoperatively. There are 2 types of EMG monitoring: spontaneous (sEMG) and triggered (tEMG). In sEMG, muscles innervated by the desired nerve roots are monitored continuously for EMG activity. This can be used to help to localize nerve roots in complex cases and prevent excessive manipulation of the root.[33,34] In tEMG, a direct stimulus is applied to structures, commonly pedicle screws, to determine if there is a breach in the pedicle resulting in contact with a nerve root. Although applicable to many cases with segmental instrumentation, it is particularly useful in minimally invasive surgery and percutaneous pedicle screw placement. It can also localize the lumbar plexus in minimally invasive transpsoas approaches to the lumbar spine.

In sEMG, electrical discharges are detected almost immediately with nerve root compression, stretch, or impingement; this gives surgeons immediate feedback on impending problems. In one study,[35] sEMG activation was detected in 77.5% of 213 patients, although only 6.6% of patients had a postoperative deficit. Although sEMG had a sensitivity of 100%, the specificity was only 23.7%. This gives the surgeon a real-time warning of nerve root manipulation but is a poor predictor of actual postoperative neurologic deficits. Beaty et al[33] used sEMG signals as an indicator of adequate nerve root decompression. Approximately 22% of compressed nerve roots had spontaneous electrical discharges before surgery that typically resolved with adequate decompression, although resolution could take 24 hours. This slow resolution and high false-negative rates limited clinical applicability.

tEMG assesses the accuracy of pedicle screw placement by stimulating the screw and recording through the muscles innervated by the nerve roots at risk. A study[36] of 4857 pedicle screws monitored with tEMG reported thresholds of stimulation that were predictive of medial wall breeches. At 8 mA, tEMG had a specificity of 94% and a sensitivity of 86% in identifying a medial wall pedicle breech. As expected, specificity increased and sensitivity decreased when the threshold was lowered to 2.8 mA. tEMG has also been used to stimulate compressed nerves to determine when adequate decompression has been achieved with promising results.[37] tEMG can be performed with up to 80% neuromuscular blockade with results similar to thresholds without blockade.[38] Chronically compressed nerves may have higher than normal stimulation thresholds; this can be determined by direct stimulation of the nerve root as a reference.

Intraoperative sEMG and tEMG are particularly valuable in minimally invasive spine surgery. With smaller incisions and limited exposure, there is a higher dependence on fluoroscopy, bone landmarks, and neuromonitoring. Although fluoroscopy is still required, confirming pedicle screw placement with tEMG may reduce overall radiation exposure for the surgeon and patient. Uribe et al. estimate, "the addition of EMG to the lateral approach [to the spine] has contributed to decrease the complication rate from 30% to less than 1%." Specifically, the use of tEMG in percutaneous pedicle screw placement and minimally invasive transpsoas approach to the lumbar spine has reduced rates of postoperative new neurologic deficits and improved localization of neurologic structures.[34]

Bindal and Ghosh[39] reported the use of tEMG and sEMG in minimally invasive transforaminal lumbar interbody fusion. The trajectory of the pedicle access needle was altered in 76.2% of the cases based on intraoperative tEMG. There were only 4 pedicle breaches as assessed by a postoperative CT scans and radiographs. All breaches were through the lateral

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wall of the pedicle and considered not to be clinically significant, suggesting this technique has the potential to prevent medial wall pedicle breaches.[39]

Advantages of sEMG and tEMG include real-time feedback on nerve root traction or compression injury, intraoperative identification of malposition pedicles screws, and facilitation of minimally invasive surgery. The main disadvantages are the need for incomplete neuromuscular block and relatively low sensitivity for sEMG. It can be coupled with other modalities for MIOM and is a significant asset in preventing intraoperative injury to nerve roots.

MULTIMODAL IOM

MIOM combines modalities to improve overall sensitivity and specificity by monitoring more tracts in the spinal cord and/or nerve roots. MIOM does not represent a preset combination of IOM but generally includes ascending and descending spinal tracts and nerve root monitoring as indicated on the basis of the surgical plan. A prospective study[40] of 1017 patients undergoing spinal surgery with MIOM, including SSEP, MEP, and EMG resulted in a sensitivity of 89% and specificity of 99%. The false-positive rate in this study was 0.8%. A similar prospective study[41] of 217 patients undergoing a similar form of MIOM reported a sensitivity of 92.3% and specificity of 98.5%. The authors concluded that MIOM was an effective form of spinal cord and nerve root monitoring that obviated the need for the wake-up test at their institution.[41] Although there are no official indications for MIOM in spinal surgery, 1 proposal includes all patients with scoliosis greater than 45 degrees, congenital spinal anomalies, intramedullary and extramedullary tumors, and decompression in cervical, thoracic, or lumbar stenosis causing myelopathies or disturbance of the cauda equina.[42]

A recent review[16] of IOM compared unimodal with multimodal monitoring. The authors concluded that MIOM was indicated in spine surgery when the spinal cord or nerve roots are at risk due to its increased sensitivity and specificity. In unimodal SSEP monitoring, sensitivity ranged from 0% to 100% and specificity from 27% to 100% in 15 studies in the English literature. Unimodal MEP ranged from 81% to 100% sensitivity and specificity.[16] When MIOM is employed, both sensitivity and specificity increase. The disadvantages of MIOM are increased setup time and cost and need for TIVA if MEPs are needed.

INTRAOPERATIVE ALERTS

It is important to determine if an intraoperative alert is a false positive attributable to technical problems or a true alert that represents an impending neurologic injury. In the latter scenario, the surgeon may have the opportunity to prevent neurologic injury.

When an intraoperative alert is triggered, attention is turned to identify possible causes. Using positive controls such as upper extremities leads in thoracolumbar cases or peripheral popliteal leads can help to identify technical versus spinal etiologies. Communication with the anesthesia team is made to determine whether there have been any changes in the anesthetic plan or drug administration, particularly neuromuscular blockade and inhalational anesthetics. It is also important to ensure the patient is euthermic and to consider increasing the mean arterial pressure if perfusion is in question. The neurophysiology team should perform an assessment of the leads and technical equipment. The wound should be inspected for a potential explanation. If changes in signals correlated with instrumentation, deformity correction, or other reversible surgical procedures, undoing the last few steps to restore signals is to be considered. If no cause is identified, options include performing a Stagnara wake-up test to help to determine if the signal change is a false- or true-positive finding. If this is not possible, advanced imaging or intensive care unit observation may be indicated at case completion.[28]

CONCLUSIONS

A number of different IOM modalities are available. Each is designed to monitor a different pathway of the spinal cord or nerve roots. Although each modality has a unique profile of advantages and disadvantages, they serve different functions. SSEPs are designed to monitor the dorsomedial aspect of the spinal cord where proprioceptive signals are transmitted. MEPs monitor the anterior motor tracts, and EMG monitors the nerve roots. Combining modalities will allow the surgeon to create an MIOM plan that will maximize sensitivity and specificity for the detection of a neurologic deficit. Intraoperative alerts should be evaluated in a stepwise fashion to rule out technical, temperature, anesthetic, and surgical etiologies. If motor function remains in question, a Stagnara wake-up test can be used to assess motor function.

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ROA_2060

CME Quiz

To earn CME credit, you must read the CME article and complete the quiz and evaluation assessment survey on the enclosed form, answering at least 70% of the quiz questions correctly. **Select the best answer and use a blue or black pen to completely fill in the corresponding box on the enclosed answer form.** Please indicate any name and address changes directly on the answer form. If your name and address do not appear on the answer form, please print that information in the blank space at the top left of the page. Make a photocopy of the completed answer form for your own files and mail the original answer form to Lippincott Williams & Wilkins, Continuing Education Department, P.O. Box 1543, Hagerstown, MD 21741-9914 by **July 31, 2013.** Only two entries will be considered for credit. For more information, call (800) 638-3030.

Online quiz instructions: To take the quiz online, **log on to your account at http://www.cssnewsletter.com**, and click on the "CME" tab at the top of the page. Then click on "Access the CME activity for this newsletter," which will take you to the log-in page for **CME.lwwnewsletters.com.** Enter your ***username and password for this screen as follows***: your ***CME username*** will be the letters LWW (case sensitive) followed by the 12-digit account number above your name on the paper answer form mailed with your issue. Your ***CME password*** will be **1234**; this password ***may not*** be changed. Follow the instructions on the site. You may print your official certificate ***immediately***. Please note: Lippincott CME Institute, Inc., ***will not*** mail certificates to online participants. **Online quizzes expire at 11:59 PM Pacific Standard Time on the due date.**

The American Association of Neurological Surgeons (AANS) manually tracks *AMA PRA Category 1 Credits*™ earned from neurosurgery activities not sponsored or joint-sponsored by the AANS. As a service to AANS members, Lippincott CME Institute will continue to provide the AANS a monthly listing of their participants and the CME credits they earned so that AANS members do not have to send their individual certificates to the AANS for tracking.

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1. SSEPs monitor which one of the following tracts in the spinal cord?
- A. Anterolateral
- B. Dorsomedial
- C. Lateral corticospinal
- D. Spinothalamic
- E. Vestibulospinal

2. tEMG can be performed with up to which one of the following percentages of neuromuscular blockade, with reliable results?
- A. 0
- B. 20
- C. 40
- D. 80
- E. 100

3. tEMG is performed intraoperatively on a 64-year-old woman with L4–L5 spondylolisthesis. Stimulation of the right-sided L5 pedicle screw is positive at 9 mA. Preoperatively, the patient has decreased sensation in the L5 nerve distribution on the right, with 3/5 strength in the right extensor hallucis longus. Which one of the following statements is *true*?
- A. Breach of the pedicle wall is unlikely because it does not stimulate at less than 8 mA.
- B. Given that the right L5 nerve root showed signs of preoperative compression, it may be resistant to stimulation; this may indicate a pedicle wall breach adjacent to a chronically compressed nerve root.
- C. This finding is not significant and is not possible to interpret, because tEMG on nerve roots that have preoperative weakness is not reliable.

4. During a T10 corpectomy, just after controlling the bleeding from the lateral body, MEP signals are lost; however, SSEP signals are unchanged. All of the following could explain this *except*
- A. excessive neuromuscular blockade is suppressing motor potentials
- B. compromise of flow in the anterior spinal artery may be causing anterior spinal cord ischemia
- C. loss of a motor cortical lead
- D. increased inhalation anesthetic
- E. TIVA

5. Which one of the following statements describes the limiting factor of the clonus test, performed by applying a rapid dorsiflexion force to the ankle?
- A. The patient must have neuromuscular scoliosis.
- B. The patient must have sustained clonus preoperatively.
- C. It must be timed precisely with the emergence from anesthesia.
- D. It can be performed only in patients with cervical myelopathy.

6. The method of monitoring with the highest overall sensitivity and specificity is
- A. SSEP
- B. MEP
- C. EMG
- D. MIOM

7. D-waves are recorded over the
- A. somatosensory cortex
- B. spinal cord
- C. muscle innervated by a specific nerve root
- D. pedicle screw

8. MEPs are recorded
- A. continuously
- B. only on request
- C. every 5 minutes
- D. only at the conclusion of the case

9. All of the following may result in loss of intraoperative signals *except*
- A. technical malfunction with wiring/leads
- B. excessive neuromuscular blockade
- C. hypothermia
- D. tachycardia
- E. hypotension

10. Contraindications to MEP monitoring include all of the following *except*
- A. low pain tolerance
- B. seizure disorder
- C. cardiac defibrillator/pacemaker
- D. brain tumor
- E. cranial defects

ROA_2061

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Encounter Date: 06/20/2016

Patient

Name	DELBRIDGE GOODWIN, CRYSTAL (38yo, F) ID# 2176596	**Appt. Date/Time**	06/20/2016 10:30AM
DOB	03/02/1978	**Service Dept.**	MOPA_PNE
Provider	THOMAS J. HOLBROOK, JR., MD		

Chief Complaint

None recorded.

HPI

Ms Goodwin is a 38 year old female who had thoracic laminectomy for spinal stenosis in 2009 and then a revision laminectomy in 2011. She has done well for the last 5 years but has recently noted declining strength in her legs , especially when climbing stairs. She has had chronic numbness in both legs since her prior surgeries and this has not changed. No changes have occured in bowel or bladder control. No gait changes otherwise. She is not describing any sensory chnage in her thoracic region.

Vitals

06/20/2016 10:29 am

Ht: 5 ft 1 in **Wt:** 260 lbs **BMI:** 49.1

BP: 152/112 sitting

Medications

Reviewed Medications

benzonatate 200 mg capsule	03/18/16 filled
ergocalciferol (vitamin D2) 50,000 unit capsule	02/10/16 filled
hydrochlorothiazide 25 mg tablet	03/01/16 filled
hydrochlorothiazide 50 mg tablet	11/04/15 filled
hydrocodone-homatropine 5 mg-1.5 mg/5 mL syrup	03/18/16 filled
lisinopril 10 mg tablet	03/01/16 filled
meloxicam 15 mg tablet	06/03/16 filled
metformin 1,000 mg tablet	06/12/16 filled
sulfamethoxazole 800 mg-trimethoprim 160 mg tablet	03/18/16 filled

Allergies

Reviewed Allergies

NKDA

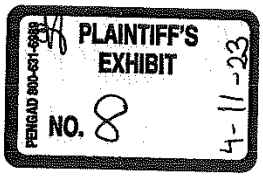
Problems

Reviewed Problems

- Spinal stenosis of thoracic region
- Spinal stenosis of lumbar region

Past Medical History

Reviewed Past Medical History
Arthritis: Y
High Blood Pressure: Y
Urinary Tract Infection: Y



Family History

Reviewed Family History

Mother	- Arthritis
	- Hypertensive disorder
Father	- Arthritis
	- Hypertensive disorder

Surgical History

Reviewed Surgical History

Social History

Reviewed Social History
Neuro - New Patient
Smoking Status: Never smoker
Back, leg, neck, arm - Motrin, Aleve, muscle relaxants or pain meds: Y
Severity of pain: 9
Pain - Aching: Y
Pain - Burning: Y
Pain - Dull: Y
Pain - Numbness: Y
Pain - Sharp: Y
Pain - Stiffness: Y
Pain - Swelling: Y
Pain - Throbbing: Y
Pain - Tingling: Y
Pain interferes - Bathing: Y
Pain interferes - Dressing: Y
Pain interferes - Food preperation: Y
Pain interferes - Grooming: Y
Pain interferes - Housework: Y
Pain frequency: constant
Painful activities - Bending: Y
Painful activities - Sitting: Y
Painful activities - Standing: Y
Painful activities - Walking: Y
Sleep position: side
Claustrophobic: Y
Metal in body: N
Alcohol intake: None
Number of children: 3
Marital status: Married
Work History: Homemaker
Are you currently employed?: N

Patient's Pharmacies

WAL-MART PHARMACY 1286 (ERX): 7520 GARNERS FERRY RD # A, COLUMBIA SC 29209, Ph (803) 783-1664, Fax (803) 783-1589

ROS

Patient reports **exercise intolerance** but reports no fever, no night sweats, no significant weight gain, and no significant weight loss. She reports **muscle aches, muscle weakness, arthralgias/joint pain, back pain, and swelling in the extremities** She reports **numbness and restless legs** but reports no loss of consciousness, no weakness, no seizures, no dizziness, and no headaches. She reports no dry eyes, no irritation, and no vision change. She reports no difficulty hearing and no ear pain. She reports no frequent nosebleeds and no nose/sinus problems. She reports no sore throat, no bleeding gums, no snoring, no dry mouth, no mouth ulcers, no oral abnormalities, and no teeth problems. She reports no chest pain, no arm pain on exertion, no shortness of breath when walking, no shortness of breath when lying down, no palpitations, and no known heart murmur. She reports no cough, no wheezing, no shortness of breath, no coughing up blood, and no sleep apnea. She reports no abdominal pain, no vomiting, normal appetite, no diarrhea, not vomiting blood, no dyspepsia, and no GERD. She reports no incontinence, no difficulty urinating, no hematuria, and no increased frequency. She reports no abnormal mole, no jaundice, and no rashes. She reports no depression, no sleep disturbances, feeling safe in relationship, and no alcohol abuse. She reports no fatigue. She reports no swollen glands and no bruising. She reports no runny nose, no sinus pressure, no itching, no hives, and no frequent sneezing.

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Physical Exam

Patient is a 38-year-old female.

This is a healthy appearing adult female in no apparent distress.
HEENT: Normocephalic/atraumatic. Pupils equal round and reactive to light.
NECK: No lymphadenopathy or JVD is noted.
CHEST: Lungs are clear to auscultation. No rales, rhonchi, or rub.
HEART: Regular, with S1 and S2 sounds.
ABDOMEN: Soft, nontender.
EXTREMITIES: No clubbing, cyanosis or edema noted.
SPINE: The thoracic spine has a well healed midline incision. The region is not tender. No paraspinal mass or spasm is observed.
NEURO: Alert and oriented x3. Cranial nerves II through XII are grossly intact. Motor power testing shows 5/5 strength in bilateral lower extremities to manual testing. There is slightly diminished sensation to light touch and pin prick below the waist. DTRs are 2+ at the knees and ankles. No clonus or Babinski. Straight leg raise and femoral stretch are negative bilaterally. The patient has a smooth tandem gait. She is able to climb up one step to get on to the exam table.

Assessment / Plan

This lady has previously had 2 surgeries on her thoracic spine at the T8-9 level for decompression for stenosis. She states that over the last month after a fall she has noted some increasing weakness in the lower extremities particularly in the left leg. She has some residual numbness in the lower extremities from her previous compression but says that the left side has increased in numbness since the fall. On exam she does have some decrease in sensation to pinprick below the knee bilaterally. On motor testing she has good power in the right leg and about 4 out of 5 power in the left leg she is not able to step up onto a low stool with the left leg due to weakness. She also continues to complain of chronic low back pain. At this time we plan to evaluate her further with MRI scanning of the thoracic and lumbar spine with further recommendations to follow.

Return to Office

None recorded.

Encounter Sign-Off

Encounter signed-off by Thomas J. Holbrook, Jr., MD, 06/22/2016.

Encounter performed and documented by Thomas J. Holbrook, Jr., MD
Encounter reviewed & signed by Thomas J. Holbrook, Jr., MD on 06/22/2016 at 8:03am

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Encounter Date: 07/18/2016

Patient

Name	DELBRIDGE GOODWIN, CRYSTAL (38yo, F) ID# 2176596	**Appt. Date/Time**	07/18/2016 08:45AM
DOB	03/02/1978	**Service Dept.**	MOPA_PNE
Provider	THOMAS J. HOLBROOK, JR., MD		

Chief Complaint

Followup: Spinal stenosis of lumbar region

HPI

This lady returns for follow-up of thoracic stenosis. She states essentially she was last seen that her symptoms have improved. She has no back pain she still has some intermittent discomfort around the left knee particularly with standing for more than about 30 minutes or so at a time. She feels that her strength is normal. MRI scanning of her thoracic and lumbar spine have the main finding of marked stenosis at the T10-11 and T11-T12 areas with some recurrent stenosis at the T9-10 level with an osteophyte noted on the left.

Vitals

07/18/2016 08:28 am

BP: 129/81 sitting

Medications

Reviewed Medications

benzonatate 200 mg capsule	03/18/16	filled
ergocalciferol (vitamin D2) 50,000 unit capsule	02/10/16	filled
hydrochlorothiazide 25 mg tablet	03/01/16	filled
hydrochlorothiazide 50 mg tablet	06/21/16	filled
hydrocodone-homatropine 5 mg-1.5 mg/5 mL syrup	03/18/16	filled
lisinopril 10 mg tablet	03/01/16	filled
meloxicam 15 mg tablet	06/03/16	filled
metformin 1,000 mg tablet	06/12/16	filled
sulfamethoxazole 800 mg-trimethoprim 160 mg tablet	03/18/16	filled

Allergies

Reviewed Allergies

NKDA

Problems

Reviewed Problems

- Spinal stenosis of thoracic region
- Spinal stenosis of lumbar region

Past Medical History

Reviewed Past Medical History
Arthritis: Y
High Blood Pressure: Y
Urinary Tract Infection: Y



DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Family History

Reviewed Family History

Mother	- Arthritis
	- Hypertensive disorder
Father	- Arthritis
	- Hypertensive disorder

Surgical History

Reviewed Surgical History

Social History

Reviewed Social History
Neuro - New Patient
Smoking Status: Never smoker
Back, leg, neck, arm - Motrin, Aleve, muscle relaxants or pain meds: Y
Severity of pain: 9
Pain - Aching: Y
Pain - Burning: Y
Pain - Dull: Y
Pain - Numbness: Y
Pain - Sharp: Y
Pain - Stiffness: Y
Pain - Swelling: Y
Pain - Throbbing: Y
Pain - Tingling: Y
Pain interferes - Bathing: Y
Pain interferes - Dressing: Y
Pain interferes - Food preperation: Y
Pain interferes - Grooming: Y
Pain interferes - Housework: Y
Pain frequency: constant
Painful activities - Bending: Y
Painful activities - Sitting: Y
Painful activities - Standing: Y
Painful activities - Walking: Y
Sleep position: side
Claustrophobic: Y
Metal in body: N
Alcohol intake: None
Number of children: 3
Marital status: Married
Work History: Homemaker
Are you currently employed?: N

Patient's Pharmacies

WAL-MART PHARMACY 1286 (ERX): 7520 GARNERS FERRY RD # A, COLUMBIA SC 29209, Ph (803) 783-1664, Fax (803) 783-1589

ROS

Patient reports no fever, no night sweats, no significant weight gain, no significant weight loss, and no exercise intolerance. She reports no dry eyes, no irritation, and no vision change. She reports no difficulty hearing and no ear pain. She reports no frequent nosebleeds and no nose/sinus problems. She reports no sore throat, no bleeding gums, no snoring, no dry mouth, no mouth ulcers, no oral abnormalities, and no teeth problems. She reports no chest pain, no arm pain on exertion, no shortness of breath when walking, no shortness of breath when lying down, no palpitations, and no known heart murmur. She reports no cough, no wheezing, no shortness of breath, no coughing up blood, and no sleep apnea. She reports no abdominal pain, no vomiting, normal appetite, no diarrhea, not vomiting blood, no dyspepsia, and no GERD. She reports no incontinence, no difficulty urinating, no hematuria, and no increased frequency. She reports no muscle aches, no muscle weakness, no arthralgias/joint pain, no back pain, and no swelling in the extremities. She reports no abnormal mole, no jaundice, and no rashes. She reports no loss of consciousness, no weakness, no numbness, no seizures, no dizziness, and no headaches. She reports no depression, no sleep disturbances, feeling safe in relationship, and no alcohol abuse. She reports no fatigue. She reports no swollen glands and no bruising. She reports no runny nose, no sinus pressure, no itching, no hives, and no frequent sneezing.

Physical Exam

Patient is a 38-year-old female.

On examination there is no point tenderness to palpation over the thoracolumbar spinous processes. She ambulates satisfactorily. There is no gross focal motor deficit in the lower extremities. She is able to step up onto a low stool with either legs satisfactorily. Sensation is intact to pinprick in the lower extremities.

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Assessment / Plan

This lady has some marked progressive thoracic spinal stenosis from T9-T12 at the disc levels. There is encroachment on the spinal cord. As the stenosis is marked and progressive I have recommended surgery I have discussed with her the surgical procedure for a decompression from T9-T12. I also discussed with her the indications and risks for surgery as well believe that she understands and would like to go ahead and schedule this to be done.

1. **Spinal stenosis of lumbar region**
   M48.06: Spinal stenosis, lumbar region
   - SPINAL STENOSIS: CARE INSTRUCTIONS

Return to Office

- Thomas J. Holbrook, Jr., MD for Operating at MOPA_BMC Surgery on 07/28/2016 at 07:30 AM
- Thomas J. Holbrook, Jr., MD for NS-SR at MOPA_PNE on 08/08/2016 at 09:45 AM
- Thomas J. Holbrook, Jr., MD for NS-OV at MOPA_PNE on 08/29/2016 at 01:00 PM

Encounter Sign-Off

Encounter signed-off by Thomas J. Holbrook, Jr., MD, 07/18/2016.

Encounter performed and documented by Thomas J. Holbrook, Jr., MD
Encounter reviewed & signed by Thomas J. Holbrook, Jr., MD on 07/18/2016 at 2:39pm

DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Encounter Date: 08/29/2016

Patient

Name	DELBRIDGE GOODWIN, CRYSTAL (38yo, F) ID# 2176596	**Appt. Date/Time**	08/29/2016 01:00PM
DOB	03/02/1978	**Service Dept.**	MOPA_PNE
Provider	THOMAS J. HOLBROOK, JR., MD		

Chief Complaint

Followup: Spinal stenosis of lumbar region

HPI

FAU7388

Reported by patient.

Are you working? not at all
How are you feeling? same
Previous PT: helped a little
Previous injections: none
Medications: helping a little
Change in symptoms: no
Do you need a work excuse? no
Do you need a prescription renewal? yes

HPI

This lady returns to the office for follow-up after having undergone repeat decompressive thoracic laminectomy for spinal stenosis. She had an ischemic event to her spinal cord during the surgery with marked motor and sensory deficit in the lower extremities. She was subsequently transferred to HealthSouth for further rehabilitation and is now at home where she will be starting home physical therapy.she is doing intermittent catheterizations for her bladder but says at times she can go well on her own without catheterization and can go up to 1 day at a time without catheterization. She states she is able to move her bowels normally. She remains on Lovenox from health South for DVT prophylaxis. She has been using Percocet and Vallum for muscle pain in the low back and also spasms in the lower extremities.

Vitals

08/29/2016 01:34 pm

Ht: 5 ft 1 in | Wt: 258 lbs | BMI: 48.7

Pain Scale: 2
10

Medications

Reviewed Medications

traMADol 50 mg tablet — 08/29/16 prescribed
Take 1 tablet(s) every 6 hours by oral route.

Vallum 5 mg tablet — 08/29/16 prescribed
Take 1 tablet(s) every 6 hours by oral route as needed for muscle spasms.

Allergies

Reviewed Allergies
NKDA

Problems

Reviewed Problems
- Spinal stenosis of thoracic region
- Spinal stenosis of lumbar region

Past Medical History

Reviewed Past Medical History
Arthritis: Y
High Blood Pressure: Y
Urinary Tract Infection: Y

PLAINTIFF'S EXHIBIT NO. 10 9-1-23

PENGAD 800-631-6989

DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Family History

Reviewed Family History

Mother	- Arthritis
	- Hypertensive disorder
Father	- Arthritis
	- Hypertensive disorder

Surgical History

Reviewed Surgical History
- Laminectomy, thoracic - 07/28/2016

Social History

Reviewed Social History
Neuro - New Patient
Smoking Status: Never smoker
Back, leg, neck, arm - Motrin, Aleve, muscle relaxants or pain meds: Y
Severity of pain: 10
Pain - Aching: Y
Pain - Burning: Y
Pain - Dull: Y
Pain - Numbness: Y
Pain - Sharp: Y
Pain - Shooting: Y
Pain - Stiffness: Y
Pain - Swelling: Y
Pain - Throbbing: Y
Pain - Tingling: Y
Pain Interferes - Bathing: Y
Pain Interferes - Dressing: Y
Pain Interferes - Food preparation: Y
Pain Interferes - Grooming: Y
Pain Interferes - Housework: Y
Pain Interferes - Sleep: Y
Pain Interferes - Toilet hygiene: Y
Pain frequency: constant
Painful activities - Lying down: Y
Painful activities - Sitting: Y
Sleep position: side
Claustrophobic: Y
Metal in body: N
Alcohol intake: None
Number of children: 3
Marital status: Married
Work History: Homemaker
Are you currently employed?: N

Patient's Pharmacies

WAL-MART PHARMACY 1266 (ERX): 7520 GARNERS FERRY RD # A, COLUMBIA SC 29209, Ph (803) 783-1664, Fax (803) 783-1589

ROS

Patient reports dry mouth but reports no sore throat, no bleeding gums, no snoring, no mouth ulcers, no oral abnormalities, and no teeth problems. She reports palpitations but reports no chest pain, no arm pain on exertion, no shortness of breath when walking, no shortness of breath when lying down, and no known heart murmur. She reports difficulty urinating but reports no incontinence, no hematuria, and no increased frequency. She reports muscle aches, muscle weakness, arthralgias/joint pain, back pain, and swelling in the extremities. She reports dry skin but reports no abnormal mole, no jaundice, and no rashes. She reports weakness, numbness, and frequent or severe headaches but reports no loss of consciousness, no seizures, and no dizziness. She reports depression and sleep disturbances but reports no alcohol abuse. She reports no fever, no night sweats, no significant weight gain, no significant weight loss, and no exercise intolerance. She reports no dry eyes, no irritation, and no vision change. She reports no difficulty hearing and no ear pain. She reports no frequent nosebleeds and no nose/sinus problems. She reports no cough, no wheezing, no shortness of breath, no coughing up blood, and no sleep apnea. She reports no abdominal pain, no vomiting, normal appetite, no diarrhea, not vomiting blood, no dyspepsia, and no GERD. She reports no fatigue. She reports no swollen glands and no bruising. She reports no runny nose, no sinus pressure, no itching, no hives, and no frequent sneezing.

Physical Exam

Patient is a 38-year-old female.

On examination she comes into the office in a wheelchair. Her back wound is well-healed. She has some tenderness over the thoracolumbar paraspinous muscles more so on the left than the right. He also complains of some intermittent spasms in the lower extremities. Deep tendon reflexes are 3+ at the knees there is bilateral clonus at the ankles. On motor testing she has about 1 out of

DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201 3520

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

5 function in the right so as to to 3 out of 5 strength in the right quadriceps 2 out of 5 plantar flexion on the right no dorsiflexion of the ankle on the right there is no voluntary so as function on the left. Quadriceps are 2-3 out of 5 on the left. She has no dorsi or plantar flexion of the left ankle. He is able to localize light touch and pinprick over the left leg although pinprick is not perceived as sharp. She is able to localize sensation in the entire right leg and is able to discern sharp from light touch below the knee but not above the knee

Assessment / Plan

At this time she will go ahead and start her home physical therapy. I've given her prescription for Ultram to use for pain and renewed her prescription for Valium and discussed proper use of the medicines with her. She is also been taking Cymbalta for pain and also what depression. She will call the office for follow-up after she has completed her course of home physical therapy.

1. Spinal stenosis of lumber region
M48.06: Spinal stenosis, lumbar region
- SPINAL STENOSIS: CARE INSTRUCTIONS

Return to Office
None recorded.

Encounter Sign-Off
Encounter signed-off by Thomas J. Holbrook, Jr., MD, 08/29/2016

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520
DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

DELBRIDGE GOODWIN, CRYSTAL 03/02/78 #2176596

*5001792w7388 Admin

When did your pain first start? _____

When did it worsen? (date and event, if applicable) 7-28-2016

Rate the severity of your pain on a scale from 1 to 10, with 1 being the least painful and 10 being the most severe:
1 2 3 4 5 6 7 8 9 (10)

Type of pain (circle all that apply):

(Aching) Cramps (Numbness) (Shooting) (Swelling) (Tingling)
(Burning) Dull (Sharp) (Stiffness) (Throbbing)

Does the pain interfere with any of the following activities of daily living? (Circle all that apply)

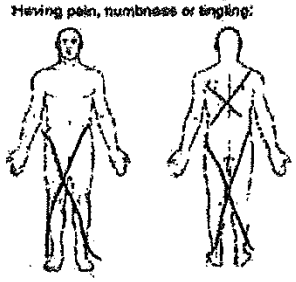
(Bathing) Feeding (Grooming) (Sleep) Work
(Dressing) (Food preparation) (Housework) (Toilet hygiene)

How often are you having pain? ✓ Constant _____ It comes and goes

Activities or movements that are painful to perform: (circle all that apply)

Bending (Lying down) (Sitting) Standing Walking

Mark "X" on the picture where you are Having pain, numbness or tingling:



Have you received/are receiving any formal Physical Therapy for this condition? (date & for how long)
8-8-2016 - 8-22-Aprile

Do you perform home exercises/stretches for this condition? yes

Have you received an Epidural Steroid Injection for this condition? n/a
When? _____
What percentage relief did the injection provide? _____

For how long? _____ (hours, days, weeks, months)

When did the pain return? (date) _____

Have you tried any of the following for pain relief?	YES	NO	Did this provide relief?	Name of Medication
Heat		✓		
Ice		✓		
Over the Counter Medications				
Prescription	✓			

Are you claustrophobic (fear of being in a closed/confined place)? ✓ Yes ___ No

Do you have metal in your body? ___ Yes ✓ No If yes, where? _____

DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Print Form

DELBRIDGE GOODWIN, CRYSTAL 03/02/78 #2176596

FOLLOW-UP QUESTIONNAIRE
DATE: NAME: CRYSTAL J. DELBRIDGE GOODWIN CHART #: 2176596

Follow Up Questions

Height: 5'1 Weight: 258

Pain: Pain scale 2 /10 with meds; 10 /10 without meds (0= no pain, 10= worst possible pain)

Are you working? ☑ not at all ☐ modified duty ☐ regular duty

Athletics? ☐ no participation ☐ non contact ☐ full participation

How are you feeling? ☐ Improving ☑ Same ☐ Worse

Previous injection: ☑ None ☐ did not help ☐ helped a little ☐ helped significantly ☐ gave relief for a few hours ☐ gave relief for a few days ☐ gave relief for a few weeks

Previous PT: ☐ None ☐ did not help ☑ helped a little ☐ helped significantly ☐ aggravated symptoms

Medications: ☑ helping a little ☐ helping a lot ☐ not helping at all ☐ upsetting stomach ☐ Not taking any medications for orthopedic problems

Change in Symptoms?: ☑ No ☐ Yes

Do you need a work excuse?: ☑ No ☐ Yes

Do you need a prescription renewal?: ☐ No ☑ Yes

Review of Systems: Please indicate if you are having any problems in the following areas:
Constitutional: ☐ fever ☐ night sweats ☐ weight gain ☐ weight loss ☐ difficulty exercising
Eyes: ☐ dry eyes ☐ irritation ☐ change in vision ☐ other: _____
Ears: ☐ difficulty hearing ☐ ear pain ☐ other: _____
Nose: ☐ frequent nosebleeds ☐ sinus/nose problems ☐ other: _____
Mouth/Throat: ☐ sore throat ☐ bleeding gums ☐ snoring ☑ dry mouth ☐ mouth ulcers ☐ oral abnormalities ☐ tooth problems
Cardiovascular: ☐ chest pain ☐ arm pain on exertion ☐ shortness of breath when walking ☐ shortness of breath when lying down ☑ palpitations ☐ heart murmur
Respiratory: ☐ coughing ☐ wheezing ☐ shortness of breath ☐ coughing up blood
Gastrointestinal: ☐ abdominal pain ☐ vomiting ☐ loss of appetite ☐ diarrhea ☐ vomiting blood
Genitourinary: ☐ incontinence ☑ difficulty urinating ☐ painful urination ☐ blood in urine ☐ increase urinary frequency
Musculoskeletal: ☑ muscle aches ☑ muscle weakness ☑ joint pain ☑ back pain ☑ swelling in extremities
Skin: ☐ abnormal mole ☐ jaundice ☐ rash ☐ itching ☑ dry skin ☐ growth/lesions
Neurologic: ☐ loss of consciousness ☑ weakness ☑ numbness ☐ seizures ☐ dizziness ☑ headaches ☐ migraines ☐ restless legs
Psychiatric: ☑ depression ☑ sleep disturbance ☐ alcohol abuse
Endocrine: ☐ fatigue ☐ increased thirst ☐ hair loss ☐ increased hair growth ☐ cold intolerance
Hematological/Lymphatic: ☐ swollen glands ☐ easy bruising ☐ excessive bleeding
Allergic/Immunologic: ☐ runny nose ☐ sinus pressure ☐ itching ☐ hives ☐ frequent sneezing
I HAVE NONE OF THE PROBLEMS LISTED ABOVE: ☐

Recent Hospitalizations?: _____

DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

DELBRIDGE GOODWIN, CRYSTAL 03/02/78 #2176596



*7991791w7388 E-HealthNet

MIDLANDS orthopaedics & NEUROSURGERY

HOME HEALTH, SKILLED NURSING AND CURRENT MEDICATIONS UPDATE

If you are currently receiving Home Health or residing in a skilled nursing facility (nursing home or rehabilitation facility), that entity may be responsible to pay for the services you receive today. It's important that we have the correct agency or facility information on file for this reason.

Are you currently receiving Home Health? ✓ yes ___ no
If yes, which agency is providing your Home Health? Amedysis
Are you currently residing in a skilled nursing facility? ___ yes ___ no
If yes, what is the name of your skilled nursing facility? ___

Eprescribing software allows a physician to see all medications a patient has received from a pharmacy within the past 12 months. As of September 18, 2011, Midlands Orthopaedics began utilizing Eprescribing software in conjunction with our Electronic Health Record software. The medication history information obtained via the Eprescribe software is term permitted and protected by HIPAA. In addition to ensuring our compliance with federal Eprescribing mandates, this medication history enhances patient safety by reducing the likelihood of medication errors.

Please circle the medications you are currently taking.

CURRENT MEDICATIONS:

Name	Date	
benzonatate 200 mg capsule	03/18/16	filled
ergocalciferol (vitamin D2) 50,000 unit capsule	07/25/16	filled
hydroCHLOROthiazide 25 mg tablet	03/01/16	filled
hydroCHLOROthiazide 50 mg tablet	07/25/16	filled
hydrocodone-homatropine 5 mg-1.5 mg/5 ml syrup	03/18/16	filled
lisinopril 10 mg tablet	03/01/16	filled
meloxicam 15 mg tablet	08/03/16	filled
metFORMIN 1,000 mg tablet	07/17/16	filled
sulfamethoxazole 800 mg-trimethoprim 160 mg tablet	03/18/16	filled

Patient / Guardian Signature: Crystal Delbridge-Goodwin

08/29/2016

To Provider	From Provider
DAVID FISHER 566 SPEARS CREEK CHURCH RD STE 102B COLUMBIA, SC 29209 Phone: Phone: (803) 995-5555 Fax: Fax: (803) 828-3795	THOMAS J. HOLBROOK, JR., MD Midlands Orthopaedics & Neurosurgery 114 Gateway Corporate Blvd Suite 110 COLUMBIA, SC 29204-2026 Phone: (803)256-4107 Fax: (803)933-6100

Referral Order Information

Diagnosis	Spinal stenosis of thoracic region ICD-10: M48.04: Spinal stenosis, thoracic region
Order Name	PRIMARY CARE REFERRAL
Notes	evaluate for Establish PCP care

Patient Information

Patient Name	DELBRIDGE GOODWIN, CRYSTAL J
Sex - DOB - Age	F 03/02/1978 41yo
Address	903 GREENLAWN DR COLUMBIA, SC 29209
Phone	H: (803) 743-9407 M: (803) 477-5465

Approved Prescription

Date Ordered: 08/29/2016

Pharmacy	Prescriber
WALMART PHARMACY 1286 7520 GARNERS FERRY RD # A COLUMBIA, SC 292092628 Phone: (803) 783-1664 Fax: (803) 783-1589	THOMAS J. HOLBROOK, JR., MD MOPA_PNE 114 Gateway Corporate Blvd Suite 110 COLUMBIA, SC 29204-2026 Phone: (803)256-4107 Fax: (803)933-6100

Prescription Information

Medication	Valium 5 mg tablet
Quantity	90 (ninety) tablet(s)
SIG	Take 1 tablet(s) every 6 hours by oral route as needed for muscle spasms.
ICD-10	Spinal stenosis of thoracic region ICD-10: M48.04: Spinal stenosis, thoracic region
Refills Allowed	1 Refill
Dispense as Written?	N
Substitution Permitted?	Y
Note to Pharmacy	

Patient Information

Patient Name	DELBRIDGE GOODWIN, CRYSTAL J
Sex - DOB - Age	F 03/02/1978 41yo
Address	903 GREENLAWN DR

DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

	COLUMBIA, SC 29209
Phone	H: (803) 743-9407 M: (803) 477-5485

Dispense as Written

Substitutions Permitted

Supervising Provider:
Rendering Provider: THOMAS J. HOLBROOK, JR., MD
NPI # 1770695660
DEA# BH0951396

Prescription is void if more than one (1) prescription is written per blank.

Approved Prescription

Date Ordered: 08/29/2016

Pharmacy	Prescriber
WALMART PHARMACY 1286 7520 GARNERS FERRY RD # A COLUMBIA, SC 292092628 Phone: (803) 783-1664 Fax: (803) 783-1589	THOMAS J. HOLBROOK, JR., MD MOPA_PNE 114 Gateway Corporate Blvd Suite 110 COLUMBIA, SC 29204-2026 Phone: (803)256-4107 Fax: (803)933-8100

Prescription Information

Medication	traMADol 50 mg tablet
Quantity	60 (sixty) tablet(s)
SIG	Take 1 tablet(s) every 6 hours by oral route.
ICD-10	Spinal stenosis of thoracic region ICD-10: M48.04: Spinal stenosis, thoracic region
Refills Allowed	3 Refills
Dispense as Written?	N
Substitution Permitted?	Y
Note to Pharmacy	

Patient Information

Patient Name	DELBRIDGE GOODWIN, CRYSTAL J
Sex - DOB - Age	F 03/02/1978 41yo
Address	803 GREENLAWN DR COLUMBIA, SC 29209
Phone	H: (803) 743-9407 M: (803) 477-5485

Dispense as Written

Substitutions Permitted

Supervising Provider:
Rendering Provider: THOMAS J. HOLBROOK, JR., MD
NPI # 1770695660

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520
DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Encounters and Procedures

Clinical Encounter Summaries
Encounter Date: 09/19/2018
Patient

Name	DELBRIDGE GOODWIN, CRYSTAL (40yo, F) ID# 2234781	Appt. Date/Time	09/19/2018 12:00PM
DOB	03/02/1978	Service Dept.	PNE Office
Provider	THOMAS HOLBROOK JR, MD		

Chief Complaint

None recorded.

Patient's Pharmacies

WALMART PHARMACY 1286 (ERX): 7520 GARNERS FERRY RD # A, COLUMBIA SC 29209, Ph (803) 783-1664, Fax (803) 783-1569
HAWTHORNE PHARMACY- TAYLOR- COLUMBI (ERX): 1520 A TAYLOR STREET, COLUMBIA SC 29201, Ph (803) 256-3440, Fax (803) 256-9727

Vitals

None recorded.

Allergies

Allergies not reviewed (last reviewed 10/30/2017)
NKDA

Medications

Medications not reviewed (last reviewed 10/30/2017)

baclofen 10 mg tablet Take 1 tablet(s) every 8 hours by oral route.	03/07/18	filled
carisoprodol 350 mg tablet	12/23/16	filled
ciprofloxacin 250 mg tablet	05/31/18	filled
ciprofloxacin 500 mg tablet	12/29/17	filled
enoxaparin 60 mg/0.6 mL subcutaneous syringe	05/15/18	filled
furosemide 20 mg tablet	08/08/18	filled
gabapentin 300 mg capsule take 1 capsule at 10:00 pm x 3 days, then increase to 2 capsules at 10:00 pm x 3 days, then 3 capsules at 9:00 pm	08/18/17	prescribed
HYDROcodone 7.5 mg-acetaminophen 325 mg/15 mL oral solution	05/14/18	filled
losartan 100 mg-hydrochlorothiazide 12.5 mg tablet	06/07/18	filled
losartan 25 mg tablet	03/11/18	filled
meloxicam 7.5 mg tablet	04/29/18	filled
nitrofurantoin monohydrate/macrocrystals 100 mg capsule	05/02/18	filled
potassium chloride ER 10 mEq tablet,extended release	08/08/18	filled

PLAINTIFF'S EXHIBIT NO. 11 4-11-23

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520
DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Valium 5 mg tablet 06/05/17 prescribed
Take 1 tablet(s) every 6 hours by oral route as needed.

Problems

Reviewed Problems
- Ischemic disorder of spinal cord - Onset: 06/02/2017
- Spinal stenosis of thoracic region - Onset: 06/02/2017
- Spinal stenosis of lumbar region - Onset: 06/02/2017
- Lumbar radiculopathy - Onset: 06/04/2017

Family History

Family History not reviewed (last reviewed 10/30/2017)

Mother	- Arthritis
	- Hypertensive disorder
Father	- Arthritis
	- Hypertensive disorder

Social History

Social History not reviewed (last reviewed 10/30/2017)
Neuro-New Patient
Smoking Status: Never smoker
back, leg, neck, arm-PT in last 6 months: Y
Back, leg, neck, arm-NSAIDS, muscle relaxants or pain meds: Y
Back, leg, neck, arm-Steroid injections in back or neck: N
Severity of pain: 3
Pain-Aching: Y
Pain-Burning: Y
Pain-Cramps: N
Pain-Dull: N
Pain-Numbness: Y
Pain-Sharp: Y
Pain-Shooting: N
Pain-Stiffness: Y
Pain-Swelling: Y
Pain-Throbbing: Y
Pain-Tingling: Y
Pain interferes w/Bathing: Y
Pain interferes w/Dressing: Y
Pain interferes w/Feeding: N
Pain interferes w/Food Preperation: Y
Pain interferes w/Grooming: Y
Pain interferes w/Housework: Y
Pain interferes w/Sleep: Y
Pain interferes w/Toilet hygiene: Y
Pain interferes w/Work: N
Pain Frequency: comes and goes
Painful Activities - Bending: N
Painful Activities - Lying down: Y
Painful Activities - Sitting: Y
Painful Activities - Standing: N
Painful Activities - Walking: N
Sleep position: side
Claustrophobic: Y
Metal in body: N

Surgical History

Surgical History not reviewed (last reviewed 10/30/2017)
- Remove spine lamina 1/2 thrs - 07/28/2016 - Laminectomy

GYN History

(not configured)

Past Medical History

Past Medical History not reviewed (last reviewed 10/30/2017)
Bladder Disease: Y - Urinary Tract Infection
High Blood Pressure: Y

Screening

None recorded.

DELBRIDGE GOODWIN, CRYSTAL J (Id #2234781, dob: 03/02/1978)

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520

DELBRIDGE GOODWIN, CRYSTAL J (Id #2234781, dob: 03/02/1978)

ROS

None recorded.

Physical Exam

None recorded.

Assessment / Plan

1. Hip pain - Bilateral
M25.559: Pain in unspecified hip
- XR, PELVIS
  Views (X-RAY, PELVIS): Standing AP Pelvis
- HIP PAIN: CARE INSTRUCTIONS

XR, PELVIS
- Views (X-RAY, PELVIS): Standing AP Pelvis

Return to Office

None recorded.

Encounter Sign-Off

Encounter signed-off by Thomas Holbrook Jr, MD, 09/19/2018.

Encounter performed and documented by Thomas Holbrook Jr, MD
Encounter reviewed & signed by Thomas Holbrook Jr, MD on 09/19/2018 at 5:03pm

Midlands Orthopaedics and Neurosurgery • 1910 Blanding Street, COLUMBIA SC 29201-3520
DELBRIDGE GOODWIN, CRYSTAL J (id #2234781, dob: 03/02/1978)

Imaging Orders

Imaging Order

09/19/2018

To Provider	From Provider
PNE OFFICE 114 GATEWAY CORPORATE BLVD SUITE 110 COLUMBIA, SC 29204-2026 Phone: Phone: (803) 256-4107 Fax: Fax: (803) 933-6100	THOMAS HOLBROOK JR, MD Midlands Orthopaedics & Neurosurgery 114 Gateway Corporate Blvd Suite 110 COLUMBIA, SC 29204-2026 Phone: (803) 256-4107 Fax: (803) 933-6100

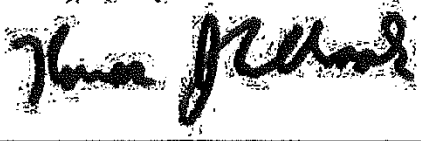
Imaging Order Information

Diagnosis	Hip pain - Bilateral ICD-10: M25.559: Pain in unspecified hip
Order Name	Orders included: 1 Hip pain - Bilateral	ICD-10: M25.559: Pain in unspecified hip • XR, PELVIS Views (X-RAY, PELVIS): Standing AP Pelvis
Notes	

Patient Information

Patient Name	DELBRIDGE GOODWIN, CRYSTAL J
Sex - DOB - Age	F 03/02/1978 41yo
Address	903 GREENLAWN DR COLUMBIA, SC 29209-2652
Phone	H: (803) 743-9407 M: (803) 477-5485
Secondary Insurance	None recorded.

Electronically Signed by: THOMAS HOLBROOK JR, MD



THOMAS HOLBROOK JR, MD

Imaging Results

XR, PELVIS 09/19/2018 (#1779252)

Discharge Information

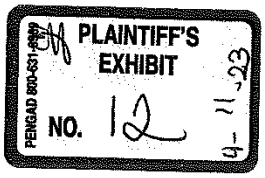
ADMITTING DIAGNOSIS:
1. Thoracic spinal stenosis.

DISCHARGE DIAGNOSES:
1. Thoracic spinal stenosis.
2. Bilateral lower extremity paralysis.

PROCEDURE: Dates performed 07/28/2016

1. Decompressive thoracic laminectomy T9 – 10 through T11 – 12.
2. Seconds procedure same day 07/28/2016 reexploration of laminectomy wound for stenosis.

HOSPITAL COURSE: The patient was admitted to this hospital on the same day of surgery. She underwent the procedure described above and was transferred to the recovery room. In the recovery room she was unable to move her legs with good strength and was taken back to the operating room for re-exploration of her thoracic incision. The patient had no evidence of hematoma or complicating wound issues. A drain was placed and she was returned to the recovery room. During her hospitalization she did not recover any significant lower extremity strength in spite of maximized therapy and intravenous (IV) steroids. Her hospital course included bladder management with a Foley catheter and extensive physical therapy. She maintained a healthy incision with staples. Her Hemovac drain was removed. She remained with a Foley because of need for bladder management and bowel program showed that she was responding and having semi-regular bowel activity. Her pain management showed decreasing amounts of narcotics required to control her pain. Her daily activity. She is getting out of bed to a chair with maximum assistance. At the time of transfer to HealthSouth on 08/08/2016 her neurologic status shows minimal hip rotation bilaterally. She cannot demonstrate any hip flexors, quadriceps tibialis anterior, gastroc soleus power to my exam. She has a virtually insensate right lower extremity and has fairly normal sensation in the left lower extremity. She claims that she is insensate in the saddle region. She has a Foley for bladder management and is semi-regular with her bowels every few days. I stressed to her the need for constant supervision of her skin to avoid bedsores and at this time she does not appear to have any pressure sores at all. Her incision is with healing well with staples and recommendation is for staples to be removed in 3 days on 08/11/2016. Her pain is controlled with p.o. medications. The plan would be for her to maximize her therapy at HealthSouth and follow-up in the office in approximately a 2 week period.



Discharge Information

Medication list is as follows:

1. Metformin 1000 mg p.o. twice daily,
2. Acetaminophen 1000 mg p.o. q.8 hours p.r.n. for pain
3. Valium 10 mg p.o. Q8 hours p.r.n. for muscle spasms.
4. MiraLax 17 g packet p.o. daily, mixed in beverage.
5. Docusate senna two tablets p.o. q. day.
6. Percocet 7.5/325 mg 2 tablets p.o. q.4 hours p.r.n. for severe pain
7. Duloxetine 20 mg p.o. daily,
8. Magnesium citrate 300 mL p.r.n. for constipation.
9. Lovenox 40 mg subcutaneous q.24 hours Protonix 40 mg p.o. daily,
10. Hydrochlorothiazide 50 mg p.o. daily.

D: 08/08/2016 08:13 T: 08/08/2016 08:37 TID: 89017
Job #: 27247 Doc #: 20869231
cc: Thomas J. Holbrook Jr., MD

Electronically Signed & Verified on 08/11/2016 11:17 by Holbrook MD, Thomas J

Inpatient Depart Summary

DOCUMENT NAME:	Patient Summary
SERVICE DATE/TIME:	8/8/2016 09:59 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Swygert RN,Joyce M (8/8/2016 09:59 EDT)
ELECTRONICALLY SIGNED BY:	Swygert RN,Joyce M (8/8/2016 09:59 EDT)

Patient Summary

Patient Summary

Palmetto Health
Baptist Richland Parkridge

Name:GOODWIN, CRYSTAL JAQUAY **Current Date**:08/08/16 09:59:06
DOB:3/02/1978 12:00 AM **MRN**:B000275536 **FIN**:B1620200813
Visit Date:7/28/2016 12:35 PM
Diagnosis:1:Thoracic spinal stenosis

The following includes your discharge instructions, follow-up instructions, patient education materials, and information regarding your hospital stay.

Surgical Documentation

Referral Functional : No Referral Indicated
Referral Nutrition : No Referral Indicated
Referral Spiritual Care : No Referral Indicated
Referral Case Mgmt-Social History : No Referral Indicated

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Pain Evaluation
Primary Pain Location : Back
Laterality : Bilateral
Quality : Aching
Primary Pain Onset : Gradual
Primary Pain Time Pattern : Constant
Self Report Pain Tool : Numeric rating scale

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Numeric/FACES Pain Scale
Numeric Pain Scale : 4
Numeric Pain Score : 4

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Image 1 - Images currently included in the form version of this document have not been included in the text rendition version of the form.

DOCUMENT NAME:	Operative Report
SERVICE DATE/TIME:	7/28/2016 11:18 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Holbrook MD,Thomas J (7/28/2016 11:18 EDT)
ELECTRONICALLY SIGNED BY:	Holbrook MD,Thomas J (7/30/2016 13:34 EDT)

Operative Report
DATE OF OPERATION: 07/28/2016

SURGEON: Thomas J. Holbrook Jr., MD

PREOPERATIVE DIAGNOSIS: Thoracic spinal stenosis.

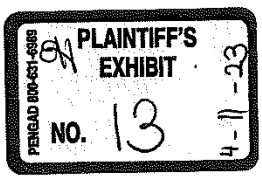
POSTOPERATIVE DIAGNOSIS: Thoracic spinal stenosis.

PROCEDURE: Decompressive thoracic laminectomy T9-10 through T11-12.

ATTENDING SURGEON: Holbrook.

ASSISTANT SURGEON: Maurio Riley

DESCRIPTION OF PROCEDURE: Patient brought to operating room. After the induction of satisfactory general endotracheal anesthesia, the back was prepared and draped in the usual sterile manner. Fluoroscopy was used to localize the level. A portion of the previous incision was reopened extending inferiorly down



through the posterior fascia. Paraspinous muscles were taken down bilaterally in a subperiosteal manner. Scar tissue from previous surgery was noted. The spinous processes at T11-12 were removed with a Leksell rongeur. Lamina were removed bilaterally with the Midas Rex, nosing the dura in the midline and dissection was continued in the midline and superiorly, dissecting scar tissue, partial calcification over the posterior dura up through the T9-10 level. This temporarily suspended correct some ventilation issues. Was continued and some additional bone in the lateral recesses. Examination with the Midas Rex and a small Kerrison rongeur. [____] remained stable up to this point and then abruptly stopped. The identifiable cause within the wound was demonstrated. Decompression was completed, thecal sac supple and was now well decompressed. Was irrigated, soft tissues were infiltrated with local anesthetic. A small Hemovac drain was left in the epidural space at the level of the [____] through a separate stab incisions superiorly and connected to an external drainage device. The paraspinous muscles were reapproximated with interrupted Vicryl, the posterior fascia with interrupted zero Nurolon, the subcutaneous tissues in layers of interrupted 2-0 Vicryl and the skin was skin staple approximator. The wound was dressed. Riley assisted with exposure and closing.

D: 07/28/2016 11:09 T: 07/28/2016 11:43 TID: 90079
Job #: 20940 Doc #: 20866988
cc: Thomas J. Holbrook Jr., MD

Electronically Signed & Verified on 07/30/2016 13:34 by Holbrook MD, Thomas J

DOCUMENT NAME:	Operative Report
SERVICE DATE/TIME:	7/28/2016 16:19 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Holbrook MD,Thomas J (7/28/2016 16:19 EDT)
ELECTRONICALLY SIGNED BY:	Holbrook MD,Thomas J (7/30/2016 13:34 EDT)

Operative Report
DATE OF OPERATION: 07/28/2016

SURGEON: Thomas J. Holbrook Jr., MD

PREOPERATIVE DIAGNOSES: [____] spinal stenosis with cord edema.

POSTOPERATIVE DIAGNOSES: [____] spinal stenosis with cord edema.

PROCEDURE: Reexploration of laminectomy wound, stenosis.

Surgical Documentation

ATTENDING SURGEON: Thomas J. Holbrook Jr., MD.

ASSISTANT SURGEON: Not dictated.

INDICATIONS: In recovering from anesthesia from the initial surgery, the patient had no voluntary movement in the lower extremities. She could localize sensation over the left lower extremity, but had no sensation below about a T10 level on the right. Repeat MRI scan of the thoracic spine was done which demonstrated some residual stenosis originating from the left at the superior portion of the laminectomy. Also edema within the cord at the superior portion of the laminectomy. The condition and findings were discussed with the husband by phone as he had already left the hospital, and the need for a repeat surgery. I believed that he understood and agreed to proceed.

DESCRIPTION OF PROCEDURE: The patient was returned to the operating room. After the induction of satisfactory general endotracheal anesthesia the back was prepared and draped. The wound was reopened down to the previous laminectomy site. On inspection, normal postoperative changes were identified. No hematoma was identified. On inspection of the superior portion of the laminectomy site showed partially calcified scar tissue was encountered on the left [____] the canal on the left side. Further dissection was done in this area [____] the scar tissue from the thecal sac and excising it to free up this portion of the spinal canal. The dura remained supple and did not appear to be under any tension. The wound was irrigated and careful attention paid to hemostasis. A small Hemovac drain was left in the wound at the level of the lamina, brought out through a separate stab incision superiorly and connected to an external drainage device. Paraspinous muscles were reapproximated with interrupted 2-0 Vicryl. The posterior fascia with interrupted 0 Nurolon, the subcutaneous tissue in layers of interrupted 2-0 Vicryl, and the skin with skin staple approximator. The wound was dressed.

D: 07/28/2016 16:11 T: 07/28/2016 16:55 TID: 420198
Job #: 21242 Doc #: 20867060
cc: Thomas J. Holbrook Jr., MD

Electronically Signed & Verified on 07/30/2016 13:34 by Holbrook MD, Thomas J

Radiology

ACCESSION	EXAM DATE/TIME	PROCEDURE	ORDERING PROVIDER	STATUS
MR-16-0022850	7/28/2016 14:30 EDT	MR Thoracic Spine W/O Contrast	Holbrook MD,Thomas J	Auth (Verified)

Findings:

HISTORY: Prior thoracic spine surgery. Bilateral leg weakness (left greater than right) since fall three days ago.

TECHNIQUE: Sagittal T1, T2 and STIR and axial T1 and T2 weighted images of the thoracic spine completed on 7/28/2016.

FINDINGS: Vertebral bodies are well aligned. The patient has had prior posterior bony fusion at the T8-T9 level with bilateral laminectomies at T9-T10, T10-T11 and T11-T12 levels. There is fluid within the surgical site. There is increased signal within the thoracic cord from the T8-T9 level to approximately the mid T10 level compatible with myelopathic change. There is some cord thinning from the T7-T8 to the T8-T9 level as well. There is no evidence of fracture or subluxation. There is a T1 and T2 hyperintense hemangioma within the posterior superior aspect of T5 to the left of midline. Bone marrow signal is otherwise unremarkable.

T1-T2, T2-T3, T3-T4: No evidence of disc herniation or canal stenosis.

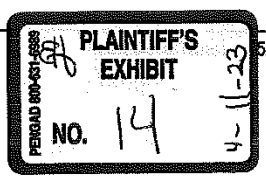
T4-T5, T5-T6 and T6-T7: No disc herniation or canal stenosis. There are facet degenerative changes at the T6-T7 level with left-sided neural foraminal narrowing suggested.

T7-T8: Again demonstrated are facet degenerative changes without disc herniation or canal stenosis.

T8-T9: The patient has had prior laminectomies with posterior bony fusion noted. There are remnants of facet degenerative change noted as well, with an osteophyte to the left of midline which contributes to mild canal stenosis.

T9-T10: The patient has had recent surgery and there is fluid within the surgical defect as well as a few gas bubbles and magnetic susceptibility artifact. There is increased signal within the cord compatible with myelopathic change again noted. There is a persistent canal stenosis created by residual facet hypertrophy on the left together with residual spondylotic disc bulging.

T10-T11: The patient has had laminectomies with fluid, gas bubbles and a fluid-fluid level demonstrated within the surgical defect. There is no significant residual canal stenosis. There are facet changes bilaterally at this level.



Radiology

ACCESSION	EXAM DATE/TIME	PROCEDURE	ORDERING PROVIDER	STATUS
MR-16-0022850	7/28/2016 14:30 EDT	MR Thoracic Spine W/O Contrast	Holbrook MD,Thomas J	Auth (Verified)

Findings:

T11-T12: Posterior laminectomy changes are noted, again containing fluid and gas bubbles within the surgical defect. There is no significant canal stenosis.

T12-L1: No disc herniation or canal stenosis.

IMPRESSION:

1. Status post bilateral laminectomies from T9-T10 to T11-T12, with fluid within the surgical defect. There is evidence of prior bony fusion at the T8-T9 level. There is increased T2 signal within the cord from approximately T8-T9 to T9-T10, with some cord thinning from T7-T8 to T8-T9 as well. These findings are suggestive of myelopathic change.
2. Marked canal stenosis created by a left-sided facet osteophyte and residual disc bulge at the T9-10 level.
3. Mild canal stenosis at T8-T9.
4. Left-sided facet degenerative change at T6-T7 contributing to left-sided neural foraminal narrowing.
5. Good posterior decompression from the mid T10 level to the T11-T12 level, with postsurgical fluid, gas bubbles and magnetic susceptibility artifact within the surgical defect as detailed above.

****** Final ***** ***Trans On: 07/28/2016 17:06 by: DR***
Read by: Graham III MD, Cole B
Released By: Graham III MD, Cole B
Released on: 07/29/2016 16:15 ***Technologist: Herron, John E***

NEUROMONTIORING RECORDS

CERTIFICATION OF AUTHENTICITY OF RECORDS
OF REGULARLY CONDUCTED ACTIVITY

The undersigned declarant hereby declares, certifies, verifies or states under penalty of perjury the following:

1. The declarant is a records custodian or other qualified person who can provide a written declaration regarding the records of regularly conducted business activity which are the subject of this certification;
2. The records of regularly conducted business activity (hereinafter "records") which are the subject of this certification are numbered.
3. The records are originals or duplicate copies of domestic business records, which include medical and/or billing records, which are true and correct copies of the original records prepared and/or maintained by SpecialtyCare, Inc.
4. The records were made at or near the time of the time of the occurrence of the matters set forth by, or from information transmitted by, a person with knowledge of those matters;
5. The records were kept in the course of a regularly conducted business activity; and
6. The records were made as a regular practice in the course of regularly conducted business activity.
7. No films or diagnostic studies are maintained by SpecialtyCare, Inc.

I hereby declare, certify or state, under penalty of perjury, that the foregoing is true and correct. Executed on April 16, 2020.

Signature of Declarant

Patricia Falte
Printed Name

Medical Records Coordinator
Title

SpecialtyCare, Inc.
3 Maryland Farms, Suite 200
Brentwood, Tennessee 37027
615.345.5551

PENGAD 800-631-6989
PLAINTIFF'S EXHIBIT
15
4-11-23

Goodwin_SpecialtyCare_0001

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS) Return to Search

Case ID 100000927513 Patient Name Goodwin, Crystal

Safety Checklist Save

☑ Neurophysiologist participated in surgical time out

Explain if not present for time out

Bite block placement verified ( ) N/A (•) Verified by Member of Anesthesia Team

Needle Electrodes

Placed in Patient 23

Removed from Patient 23

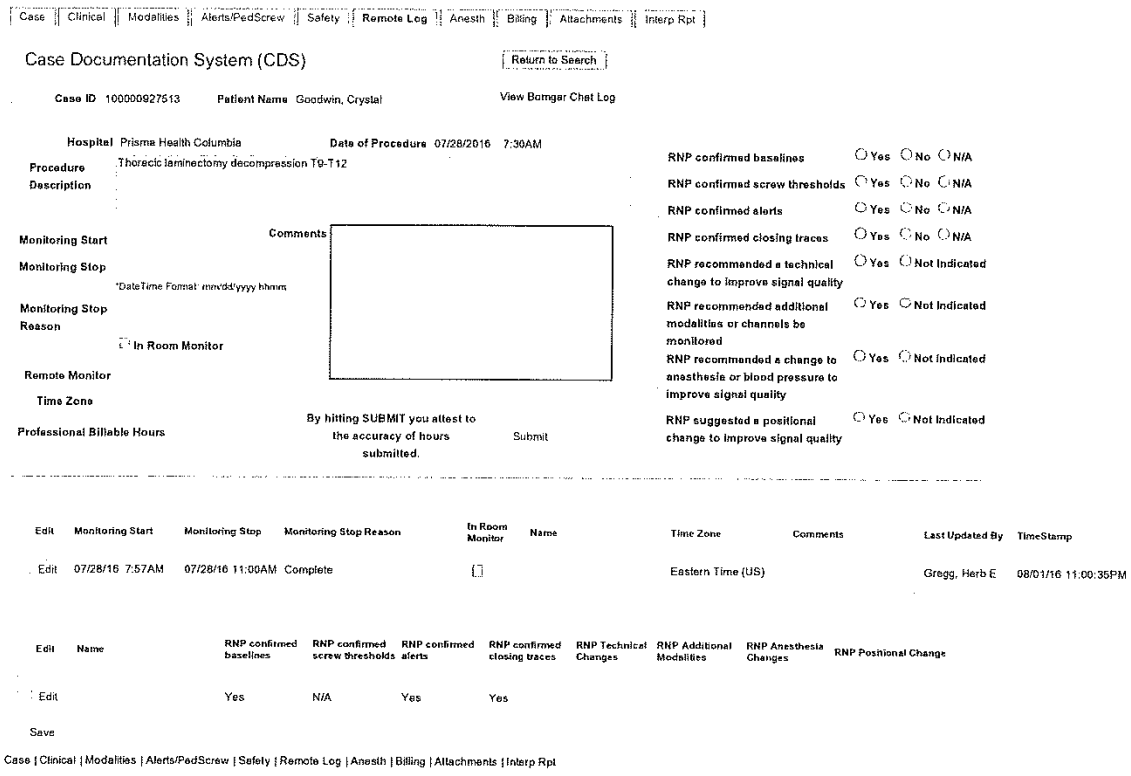
☑ OR staff reminded of locations, as appropriate

☑ Removal from patient physically verified (2nd check)

☑ Removal announced to OR staff

Save

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt



Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS)

Return to Search

Case ID 100000927513 Patient Name Goodwin, Crystal

View Bomgar Chat Log

Hospital Prisma Health Columbia Date of Procedure 07/28/2016 7:30AM

Procedure Description Thoracic laminectomy decompression T9-T12

Monitoring Start

Monitoring Stop

*DateTime Format: mm/dd/yyyy hhmm

Monitoring Stop Reason

In Room Monitor

Remote Monitor

Time Zone

Professional Billable Hours

Comments

By hitting SUBMIT you attest to the accuracy of hours submitted.

Submit

RNP confirmed baselines	○ Yes ○ No ○ N/A
RNP confirmed screw thresholds	○ Yes ○ No ○ N/A
RNP confirmed alerts	○ Yes ○ No ○ N/A
RNP confirmed closing traces	○ Yes ○ No ○ N/A
RNP recommended a technical change to improve signal quality	○ Yes ○ Not Indicated
RNP recommended additional modalities or channels be monitored	○ Yes ○ Not Indicated
RNP recommended a change to anesthesia or blood pressure to improve signal quality	○ Yes ○ Not Indicated
RNP suggested a positional change to improve signal quality	○ Yes ○ Not Indicated

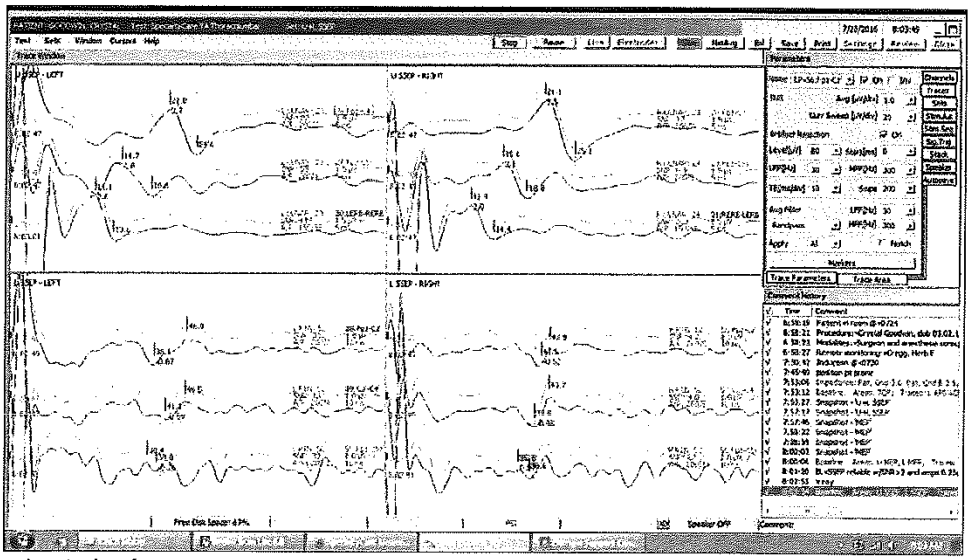
Edit	Monitoring Start	Monitoring Stop	Monitoring Stop Reason	In Room Monitor	Name	Time Zone	Comments	Last Updated By	TimeStamp
Edit	07/28/16 7:57AM	07/28/16 11:00AM	Complete	☐		Eastern Time (US)		Gregg, Herb E	08/01/16 11:00:35PM

Edit	Name	RNP confirmed baselines	RNP confirmed screw thresholds	RNP confirmed alerts	RNP confirmed closing traces	RNP Technical Changes	RNP Additional Modalities	RNP Anesthesia Changes	RNP Positional Change
Edit		Yes	N/A	Yes	Yes				

Save

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

08:03:49 Snapshot - 'U+L SSEP'

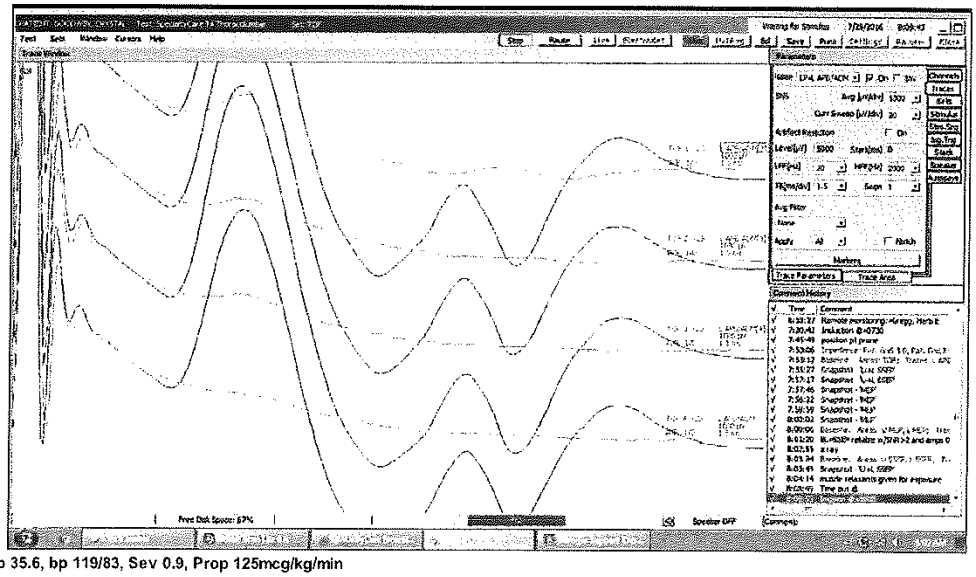


08:04:14 muscle relaxants given for exposure

08:08:49 Time out @

08:08:53 Incision @»0808

08:09:43 Snapshot - 'TOF'»0/4



08:10:26 .»temp 35.6, bp 119/83, Sev 0.9, Prop 125mcg/kg/min

08:14:45 exposure

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS)

Return to Search

Case ID 100000927513

Patient Information

Save — **Bomger Team**

Billing Submit — Bomgar

Create Billing Sheet

Go to Postop Info

Void Case?

Patient Last Name Goodwin

Patient First Name Crystal

Patient ID 1620200813

Patient MRN 000275536

Gender ○ Male ◉ Female

Date of Birth 03/02/1978

Case Information

Date of Procedure 07/28/2016

Account 2102 Prisma Health Columbia

Product Line IOM

Region South IONM **Ops Group** South Atlantic IONM **Team** Palmetto IONM

Case Status ◉ Case Monitored ○ Baselines Only ○ Setup Only ○ Case Not Monitored ○ Case Cancelled ○ Remote Monitoring Only

Comments

Customer ID 2102N01 Prisma Health Columbia

Surgeons / Referring Physicians / Anesthesiologists

Role	Name	NPI ID	Primary	If not in list, enter Name
Anesthesiologist			☑	Dr. Root
Surgeon	Holbrook, Thomas	1770695660	☑	

Monitoring and Clinical Staff

Type	Staff Name	Empl ID	Staff Role	Arrival Date	Arrival Time	Departure Date	Departure Time
Remote Monitor	Gregg, Herb E	2062474	Primary				
Clinician	Adkins, Teresa	2063585	Primary	07/28/2016	6:24AM	07/28/2016	12:45PM

Equipment

Equipment Type	Non-SC Owned	SC Tag #	Model	Serial No	Brand	Comment
Master	☐	SC2005	Eclipse IONM system E4	SC2005	Medtronic	
Controller	☐	00876	ECLC Controller-NIM Eclipse	070818 E1	Medtronic	
Amplifier	☐	01887	DAQ916 Eclipse Amp	0842281D	Medtronic	
Amplifier	☐	02843	DAQ916 Eclipse Amp	062231C	Medtronic	
Stimulator	☐	05768	EEX901	0915047B	Medtronic	
Stimulator	☐	05835	EEX901	070474A1	Medtronic	

Save

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

CDS Post Op Info

Case Documentation System (CDS) - Post Op Data Go to Case Info Return to Search

Case ID 100000927513 Date of Procedure 07/28/2016 Patient Name Goodwin, Crystal

Postop Information Find | View All First 1 of 1 Last

Date of Entry 07/29/2016

Entered By Adkins, Teresa

Time of Neuro Status Check: Postop day 1

Source of Information: Other Name of Info Provider: Maurio Riley, PA

Postop Status
- ○ NO new neuro deficit noted postoperatively
- ◉ New neuro deficit noted postoperatively

Provide additional details if new deficited noted postoperatively.
- ◉ Initial report of postop deficit - immediate onset
- ○ Initial report of postop deficit - delayed onset
- ○ Follow-up: deficit completely resolved
- ○ Follow-up: deficit partly resolved - improvement from previous report
- ○ Follow-up: deficit partly resolved - no improvement from previous report
- ○ Follow-up: deficit unresolved from initial report

(Select all that apply)

☐ Pain

Motor and Sensory Deficit Details (Select all that apply)

☑ Sensory Severity: Severe

☑ Somatosensory

☐ Head ☐ Neck ☐ Trunk ☐ L Face ☐ R Face ☐ L UE ☐ R UE
☐ L LE ☑ R LE ☐ Sacral ☐ Other (describe)

☐ Other Sensory

Comments re Sensory Deficit

patient has no feeling from waist down on the right side.

☑ Motor Severity: Severe

☑ Weakness

☐ L UE ☐ R UE ☑ L LE ☑ R LE ☐ Trunk ☐ Other (describe)

☐ Other Motor/Sensorimotor Disorder

Ambulatory Status: Unknown at this Time

Comments re Motor Deficit

Patient cannot move legs

☐ Mental Status Change

Additional Comments

Follow up w/ PA. PA stated Dr. Holbrook ended up taking her back into OR because she couldn't move her legs when she woke up. Lumbar MRI showed cord edema in the surgical region. Right now, she cant move her legs and has no feeling from the waist down on the right side.

Save

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS)

Return to Search

Case ID 100000927513 **Patient Name** Goodwin, Crystal

Save

Pre-Op Diagnosis thoracic stenosis

Patient presents secondary to trauma		○ Yes	◉ No	○ Unknown
Patient presents for treatment of tumor/mass		○ Yes	◉ No	○ Unknown
Etiology of pathology	○ Congenital	○ Idiopathic	◉ Not Specified	○ NA
Treatment Encounter	○ Initial	○ Subsequent	◉ Not Specified	○ NA

Find | First 1 of 1 Last

Additional Diagnostic Information | Spine Details

Related Organ System	Diagnostic Descriptor	Laterality	Information Source	Additional Comments
Skeletal-Spine-Other	Stenosis - Spinal	Bilateral	Chart	

Post-Op Diagnosis thoracic stenosis

Procedure Category Spine

All Extradural
- ☐ Cervical
- ☑ Thoracic
- ☐ Lumbosacral

Procedure Code SPIPHTHOR Posterior Thoracic

Spine Levels

Level
17 T9
18 T10
19 T11
20 T12

Procedure Description Thoracic laminectomy decompression T9-T12

Stereotactic Frame Type

Procedure Approach 1 - Open

Maintenance Anesthesia (2) Mixed IV and inhalational

Technical IONM Confounds	◉ No	○ Yes - Resolved	○ Yes - Unresolved	
Anesthetic IONM Confounds	○ No	○ Yes - Resolved	◉ Yes - Unresolved	
Alert Status	○ No	◉ Yes		
Pedicle Wall / Screw Stimulation	◉ No	○ Yes		
Testing/Mapping	◉ No	○ Yes		

Will the CDS Interp Rpt be used? ○ No ◉ Yes

Will Remote Monitors verify the Interp Report? ○ No ◉ Yes

Comments paralytics were given during airway issues and bite block was removed. unable to obtain MEPs once patient was stable.

Save :

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Additional Diagnostic Information | Spine Details

Find | First 1 of 1 Last

Related Organ System	Diagnostic Descriptor	Anatomic Level(s)	Myelopathy	Radiculopathy
Skeletal-Spine-Other	Stenosis - Spinal	T9-T12	Unspecified	Unspecified

Return

CDS Applications

Case Documentation System (CDS)

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS)

Return to Search

Case ID 100000927513 **Patient Name** Goodwin, Crystal

Modalities

Modalities Save

	Description
✓	Somatosensory Evoked Potentials (SSEP)
	Other Sensory Evoked Potentials (OSP)
✓	Train Of Four Testing (TOF)
	Spontaneous Electromyography (spEMG)
	Stimulus Triggered Electromyography (tEMG)
✓	Transcranial Electric Motor Evoked Potentials (tcMEP)
	Direct Cortical Motor Evoked Potentials (dcMEP)
	Trans-spinal / Neurogenic Evoked Potentials (tsNEP)
	Other Monitoring Modalities
	Electroencephalography (EEG)
	Single/Multi-unit Recording

Somatosensory Evoked Potentials (SSEP)

	Description	Side	Monitorability	Likely Cause if Unmonitorable	Comments
✓	Ulnar Nerve	Bilateral	All Recordings Monitorable		
	Median Nerve				
	Radial Nerve				
	Dermatomal UE (List Level in Comments)				
	Other UE SSEP				
✓	Posterior Tibial Nerve	Bilateral	All Recordings Monitorable		
	Femoral Nerve				
	Peroneal Nerve				
	Dermatomal LE/T (List Level in Comments)				
	Saphenous Nerve				
	Sural Nerve				
	Other LE SSEP				

Train Of Four Testing (TOF)

	Description	Side	Monitorability	Likely Cause if Unmonitorable	Comments
	First Dorsal Interosseous				
✓	Abductor Pollicis Brevis	Left	All Recordings Monitorable		
	Thenar Eminence				
	Abductor Digiti Minimi				
	Tibialis Anterior				
	Gastrocnemius				
	Abductor Hallucis				
	Extensor Digitorum Brevis				

Transcranial Electric Motor Evoked Potentials (tcMEP)

Description	Side	Monitorability	Likely Cause if Unmonitorable	Comments
Trapezius				

	Deltoid		
	Biceps Brachii		
	Extensor Carpi Radialis		
	Flexor Carpi Radialis		
	Flexor Carpi Ulnaris		
	Pronator Teres		
	Brachioradialis		
	Triceps		
	First Dorsal Interosseous		
✔	Abductor Pollicis Brevis	Bilateral	All Recordings Monitorable
✔	Abductor Digiti Minimi	Bilateral	All Recordings Monitorable
	Thenar		
	Hypothenar		
	Other UE (Describe in Comment)		
	Intercostals		
	Diaphragm - Phrenic motor nerve		
	Rectus Abdominis		
	Internal / External Oblique		
	Iliopsoas		
	Adductor Longus		
	Quadriceps		
	Quadriceps - Vastus Lateralis		
	Quadriceps - Vastus Medialis		
	Quadriceps - Rectus Femoris		
✔	Tibialis Anterior	Bilateral	All Recordings Monitorable
	Peroneus Longus		
✔	Gastrocnemius	Bilateral	All Recordings Monitorable
	Biceps Femoris		
	Gluteus Maximus / Minimus		
	External Anal Sphincter		
	Extensor Hallucis Longus		
	Extensor Digitorum Brevis		
✔	Abductor Hallucis	Bilateral	All Recordings Monitorable
	Cremaster		
	Other LE/T (Describe in Comment)		
	Inferior Rectus - CN III		
	Superior Oblique - CN IV		
	Masseter - CN V		
	Temporalis - CN V		
	Lateral Rectus - CN VI		
	Frontalis - CN VII		
	Oculi - CN VII		
	Nasalis - CN VII		

Oris - CN VII

Mentalis - CN VII

Soft Palate - CN IX

Vocalis - CN X

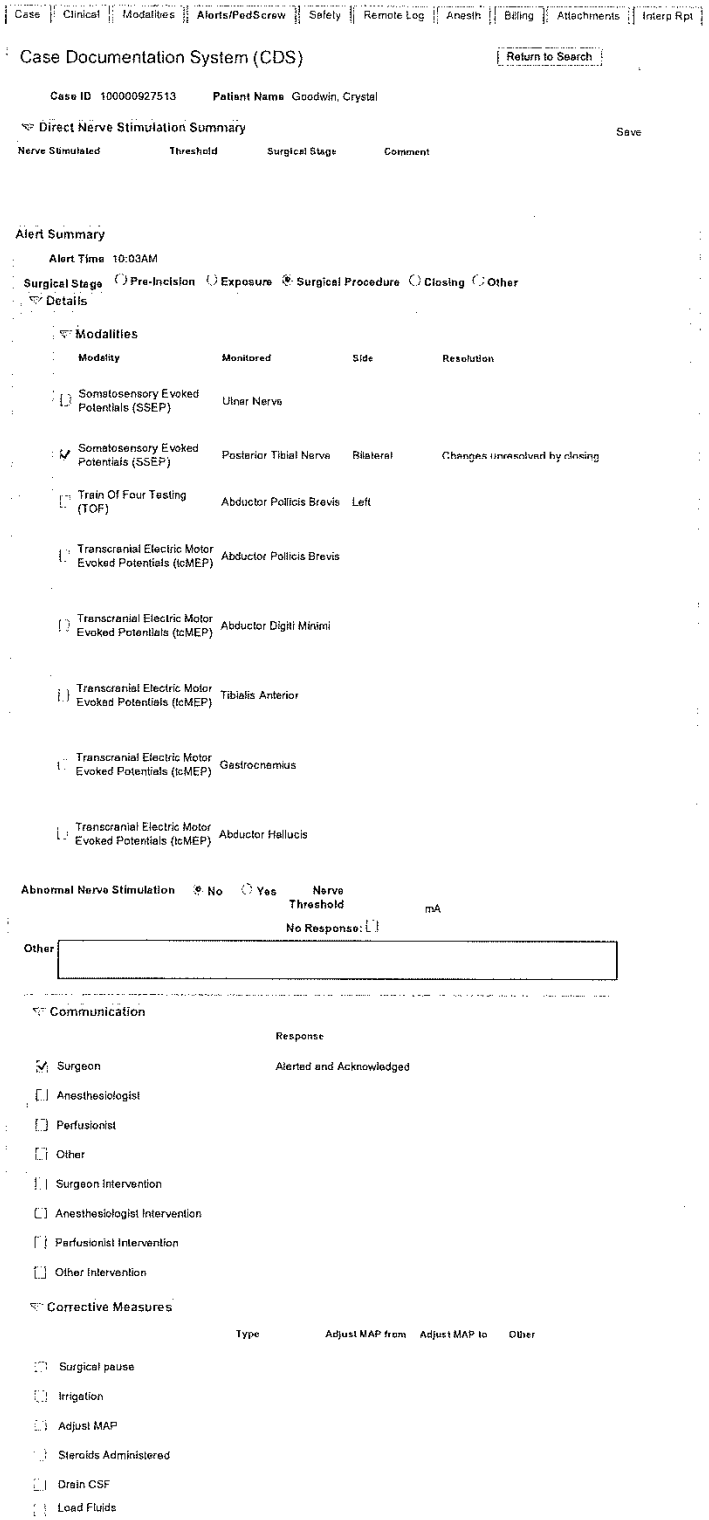
Vocalis - RLN

Trapezius - CN XI

Tongue - CN XII

Other CN Innervated Muscles

Save



Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS) Return to Search

Case ID 100000927513 Patient Name Goodwin, Crystal

Direct Nerve Stimulation Summary Save

Nerve Stimulated	Threshold	Surgical Stage	Comment

Alert Summary

Alert Time 10:03AM

Surgical Stage ○ Pre-Incision ○ Exposure ◉ Surgical Procedure ○ Closing ○ Other

Details

Modalities

	Modality	Monitored	Side	Resolution
☐	Somatosensory Evoked Potentials (SSEP)	Ulnar Nerve		
☑	Somatosensory Evoked Potentials (SSEP)	Posterior Tibial Nerve	Bilateral	Changes unresolved by closing
☐	Train Of Four Testing (TOF)	Abductor Pollicis Brevis	Left	
☐	Transcranial Electric Motor Evoked Potentials (tcMEP)	Abductor Pollicis Brevis		
☐	Transcranial Electric Motor Evoked Potentials (tcMEP)	Abductor Digiti Minimi		
☐	Transcranial Electric Motor Evoked Potentials (tcMEP)	Tibialis Anterior		
☐	Transcranial Electric Motor Evoked Potentials (tcMEP)	Gastrocnemius		
☐	Transcranial Electric Motor Evoked Potentials (tcMEP)	Abductor Hallucis		

Abnormal Nerve Stimulation ◉ No ○ Yes Nerve Threshold mA

No Response: ☐

Other

Communication

	Response
☑ Surgeon	Alerted and Acknowledged
☐ Anesthesiologist	
☐ Perfusionist	
☐ Other	
☐ Surgeon Intervention	
☐ Anesthesiologist Intervention	
☐ Perfusionist Intervention	
☐ Other Intervention	

Corrective Measures

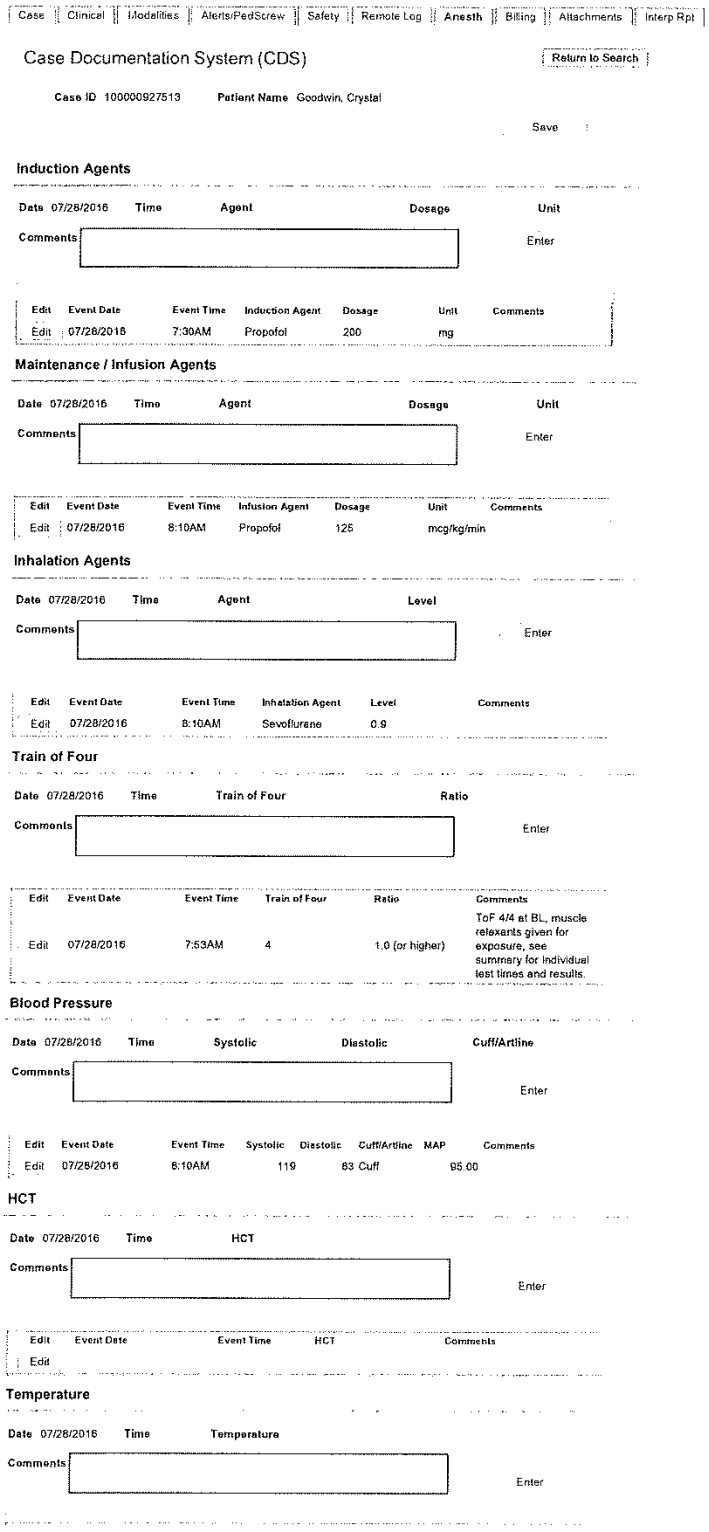
	Type	Adjust MAP from	Adjust MAP to	Other
☐ Surgical pause				
☐ Irrigation				
☐ Adjust MAP				
☐ Steroids Administered				
☐ Drain CSF				
☐ Load Fluids				

- [ ] Administer Blood Products
- [ ] Adjust Head/Neck position
- [ ] Adjust UE position
- [ ] Adjust LE position
- [ ] Adjust Other Position
- [ ] Decrease Weights / Traction
- [ ] Adjust Instrumentation
- [ ] Remove Instrumentation
- [ ] Stage surgical procedure
- [ ] Terminate Procedure
- [ ] Procedure changes
- [ ] Other
- [x] None

Comments

Save

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt



Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS) Return to Search

Case ID 100000927513 Patient Name Goodwin, Crystal

Save

Induction Agents

Date 07/28/2016 Time Agent Dosage Unit

Comments Enter

Edit	Event Date	Event Time	Induction Agent	Dosage	Unit	Comments
Edit	07/28/2016	7:30AM	Propofol	200	mg	

Maintenance / Infusion Agents

Date 07/28/2016 Time Agent Dosage Unit

Comments Enter

Edit	Event Date	Event Time	Infusion Agent	Dosage	Unit	Comments
Edit	07/28/2016	8:10AM	Propofol	125	mcg/kg/min	

Inhalation Agents

Date 07/28/2016 Time Agent Level

Comments Enter

Edit	Event Date	Event Time	Inhalation Agent	Level	Comments
Edit	07/28/2016	8:10AM	Sevoflurane	0.9	

Train of Four

Date 07/28/2016 Time Train of Four Ratio

Comments Enter

Edit	Event Date	Event Time	Train of Four	Ratio	Comments
Edit	07/28/2016	7:53AM	4	1.0 (or higher)	ToF 4/4 at BL, muscle relaxants given for exposure, see summary for individual test times and results.

Blood Pressure

Date 07/28/2016 Time Systolic Diastolic Cuff/Artline

Comments Enter

Edit	Event Date	Event Time	Systolic	Diastolic	Cuff/Artline	MAP	Comments
Edit	07/28/2016	8:10AM	119	83	Cuff	95.00	

HCT

Date 07/28/2016 Time HCT

Comments Enter

Edit	Event Date	Event Time	HCT	Comments
Edit				

Temperature

Date 07/28/2016 Time Temperature

Comments Enter

Edit	Event Date	Event Time	Temperature	Comments
Edit	07/28/2016	8:10AM	35.6	

Save

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

CDS Applications

Case Documentation System (CDS)

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS)

Return to Search

Case ID 100000927513 **Patient Name** Goodwin, Crystal

Billing Information

Scheduled Start	7:30AM	**First Contact with Patient**	7:05AM
Clinician Arrival	6:24AM	**Clinician Departure**	12:45PM
Pt. In Room	7:24AM	**Pt. Out Room**	11:49AM
First Electrode Placed	7:35AM	**Last Electrode Removed**	11:15AM
IONM Recordings Started	7:53AM	**IONM Recordings Concluded**	11:00AM
Post Baselines	8:03AM		
Skin Incision	8:08AM	**Skin Closed**	11:02AM
Anesthesia Start	7:19AM	**Anesthesia Stop**	11:54AM

Save | Billing Submit | Create Billing Sheet

**All times must be based on the same clock used by OR staff **Time Format: 1525 or 0325PM

Billable Hours 5.00

Charges / Disposables

Charges

*Item ID	Description	Quantity	UOM	Comments	Status
750000		5.00			
750402	IONM Supplies-Per Case	1.00	EA		

Disposables

*Inv BU	Item ID	Description	No SC Disp Used	Lot	Serial Nbr	Quantity	UOM	Comments	Status
8594C	10004649	*DNO* Single Needle Electrode,				1	EA		I
8594C	10006551	Paired Twisted Needle Electro				6	PR		
8594C	10006552	6 Lead Twisted Needle Electro				1	EA		
8594C	10007488	Paired Surface Sticky Electrod				2	PK		

Comments

Neurophysiologic Tests Performed

CPT Code	Services Rendered	Units	Explanation of Use
IONM	Intraoperative neurophysiology testing		Do not use for Functional cortical / subcortical mapping - Use Codes 95961 / 95962

Somatosensory Evoked Potentials

CPT Code	Professional Services Rendered	Units	Explanation of Use
95925	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper limbs		Use if monitoring upper extremity SSEPs or upper extremity dermatomal SSEPs or upper extremity Phase Reversal mapping. Do not use if monitoring lower extremity SSEPs as well
95926	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in lower limbs		Use if monitoring lower extremity SSEPs or lower extremity dermatomal SSEPs or lower extremity Phase Reversal mapping. Do not use if monitoring upper extremity SSEPs as well
	Short-latency somatosensory evoked		Use for epidural SSEPs, Neurogenic EPs, or

	95927	potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in the trunk or head	other intra-spinal somatosensory evoked potential recording including dorsal column stimulator mapping, and trigeminal evoked potentials
	95938	Short-latency somatosensory evoked potential study, stimulation of any/all peripheral nerves or skin sites, recording from the central nervous system; in upper and lower limbs,	Use if monitoring upper AND lower extremity SSEPs and/or dermatomal SSEPs with or without phase reversal. DO NOT USE 95925 and 95926

Transcranial motor Evoked Potentials

CPT Code	Professional Services Rendered	Units	Explanation of Use
95928	Central motor evoked potential study (transcranial motor stimulation); upper limbs		Use if monitoring tceMEPs of upper extremity muscles and/or cervical D-waves ONLY Do not use if monitoring lower extremity tceMEPs as well
95929	Central motor evoked potential study (transcranial motor stimulation); lower limbs		Use if monitoring tceMEPs of lower extremity muscles and/or thoracic D-waves ONLY Do not use if monitoring upper extremity tceMEPs as well
95939	Central motor evoked potential study (transcranial motor stimulation) in upper and lower limbs		Use if monitoring tceMEPs from upper AND lower extremity muscles and/or cervical and thoracic D-waves DO NOT USE 95928 and 95929
95870	Electromyography; limited study of muscles in one extremity or non-limb (axial) muscles (unilateral or bilateral), other than thoracic paraspinal, cranial nerve supplied muscles, or sphincters		Use this code for TceMEPs from the external anal sphincter muscle.

Auditory & Visual Evoked Potentials

CPT Code	Professional Services Rendered	Units	Explanation of Use
92586	Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; limited		Use anytime you record BAERs unilaterally.
92585	Auditory evoked potentials for evoked response audiometry and/or testing of the central nervous system; comprehensive		Use anytime you record a BAERs bilaterally.
92584	Electrocochleography		Use when doing direct 8th nerve recordings
95930	Visual evoked potential (VEP) testing central nervous system, checkerboard or flash		Use anytime you record an intraoperative VEP.
92270	Electro-oculography with interpretation and report		Use anytime you record eye movement EXCEPT for when you're monitoring CN III, IV, and VI or their respective nuclei

Nerve Conduction Velocity (NCV) Studies

CPT Code	Services Rendered	Units (or Left)	Explanation of Use
95937	Neuromuscular junction testing (repetitive stimulation, paired stimuli), each nerve, any one method		(# Nerves Stimulated) Use for TOF monitoring. # Units= # nerves stimulated. e.g. Lt Ulnar & PTN TOF=2 units. TOF from both UE & LE=4 units.
51792	Stimulus evoked response (eg, measurement of bulbocavernosus reflex latency time)		Use whenever doing BCR Recordings (eg during cauda equina surgery or sacral plexus surgery).
92516	Facial nerve function studies (e.g electroneuronography)		Peripheral facial nerve monitoring using electroneuronography (eg parotidectomies)
NCS	Nerve conduction studies		(# Nerves Stimulated) Use for all direct and indirect nerve stimulated EMG EXCEPT pedicle screw testing: (1) Sensory or Motor Spinal Roots and Cranial Nerves stimulated directly (1 unit per nerve) OR 2) Sensory and Motor cranial / spinal nerves identified through indirect stimulation (e.g. through tumor). OR 3) CNAPs from peripheral nerves*SEE FAQs* for details about how to count # nerves identified. If spEMG was performed, also select 95885, 95886, and 95887 as appropriate

95885	Needle electromyography: each extremity, with related paraspinal areas, when performed, done with nerve conduction, amplitude and latency / velocity study; limited	(# Limbs) Use in conjunction with NCS when recording from 4 or fewer muscles in one limb, or when assessing 2 or fewer nerves / 3 or fewer spinal nerve levels. Do not use for thoracic stEMG or CN EMG.
95886	Needle electromyography: each extremity, with related paraspinal areas, when performed, done with nerve conduction, amplitude and latency / velocity study; complete, five or more muscles studied, innervated by three or more nerves or four or more spinal levels	(# Limbs) Use in conjunction with NCS when recording from 5 or more muscles in one limb, or when recording from multiple muscles bilaterally if innervated by 3 or more nerves or 4 or more spinal levels. Do not use for thoracic stEMG or CN EMG.
95887	Needle electromyography: non-extremity (cranial nerve supplied or axial) muscle(s) done with nerve conduction, amplitude and latency / velocity study (List separately in addition to code for primary procedure)	Use in conjunction with NCS when recording from spEMG + stEMG from non limb muscles such as from cranial nerve innervated muscles, thoracic/abdominal muscles or anal sphincter.
95905	Motor and/or sensory nerve conduction, using preconfigured electrode array (s), amplitude and latency/velocity study, each limb includes F-Wave Study	(# Limbs) Use for intraoperative F-wave or H-reflex Recording.

EEG/Electrocorticography/Cortical Mapping

CPT Code	Professional Services Rendered	Units	Explanation of Use
95812	Electroencephalogram (EEG) extended monitoring 41-60 minutes.		Use for EEG monitoring for 1st 41-60min any time there is significant risk for changes in cerebral perfusion .(Intracranial AVMs / Aneurysms / Tumors / Chiaris, Spine Cases with high risk for cerebrovascular compromise) EXCEPT during carotid / cardiac / aortic aneurysm cases (use 95955 for those). Also select 95813 if EEG monitoring >1hr
95813	Electroencephalogram (EEG) extended monitoring greater than 1 hour.		Use for EEG monitoring > 1 hour any time there is significant risk for changes in cerebral perfusion .(Intracranial AVMs / Aneurysms / Tumors / Chiaris, Spine Cases with high risk for cerebrovascular compromise) EXCEPT during carotid / cardiac / aortic aneurysm cases (use 95955 for those). Also select 95812
95955	Electroencephalogram (EEG) during non intracranial surgery; (e.g. Carotid Surgery)		Use for EEG monitoring: 1) carotid artery surgery 2) cardiac 3) aortic aneurysm surgery. All other cases where EEG is used to monitor cerebral perfusion use 95813
95961	Functional cortical and subcortical mapping by stimulation and/or recording of electrodes on brain surface, or of depth electrodes, to provoke seizures or identify vital brain structures; initial hour		Use for motor, sensory and/or speech cortex mapping: 1) direct cortical stimulation with tceMEPS, 2) direct cortical stimulation for speech/language arrest, 3) deep brain stimulation for Parkinsons or other movement disorders. 1st Hr. Only - additional hours use 95962; DO NOT USE 95920
95962	Functional cortical and subcortical mapping by stimulation and/or recording of electrodes on brain surface, or of depth electrode each additional hour.		Same as 95961. Use 95961 for the first hour Units = total time minus 1 hour. 1st hour charge is CPT 95961; DO NOT USE 95920
95829	Electrocorticogram at surgery (separate procedure)		Use for cases involving electrocorticography for identification of seizure foci during epilepsy surgery.

Transcranial Doppler

CPT Code	Professional Services Rendered	Units	Explanation of Use
93888	Transcranial Doppler study of the intracranial arteries; Limited Study		Use when recording TCD during cardiac or other vascular surgery or during neurosurgery for management of cerebral aneurysm OR in the ICU.

Electromyography (EMG)

CPT Code	Professional Services Rendered	Units	Explanation of Use
95870	Electromyography; limited study of muscles in one extremity or non-limb (axial) muscles (unilateral or bilateral), other than thoracic paraspinal, cranial nerve supplied muscles, or sphincters		(# Limbs Monitored)Use for spEMG monitoring or pedicle screw testing when recording from 4 or fewer muscles in one limb, or when assessing 2 or fewer nerves / 3 or fewer spinal nerve levels. Bill 1 unit per limb. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95885)

Goodwin_SpecialtyCare_0018

ROA_2106

95870	Electromyography: limited study of muscles in one extremity or non-limb (axial) muscles (unilateral or bilateral), other than thoracic paraspinal, cranial nerve supplied muscles, or sphincters	Use for spEMG monitoring for thoracic nerve roots and/or pedicle screws testing (intercostals, rectus abdominis, external / internal obliques). DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
95860	Electromyography: One Extremity with or without paraspinal areas	Use for spEMG or pedicle screw testing from 5 or more muscles in ONE Upper or Lower extremity (e.g. spEMG monitoring during peripheral nerve surgery, shoulder surgery, etc. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95886)
95861	Electromyography: Two Extremities with or without paraspinal areas	Use for spEMG or pedicle screw testing from 5 or more muscles PER limb. If less than 5 muscles PER limb use 95870 with 2 units. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95886)
51785	Electromyography of anal or urethral sphincter, any technique.	Use for spEMG from anal sphincter muscles with subdermal needle electrodes (lumbosacral surgeries). DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
51784	Electromyography of anal or urethral sphincter other than needle, any technique.	Use for spEMG from the anal or urethral sphincter muscles (lumbosacral surgeries) with foam anal plug electrode, urethral catheter electrode, etc. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
95869	Electromyography: Thoracic paraspinal muscles (excluding T1 or T12)	Use for spEMG monitoring from thoracic paraspinal muscles only. DO NOT USE THIS CODE in conjunction with 95907 - 95913. For spEMG from abdominal wall (rectus abdominis, external / internal obliques) or intercostals, use 95870
95863	Electromyography: Three Extremities with or without paraspinal areas	Use for spEMG or pedicle screw testing from 5 or more muscles PER limb. If less than 5 muscles PER limb use 95870 with 3 units. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95886)
95864	Electromyography: All Four Extremities with or without paraspinal areas	Use for spEMG or pedicle screw testing from 5 or more muscles PER limb. If less than 5 muscles PER limb use 95870 with 4 units. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95886)
95865	Electromyography: muscles of the larynx	Use for spEMG from laryngeal muscles for thyroidectomy, ACD, posterior fossa tumors, etc . DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
95867	Electromyography: cranial nerve supplied muscle(s), unilateral	spEMG monitoring of all CN supplied muscles monitored unilaterally (except CN 3,4,6 see 92265 or CN10 see 95865). DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
95868	Electromyography: cranial nerve supplied muscle(s), bilateral	Use for spEMG monitoring of all CN supplied muscles monitored bilaterally (except CNs 3, 4,6 see 92265 or 10 see CPT 95865). DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
92265	Needle oculoelectromyography , one or more extraocular muscles, one or both eyes, with interpretation and report	Use for spEMG from extraocular muscles when monitoring any or all upper CNs 3,4, 6 during posterior fossa surgery. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)
95866	Electromyography: Hemidiaphragm	Use for spEMG from electrodes placed by surgeon into the diaphragm. DO NOT USE THIS CODE if you also did direct nerve stEMG (use code 95887)

Clinical Studies

CPT Code	Professional Services Rendered	Units	Explanation of Use
95970	Electronic analysis of implanted neurostimulator pulse generator system; simple or complex brain, spinal cord, or peripheral neurostimulator pulse generator/transmitter, without reprogramming		FOR CLINICAL STUDIES ONLY - Office programming of stimulator

	95971	Electronic analysis of implanted neurostimulator pulse generator system; simple spinal cord, or peripheral neurostimulator pulse generator/transmitter, with intraoperative or subsequent programming	FOR CLINICAL STUDIES ONLY - Office programming of stimulator
	95972	Electronic analysis of implanted neurostimulator pulse generator system; complex spinal cord, or peripheral neurostimulator pulse generator/transmitter, with intraoperative or subsequent programming, first hour	FOR CLINICAL STUDIES ONLY - Office programming of stimulator
	95973	Electronic analysis of implanted neurostimulator pulse generator system; complex spinal cord, or peripheral; complex brain, spinal cord, or peripheral neurostimulator pulse generator/transmitter, with intraoperative or subsequent programming, additional 30 minutes after hour	FOR CLINICAL STUDIES ONLY - Office programming of stimulator
	95885	Needle electromyography : each extremity, with related paraspinal areas, when performed, done with nerve conduction, amplitude and latency/velocity study; limited	FOR CLINICAL STUDIES ONLY - Use in conjunction with 95907-95913 when recording from 4 or fewer muscles in each limb. Do not use for thoracic stEMG or CN EMG
	95886	Needle electromyography:each extremity, with related paraspinal areas, when performed, done with nerve conduction, amplitude and latency/velocity study; complete, five or more muscles studied, innervated by three or more nerves or four or more spinal levels	FOR CLINICAL STUDIES ONLY - Use in conjunction with 95907-95913 when recording from five or more muscles, innervated by three or more nerves or four or more spinal levels, Do not use for thoracic stEMG or CN EMG
	95887	Needle electromyography : non-extremity (cranial nerve supplied or axial) muscle(s) done with nerve conduction, amplitude and latency/velocity study (List separately in addition to code for primary procedure)	FOR CLINICAL STUDIES ONLY - Use in conjunction with 95907-95913 when recording from spEMG + stEMG from cranial nerve, thoracic/abdominal muscles or anal sphincter
	NCS	Nerve conduction studies	(# Nerves Stimulated) Use for all direct and indirect nerve stimulated EMG EXCEPT pedicle screw testing: (1) Sensory or Motor Spinal Roots and Cranial Nerves stimulated directly (1 unit per nerve) OR 2) Sensory and Motor cranial / spinal nerves identified through indirect stimulation (e.g. through tumor), OR 3) CNAPs from peripheral nerves*SEE FAQs* for details about how to count # nerves identified. If spEMG was performed, also select 95885, 95886, and 95887 as appropriate
	95999	Unlisted neurological or neuromuscular diagnostic procedure	Use when performing DSEPs per nerve root. Or specify in the notes section other specific testing not found in other sections above.

PALMETTO HEALTH BAPTIST

TAYLOR AND MARION ST.
COLUMBIA, SC 29220

INPATIENT ADMISSION FORM

PATIENT ACCOUNT NO.	SERVICE DATE & TIME	DISCHARGE DATE & TIME	PT TYPE	AC	EV CODE	ADMT SOURCE	TYPE	PTN CLASS	STATION ROOM BED	MEDICAL RECORD NO
1620200813	07/28/2016 00:30		PAB		SUR	1	3	72	OPS	000275536

ACCIDENT TYPE	ACCIDENT DATE & TIME	DENOMINATION	CHURCH	PUBLICITY	LIVING WILL
		None	NONE	YES DIRECTORY	No

NAME AND ADDRESS	SOCIAL SECURITY NUMBER	EMPLOYER	OCCUPATION
GOODWIN, CRYSTAL JAQUAY 903 GREENLAWN DRIVE COLUMBIA SC 29209	251492070 COUNTY: Richland PHONE: (803)743-9407	UNEMPLOYED	UNEMPLOYED STATUS: Not Employed PHONE:

SEX	RACE	MARITAL STATUS	DATE OF BIRTH	AGE	DATE OF LAST VISIT	MOTHER'S MAIDEN NAME	PLACE OF BIRTH
F	81	M	03/02/1978	38Y	05/14/2014	JACKSON	SC

GUARANTOR NAME AND ADDRESS	SOCIAL SECURITY NUMBER	GUARANTOR EMPLOYER	OCCUPATION
GOODWIN, CRYSTAL JAQUAY 903 GREENLAWN DRIVE COLUMBIA SC 29209	251-49-2070 RELATIONSHIP: Self PHONE: (803)743-9407	UNEMPLOYED	UNEMPLOYED STATUS: Not Employed PHONE:

NOTIFY IN CASE OF EMERGENCY		NEXT OF KIN	
GOODWIN' JAMES D 903 GREENLAWN DRIVE COLUMBIA SC 29209	RELATIONSHIP: Spouse PHONE: (803)743-9407		RELATIONSHIP PHONE

INSURANCE 1	INSURANCE 2	INSURANCE 3	INSURANCE 4
BCBS PPC/PREFERRED BLUE GOODWIN, JAMES D ZCW052657245612 PO BOX 100300 COLUMBIA SC 29202 INSURED DOB: 03/23/1978	1500 BCBS PPC GOODWIN, JAMES D ZCW052657245612 PO BOX 100300 COLUMBIA SC 29202 INSURED DOB: 03/23/1978	INSURED DOB:	INSURED DOB:

ADMITTING DIAGNOSIS/CHIEF COMPLAINT	DATE OF LAST VISIT	ADMITTING PHYSICIAN	ADM PHY PHONE
THORACIC STENOSIS	05/14/2014	437 HOLBROOK, THOMAS J JR	(803)794-3700

ORGAN DONOR	Shared Care Physician	Primary Care Physician
N		

THIS SECTION FOR INPATIENT USE (ER/OUTPATIENT OPTIONAL)

FINAL DIAGNOSIS	CODE NUMBER	DRG DATA
HX RESISTANT ORG		PROVISIONAL DRG ALOS DATE ASSIGNED DISCHARGE STATUS PROJECTED 1. = HOME/SELF CARE (ROUTINE) 2. = ANOTHER SHORT TERM GENERAL HOSPITAL 3. = SNF 4. = ICF 5. = HOSPITAL OTHER THAN SHORT TERM 6. = HOME WITH HOME HEALTH CARE SERVICE AID FINAL 1. = HOME/SELF CARE (ROUTINE) 2. = ANOTHER SHORT TERM GENERAL HOSPITAL 3. = SNF 4. = ICF 5. = HOSPITAL OTHER THAN SHORT TERM GENERAL 6. = HOME WITH HOME HEALTH CARE SERVICE AID 7. = LEFT AMA 20. = EXPIRED

DATE	OPERATION/SPECIAL PROCEDURES

CONSULTATION WITH

RESULTS
ORECOVERED
ONOT TREATED ODIED UNDER 48 HOURS
OIMPROVED ODIED OVER 48 HOURS
ONOT IMPROVED OAUTOPSY

INFECTIONS
ONOSOCOMIAL
OPOST-OP
OOTHER
OCOMMUNITY ACQUIRED

"I certify that the narrative descriptions of the principal and secondary diagnoses and the major procedures performed are accurate and complete to the best of my knowledge."

DATE ATTENDING PHYSICIAN

Printed on 07/21/2016 06:31 AM

PALMETTO HEALTH
HISTORY and PHYSICAL

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536 HOLBROOK, THOMAS .
03/02/1978 38Y F

* **Name** _____ **Age** _____ **Sex** _____
* **Chief Complaint** Back and leg pain
* **History of Present Illness (Onset, Duration, Cause)** Left knee pain exacerbated by standing for long periods of time.

Family History Non-contributory
Habits and Social History Never-smoker, married
* **Past Medical History(Injuries, Operations, etc)** HTN, Arthritis
* **Review of Systems** Negative
* **Allergies** NKDA
* **Current Medications** _____

* **Physical Exam** **Temp** _____ **Pulse** _____ **Resp** _____ **BP** _____ **Weight** _____
HEENT NC/AT
* **Mental Status (Alert, Oriented, etc)** A+Ox3. Speech is clear
* **Heart & Lungs** RRR, CTAB
Abdomen Normal Active Bowel sound
Genitourinary _____
Breast _____
Extremities: _____
Labs: _____
Other Pertinent Findings S/S pain in upper & lower back, ↓ ROM

Indication for Surgical Procedure Failed Conservative Treatment
Informed Consent Discussed prior to procedure, if indicated: Yes ✓ **NA** _____
* **Admitting Diagnosis** Thoracic stenosis
* **Plan** Thoracic decompression T9-T12
Physician Signature Marcus Kelly PA-C **Date/Time** 7/20/16 7:05 AM
* **DENOTES REQUIRED INFORMATION**

SpecialtyCare

CONSENT FOR TREATMENT - ASSIGNMENT OF BENEFITS - AUTHORIZATION

Informed Consent for Intraoperative Neurophysiological Monitoring (IONM)

1. The nature, purpose, benefits, and risks of IONM have been explained to me by the clinician. We also discussed possible alternatives to IONM. No guarantee or assurance has been given as to the results that may be obtained.

2. IONM, as with all medical procedures, is not without risk. The potential risks, which have been explained to me, include, but may not be limited to, seizure, skin burn/tear, tongue bite, dental damage, hematoma/bruising, infection, missed detection of neurologic injury/paralysis/neurologic loss, and device malfunction/failure.

3. This procedure may include remote neuromonitoring by a physician or other neuromonitoring professional utilizing telemedicine and working with a neurophysiologist who will be in the operating room. The potential risks associated with telemedicine, which have been explained to me, include, but may not be limited to, information transmitted may not be sufficient to allow for appropriate medical decision making, delays in treatment could occur due to deficiencies or failure of equipment, software or connectivity, security protocols could fail which may result in unintended disclosure of my confidential medical information, and a *lack of access to complete medical records that may result in errors in medical judgment.*

4. I recognize that unforeseen conditions arising during the course of IONM may necessitate additional or different procedures or an extension of IONM. I further authorize and request that such additional or different procedures as are clinically appropriate be performed on me.

5. Having read this form and talked to the clinician, my signature below acknowledges that I voluntarily give my authorization and consent for IONM.

6. The foregoing information has been explained to me in terms that I understand and I have been given an opportunity to ask questions.

X _____	X _____	X _____
Patient/Authorized Party Signature	Clinician	Signature Witness
Print Name: Crystal Goodwin	Print Name: Teresa Adkins CRNP	Print Name: Mauro Ruiz
Date: 7/28/16 Time: 7:09	Date: 7/28/2016 Time: 0709	Date: 7/28/16 Time: 0709

If signed by person other than patient, relationship of Authorized Party: _____

If applicable, to be completed SpecialtyCare clinician:

Patient/Authorized Person unable to sign because: _____

Clinician name: _____ **Date:** _____ **Time:** _____

Financial Responsibility - Assignment of Benefits - Release of Records

I understand that my physician has ordered the services of SpecialtyCare and/or its affiliates (Active Diagnostics, Active Diagnostics of Nevada, Remote Neuromonitoring Physicians, SpecialtyCare IOM Services, and Surgical Monitoring Associates (collectively, "Providers")) to provide IONM during my procedure. Regarding the IONM services, I hereby assign to Providers all medical benefits, insurance reimbursement, and fiduciary duty and other legal claims concerning medical expenses incurred. I hereby authorize and direct my insurance carrier(s), including private insurance and any other health/medical plan, to issue payment check(s) directly to Providers for medical services rendered to myself and/or my dependents regardless of my insurance benefits, if any. I understand that I am responsible for any amount not covered by insurance, including, but not limited to, deductible and co-insurance amounts, and any increased financial obligations if Providers are out-of-network. I hereby authorize the release by Providers of my medical records to my insurer(s) for claims processing purposes, and to my referring physician and other healthcare providers involved in my care.

X _____ Date: 7/28/16 Time: 7:09
Patient/Authorized Party Signature

Medicare Authorization of Benefits

I hereby authorize Providers to file claims to Medicare and I authorize Medicare to issue payment check(s) directly to Providers for eligible, covered medical services rendered to me and acknowledge personal responsibility to pay for related non-covered deductible and co-insurance amounts due, if any up to the Medicare allowable amount. I hereby authorize the release by Providers of my medical records to Medicare for claims processing purposes, and to my referring physician and other healthcare providers involved in my care. I permit a copy of this authorization to be used in place of the original.

X _____ Date: 7/28/16 Time: 7:09
Patient/Authorized Party Signature

Consent for Use and Disclosure of Information

I hereby give my consent for Providers to use and disclose protected health information ("PHI") about me to carry out treatment, payment and health care operations ("TPO"). I acknowledge that my de-identified PHI may be used by Providers or disclosed to third parties for research, educational and other purposes that are not TPO.

X _____ Date: 7/28/16 Time: 7:09
Patient/Authorized Party Signature

Florida Only: To report suspected Medicaid fraud, please call AHCA Medicaid Program Integrity toll-free at (888) 419-3456 or the Attorney General toll free at (866) 966-7226. To report a complaint regarding the services you receive, please call AHCA toll-free at (888) 419-3456. To report abuse, neglect, or exploitation, please call the Florida Abuse Hotline toll-free at (800) 962-2873. The AHCA license number for Remote Neuromonitoring Physicians, PC (RNP) is 9786 and the Medical Director for RNP is Dr. Jason Sorlano.
Pursuant to Fla. Stat. §626.9892 the Department of Financial Services may pay rewards up to $25,000 to persons providing information leading to the arrest and conviction of persons committing crimes investigated by the Division of Insurance arising from violations of §§ 440.105, 624.15, 626.9541, 626.989 or 817.234, Fla. Stat.

Physician Order

I authorize Providers to perform IONM services for the above patient, which services I deem medically necessary.

X _____ Date: 7/28/16 Time: 1057
Physician Signature

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536 HOLBROOK, THOMAS J JR
03/02/1978 38Y F

Remit address: Dept 1748, PO Box 11407, Birmingham, AL 35246-1748 • 888-203-4247 • 888-839-5548 facsimile • specialtycare.net

SpecialtyCare

Purchase Request

Date	07-27-2016
Hospital	Palmetto Health Baptist
City, State	Columbia, SC
Physician	Dr. Holbrook, MD

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536 HOLBROOK, THOMAS J JR
03/02/1978 38Y F

	X	**Bill Only**
		Shelf Order
		Other
		Rush

Reference #	Lot #	Description	Qty.	Unit/Hrs	Price	Price Total
		IOM Time: Patient in 09:24	5.0	Hrs	$150.00	$500.00 (capped)
		Patient out 11:49				
		Supplies	1		$50.00	$50.00
					Total $	550.00

Please Submit to: SpecialtyCare IOM Services, LLC. Department 1614 P.O Box 11407 Birmingham, Al 35246-161614

Technologist:	Teresa N. Adkins, CNIM
Contact Number:	803-414-6404

Procedure:	Thoracic Laminectomy TP+2
Chart #:	000275536
Comments:	SSEP, MEP, TOF

Print Time: 7/28/2016 11:00:57

PATIENT INFORMATION REPORT

Personal

PATIENT ID:	072816-1	SEX:	Female	ADDRESS:	903 GREENLAWN DR
LAST NAME:	GOODWIN	DATE OF BIRTH:	03/02/1978	CITY:	COLUMBIA
FIRST NAME:	CRYSTAL	HEIGHT:		STATE:	SC
M.I.:	J.	WEIGHT:		ZIP:	29209
SSN:	251-49-2070	HOME PHONE:		CELL PHONE:	
MEDICAL REC.:	000275536				
PHYSICIAN:	Dr. Thomas J. Holbrook MD				

NOTES: dx: Thoracic stenosis
Thoracic lami decompression T9-T12
Remote Monitoring: Gregg, Herb E

Preop: no contraindications for MEP noted, pt states having a little bit of back pain, bilateral leg pain, bilateral numbness/tingling in legs and feet, pt denies pain/numbness/tingling in upper extremities.
Clinical hx: 38-year-old female w/ back pain and leg pain, left knee pain exacerbated by standing for long periods of time, pt returns for thoracic stenosis.

Pat: CRYSTAL GOODWIN
ID: 072816-1

SpecialtyCare TA Thoracolumbar

SUMMARY REPORT

Data Time: 7/28/2016 11:00:57
Print Time: 7/28/2016 11:00:57
Operator: Teresa N. Adkins, CNIM

06:58:19 Patient in room @»0724

06:58:21 Procedure:»Crystal Goodwin, dob 03.02.1978, CaseID: 100000927513, Thoracic lami decompression T9-T12

06:58:23 Modalities:»Surgeon and anesthesia consulted, surgeon accepted SSEP, MEP, Tof. MEP stimulated at surgeon's request only during procedure. Soft bite block placed by CRNA, CONFIRMED

06:58:27 Remote monitoring:»Gregg, Herb E

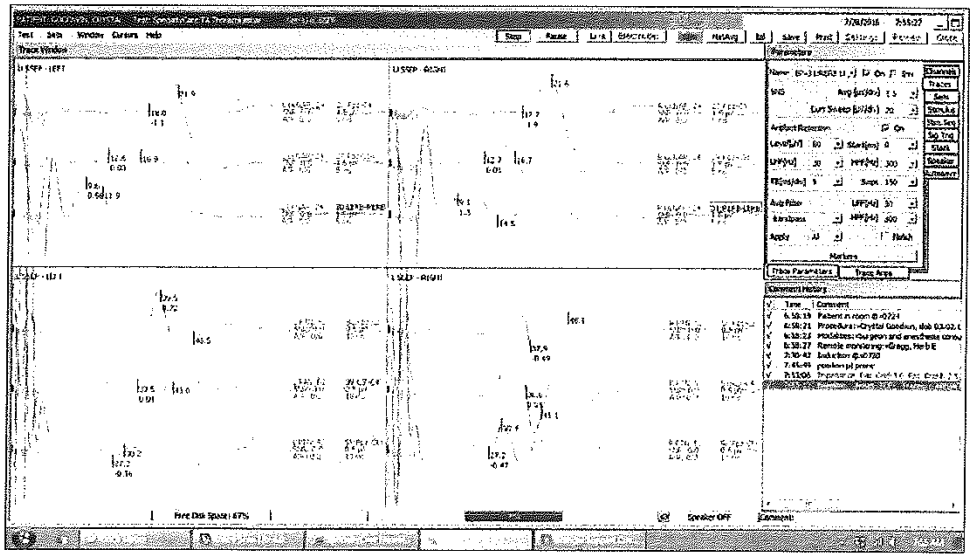
07:30:42 Induction @»0730

07:45:49 position pt prone

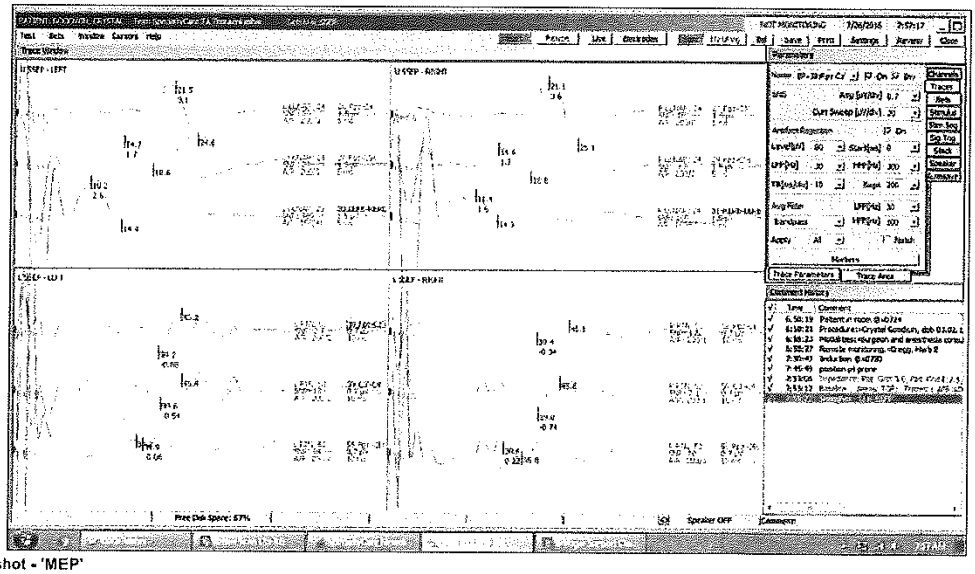
07:53:06 Impedance: Pat. Gnd:3.0, Pat. Gnd B:2.5,
Fpz:1.0, Cz':1.0, C3':1.1, C4':0.6, C5s:1.0, LERB:1.1, RERB:1.7,
LAPB:1.4, RAPB:1.2,
LADM:1.8, RADM:1.3,
LIc+:Open, LI+:Open, LRA+:Open, LSa+:Open, RIc+:Open, RI+:Open, RRA+:Open, RSa+:Open,
LIc-:Open, LI-:Open, LRA-:Open, LSa-:Open, RIc-:Open, RI-:Open, RRA-:Open, RSa-:Open,
LQ+:Open, LTA+:1.5, LAH+:1.1, ANS+:Open, RQ+:Open, RTA+:1.6, RAH+:1.0,
Lq-:Open, LTA-:2.6, LAH-:0.9, ANS-:Open, RQ-:Open, RTA-:2.9, RAH-:0.9,

07:53:12 Baseline.
Areas: TOF;
Traces: L APB/ADM[2], L APB/ADM[3], L APB/ADM[4], L APB/ADM

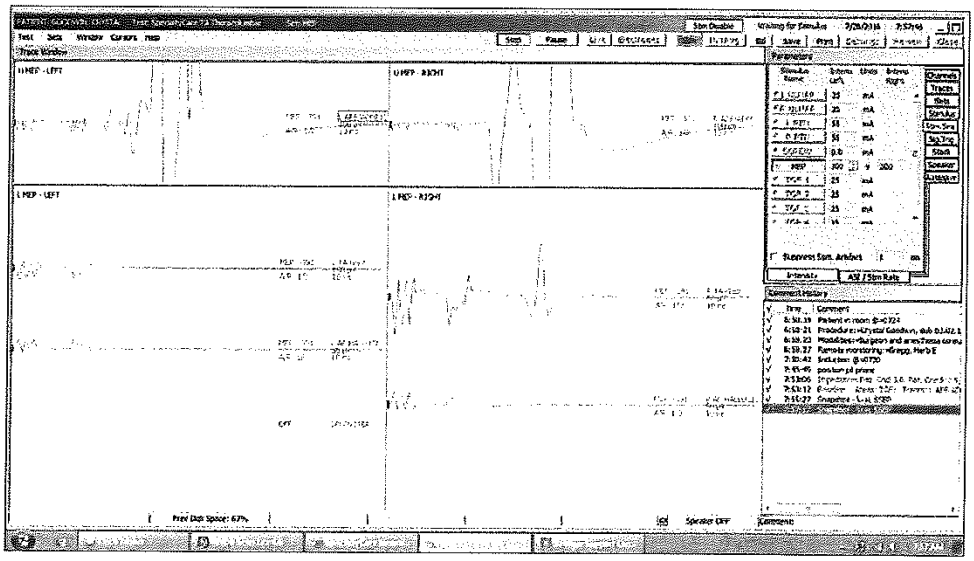
07:55:27 Snapshot - 'U+L SSEP'



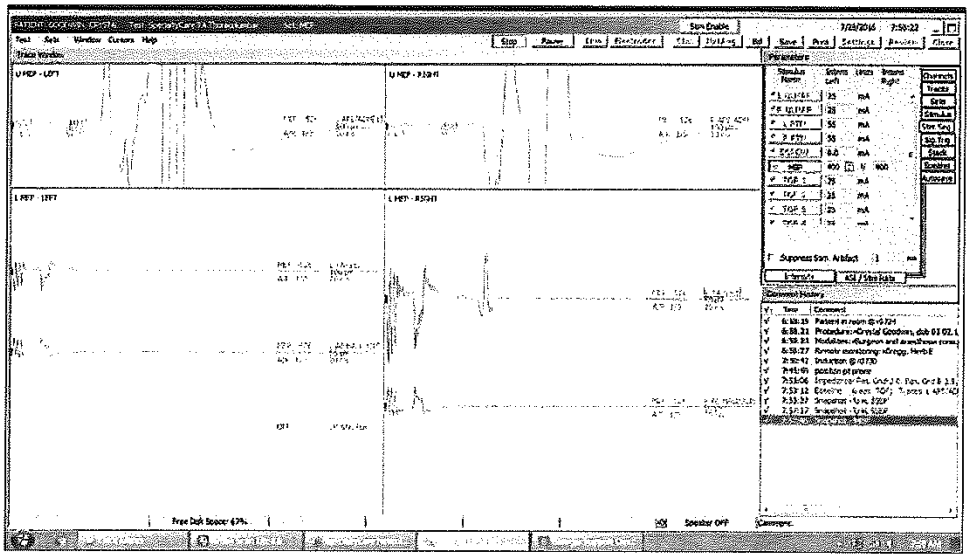
07:57:17 Snapshot - 'U+L SSEP'



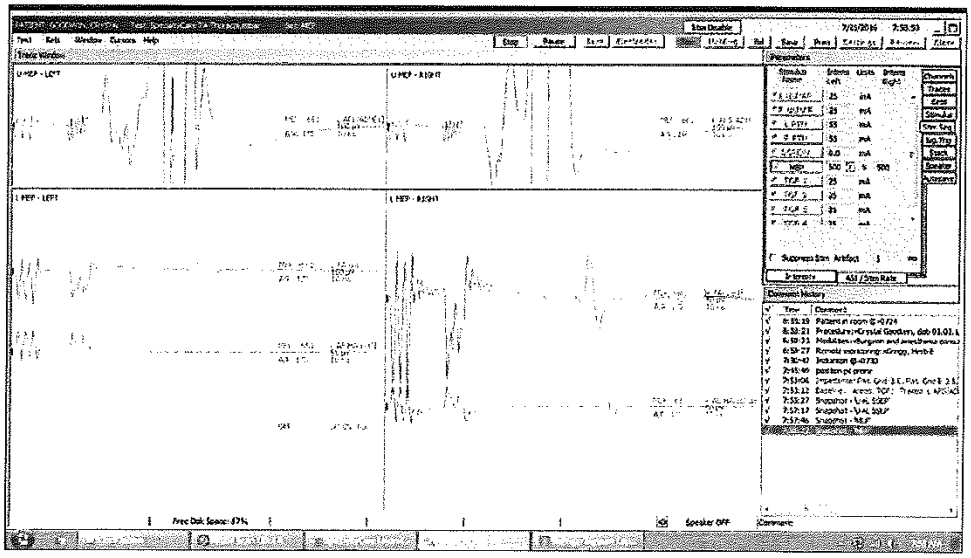
07:57:46 Snapshot - 'MEP'



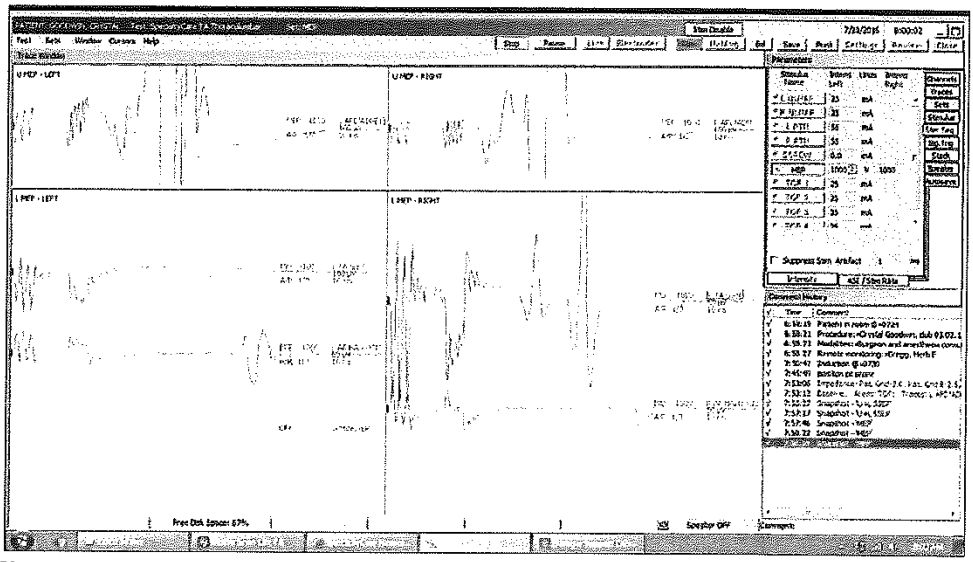
07:58:22 Snapshot - 'MEP'



07:58:59 Snapshot - 'MEP'



08:00:02 Snapshot - 'MEP'



08:00:06 Baseline.
Areas: U MEP, L MEP;
Traces: L APB/ADM[1], R APB/ADM, L TA-Gast, L AB HALLUCIS, R TA-Gast, R AB HALLUCIS

08:01:20 BL»SSEP reliable w/SNR>2 and amps 0.25uV or greater in all extremities. ToF 4/4, MEP present and reliable in all extremities.

BL reported, surgeon acknowledged

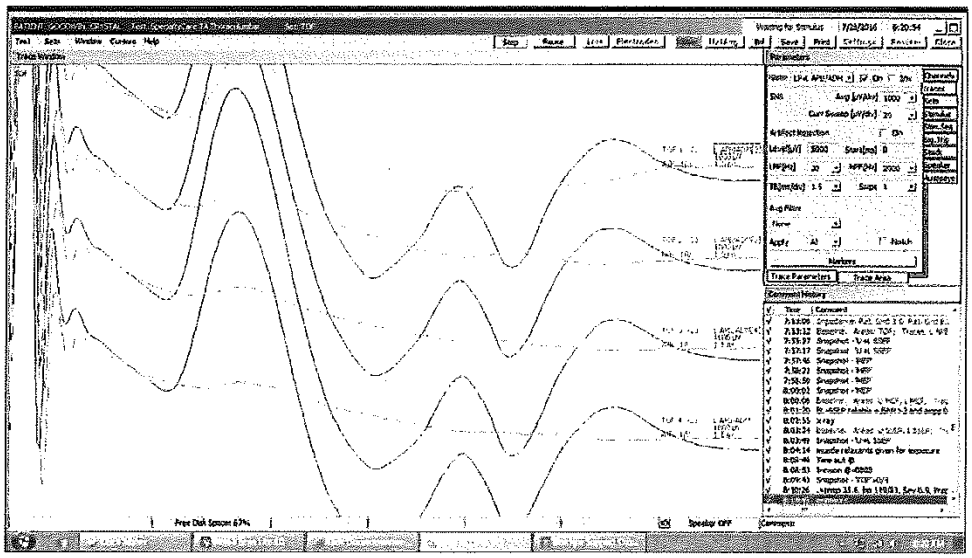
(07:57:25) Gregg, Herb said to you:
sseps present in all ext

(07:59:37) Gregg, Herb said to you:
meps present in bilateral upper ext, also with bilateral gastrocs - higher amplitude on the right

08:02:55 x ray

08:03:34 Baseline.
Areas: U SSEP, L SSEP;
Traces: 26:Fpz-C4', 27:Fpz-C5s, 28:Fpz-C3', 29:Fpz-C5s, 30:LERB-RERB, 31:RERB-LERB, 38:Fpz-Cz', 39:C3'-C4', 55:Fpz-C5s, 56:Fpz-Cz', 57:C3'-C4', 58:Fpz-C5s

08:20:54 Snapshot - 'TOF'»2/4

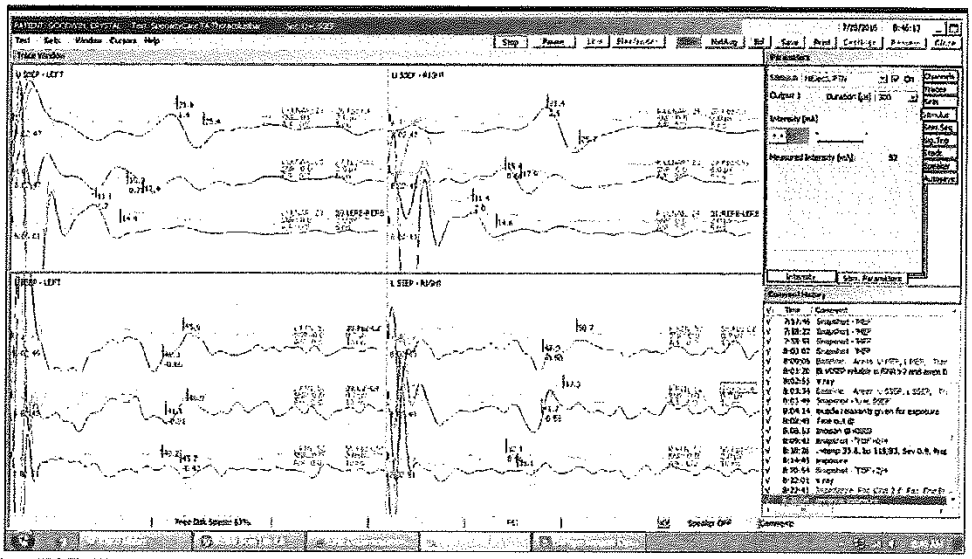


08:22:01 x ray

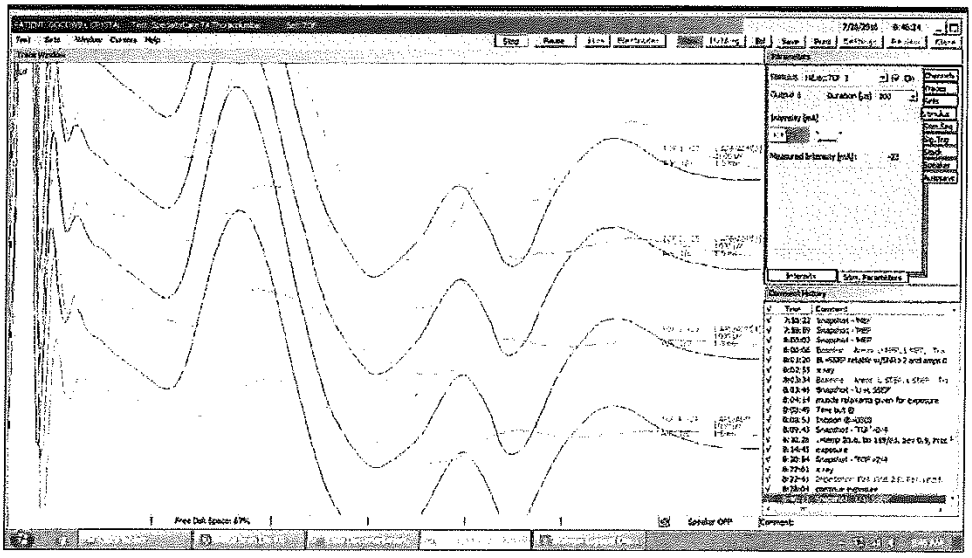
08:22:41 Impedance: Pat. Gnd:2.0, Pat. Gnd B:2.3,
Fpz:0.7, Cz':0.8, C3':0.7, C4':0.4, C5s:0.7, LERB:0.9, RERB:1.1,
LAPB:1.2, RAPB:0.9,
LADM:1.6, RADM:1.0,
LIc+:Open, LI+:Open, LRA+:Open, LSa+:Open, RIc+:Open, RI+:Open, RRA+:Open, RSa+:Open,
LIc-:Open, LI-:Open, LRA-:Open, LSa-:Open, RIc-:Open, RI-:Open, RRA-:Open, RSa-:Open,
LQ+:Open, LTA+:1.3, LAH+:1.0, ANS+:Open, RQ+:Open, RTA+:1.2, RAH+:1.1,
Lq-:Open, LTA-:2.7, LAH-:0.8, ANS-:Open, RQ-:Open, RTA-:2.4, RAH-:0.9,

08:28:04 continue exposure

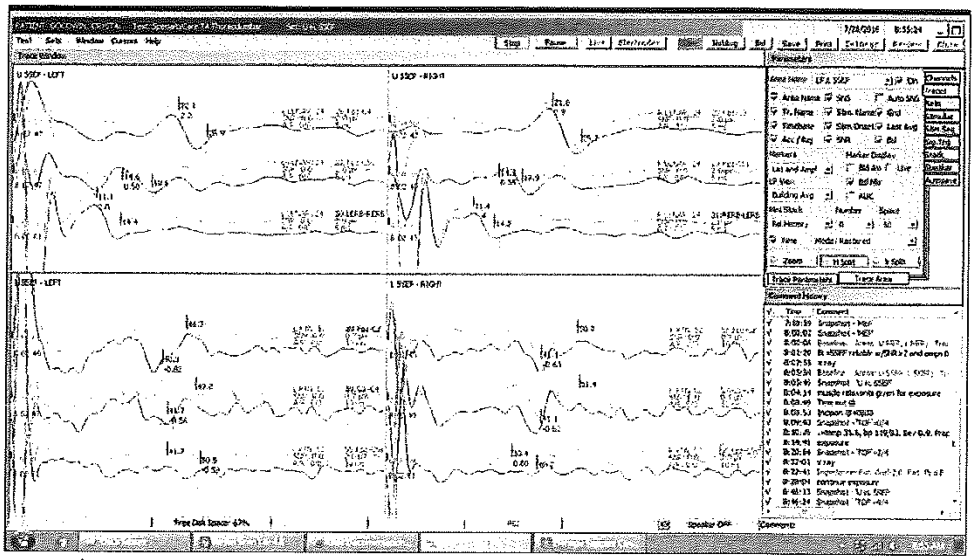
08:46:13 Snapshot - 'U+L SSEP'



08:46:24 Snapshot - 'TOF'»4/4

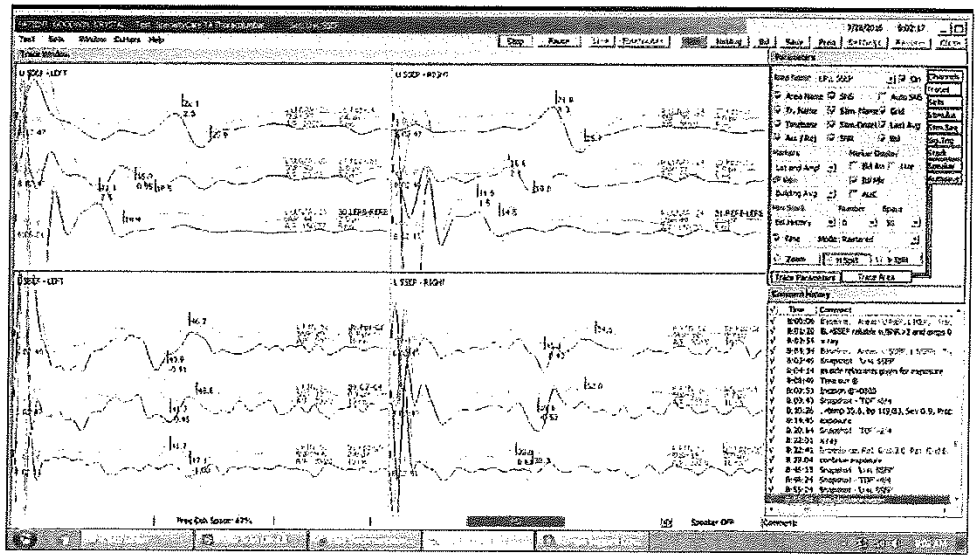


08:55:24 Snapshot - 'U+L SSEP'

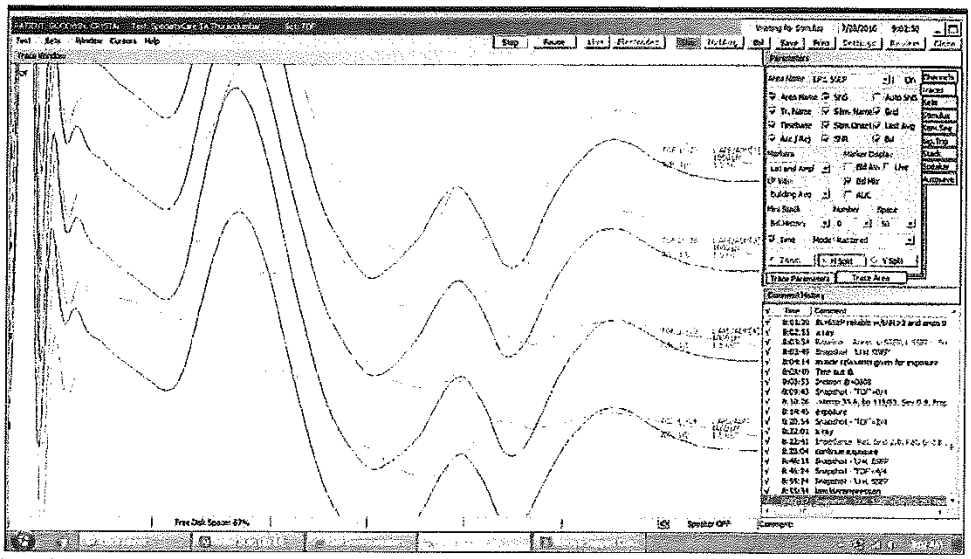


08:55:34 lami/decompression

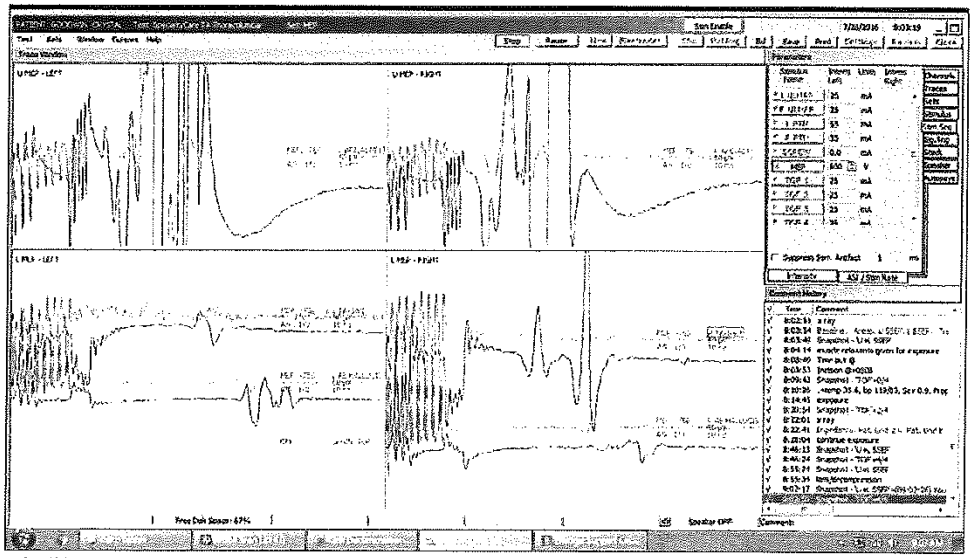
09:02:17 Snapshot - 'U+L SSEP'»(09:02:26) You said to Gregg, Herb:
ssep stable at this time
(09:02:32) Gregg, Herb said to you:
sseps stable, agree



09:02:50 Snapshot - 'TOF'»4/4



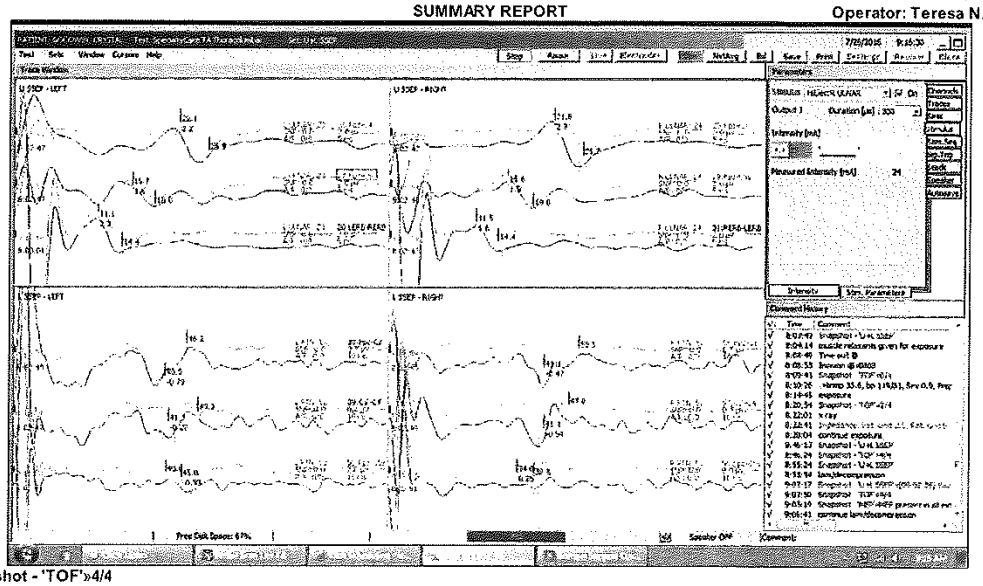
09:03:19 Snapshot - 'MEP'»MEP present in all ext, no changes, surgeon acknowledged
(09:03:23) Gregg, Herb said to you:
meps in all ext
(09:03:46) You said to Gregg, Herb:
ty agree,



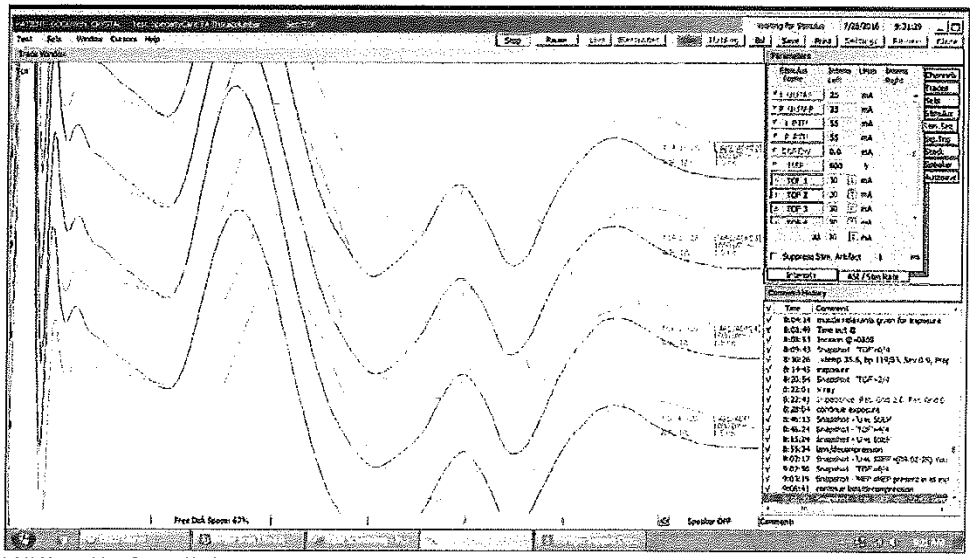
09:06:41 continue lami/decompression

09:16:30 Snapshot - 'U+L SSEP'»09:22:43) Gregg, Herb said to you:
sseps stable
(09:23:03) You said to Gregg, Herb:
Ty agree

SUMMARY REPORT



09:31:29 Snapshot - 'TOF'»4/4



09:33:14 .»(09:32:38) You said to Gregg, Herb:
anesthesia is having issues w/ moving airway, going to give paralytics.

pause procedure, anesthesia troubleshooting airway

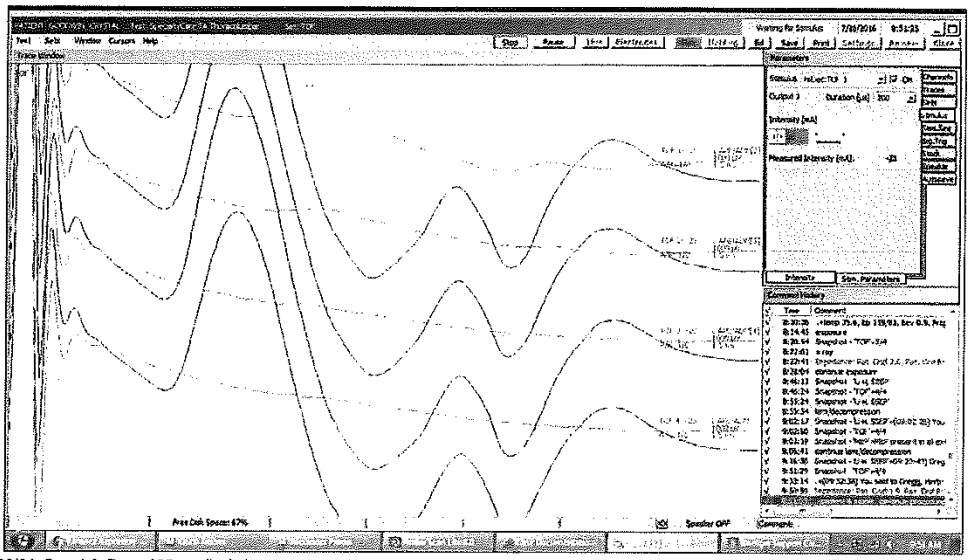
09:50:59 Impedance: Pat. Gnd:1.9, Pat. Gnd B:2.1,
Fpz:0.5, Cz':0.8, C3':0.5, C4':0.4, C5s:0.7, LERB:0.8, RERB:1.0,
LAPB:1.2, RAPB:0.9,
LADM:1.4, RADM:1.0,
Llc+:Open, LI+:Open, LRA+:Open, LSa+:Open, Rlc+:Open, RI+:Open, RRA+:Open, RSa+:Open,
Llc-:Open, LI-:Open, LRA-:Open, LSa-:Open, Rlc-:Open, RI-:Open, RRA-:Open, RSa-:Open,
LQ+:Open, LTA+:1.1, LAH+:0.9, ANS+:Open, RQ+:Open, RTA+:1.0, RAH+:1.0,
Lq-:Open, LTA-:2.6, LAH-:0.8, ANS-:Open, RQ-:Open, RTA-:1.8, RAH-:0.9,

09:51:03 .»patient is stable, continue procedure, bite block is out

09:51:25 Snapshot - 'TOF'»1/4

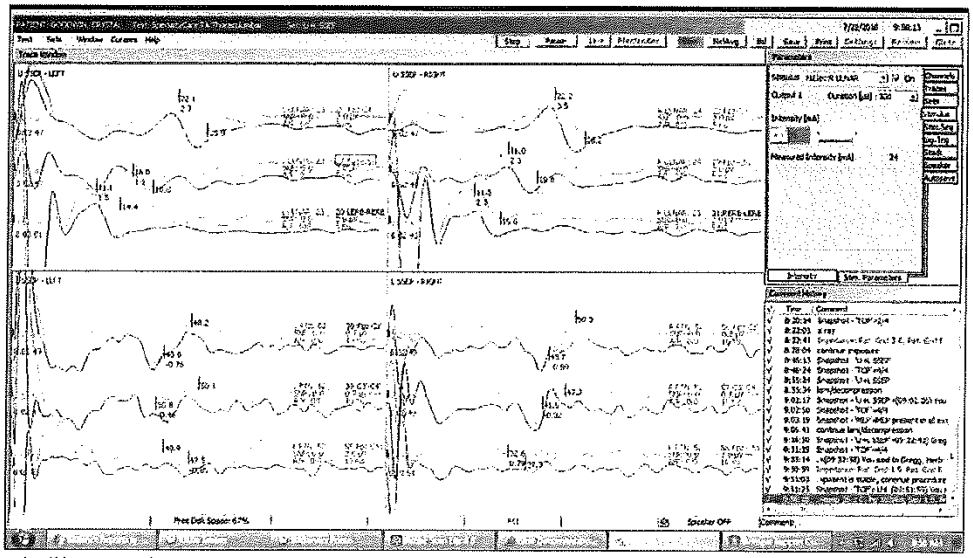
(09:51:59) You said to Gregg, Herb:
they got pt stable now and proceeding w/ procedure. will keep paralytics on board for remainder

(09:53:54) Gregg, Herb said to you:
ty



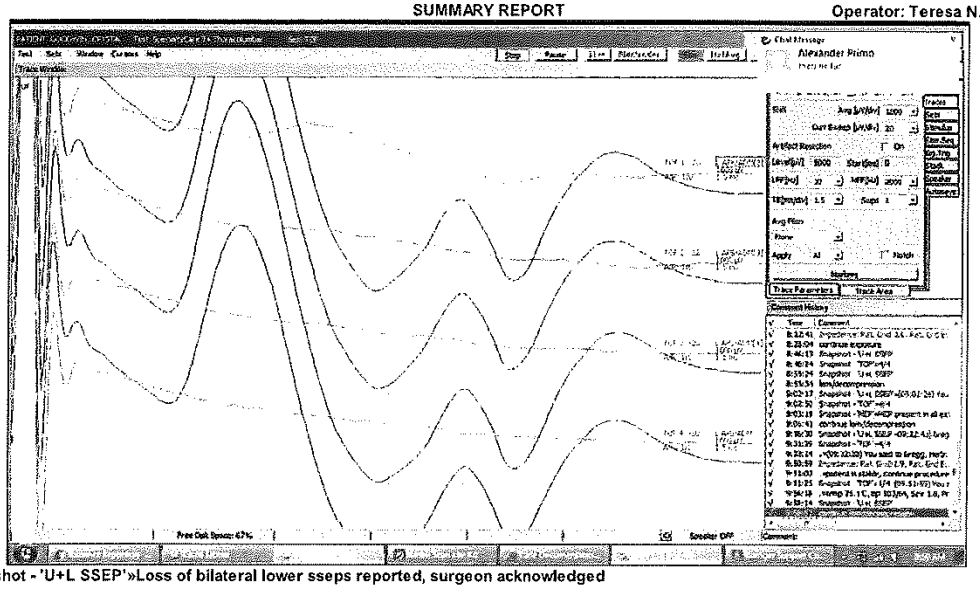
09:56:18 .»bp 103/64, Sev 1.0, Prop 125mcg/kg/min

09:58:14 Snapshot - 'U+L SSEP'

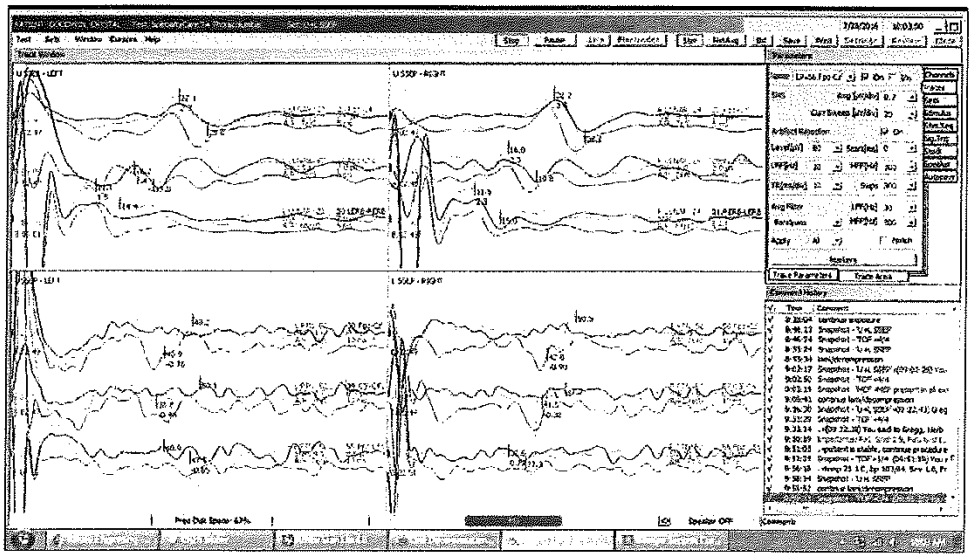


09:58:52 continue lami/decompression

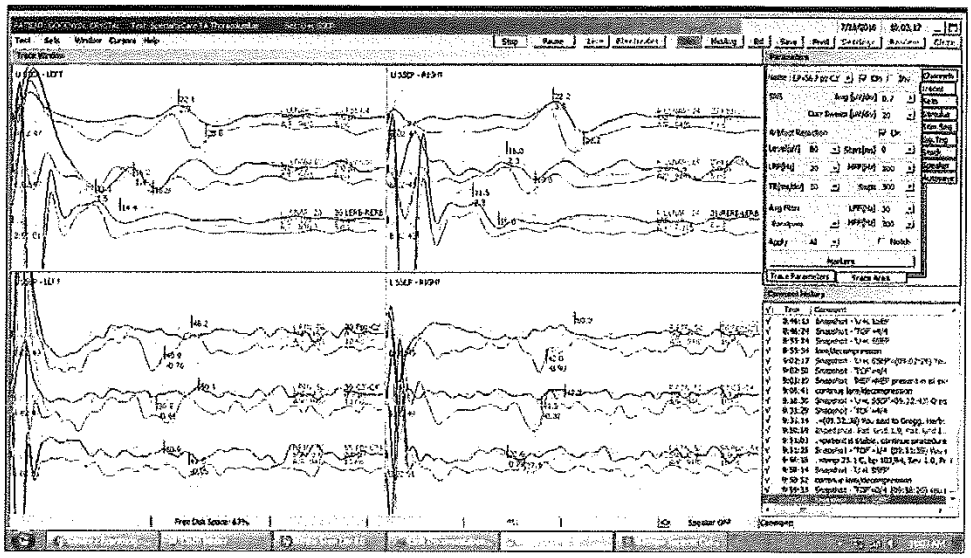
09:59:33 Snapshot - 'TOF'»0/4
(09:58:20) You said to Gregg, Herb:
ssep stable at this time
(10:01:47) Gregg, Herb said to you:
agree. thanks



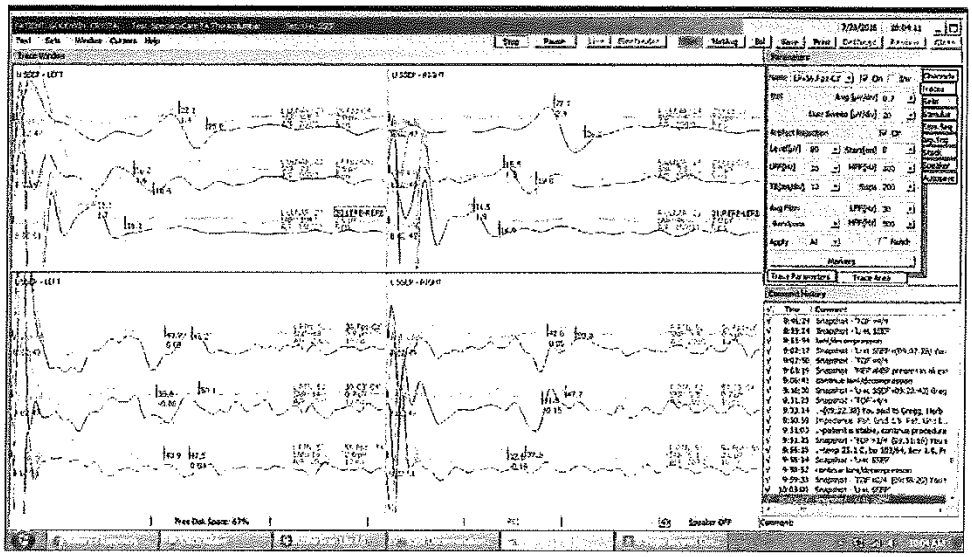
10:03:00 Snapshot - 'U+L SSEP'»Loss of bilateral lower sseps reported, surgeon acknowledged



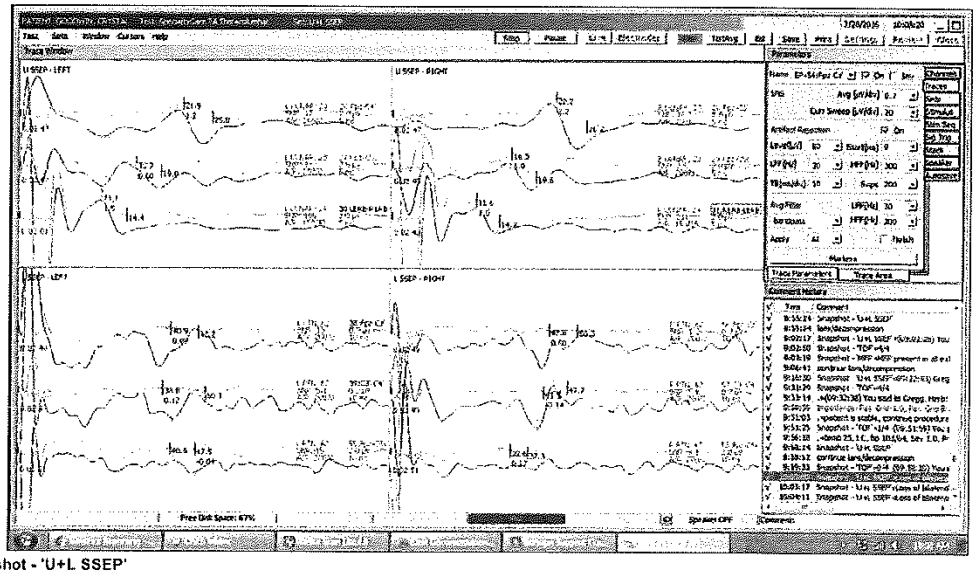
10:03:17 Snapshot - 'U+L SSEP'»Loss of bilateral lower sseps reported, surgeon acknowledged



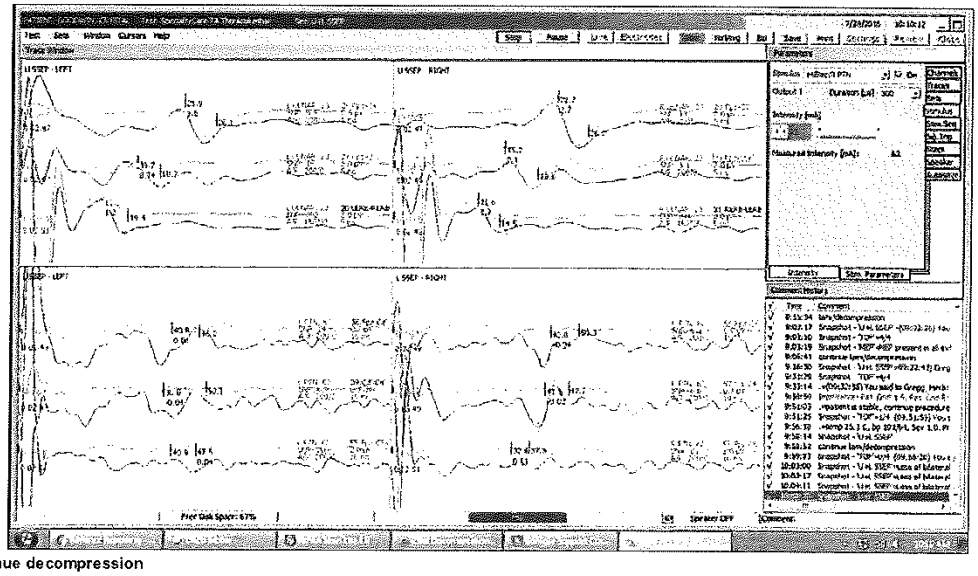
10:04:11 Snapshot - 'U+L SSEP'»Loss of bilateral lower sseps reported, surgeon acknowledged



10:08:20 Snapshot - 'U+L SSEP'

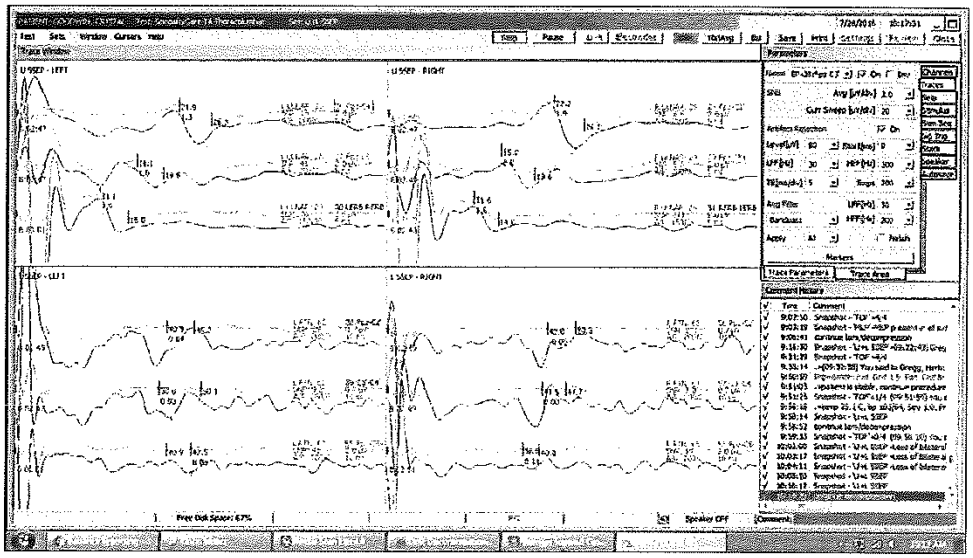


10:10:12 Snapshot - 'U+L SSEP'



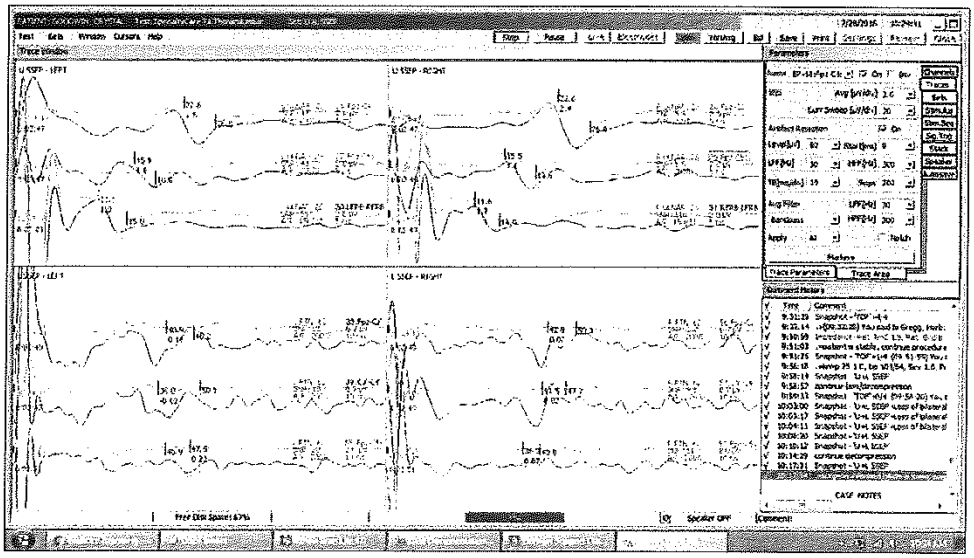
10:14:29 continue decompression

10:17:31 Snapshot - 'U+L SSEP'



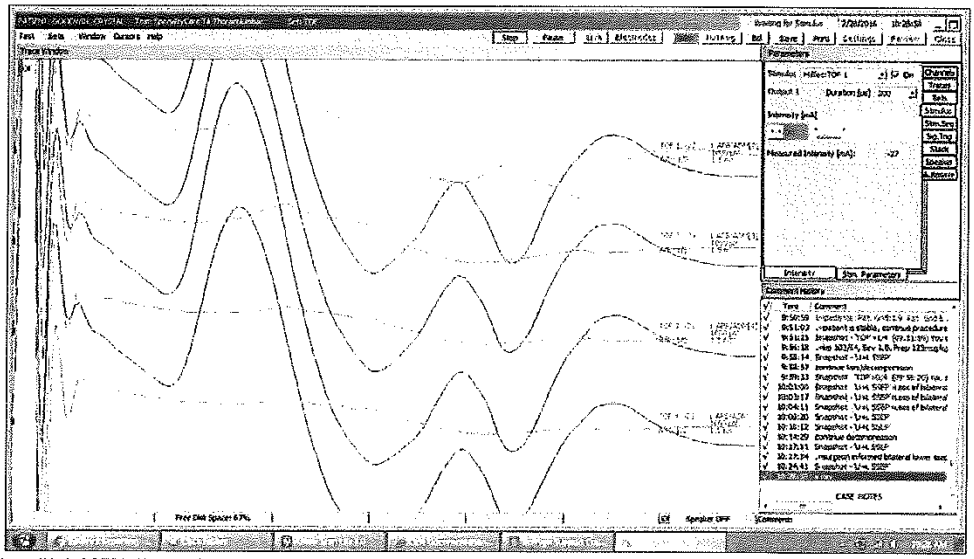
10:17:34 .»surgeon informed bilateral lower sseps remain out, surgeon stated he was not around the cord when lower sseps reported to be lost.

10:24:41 Snapshot - 'U+L SSEP'

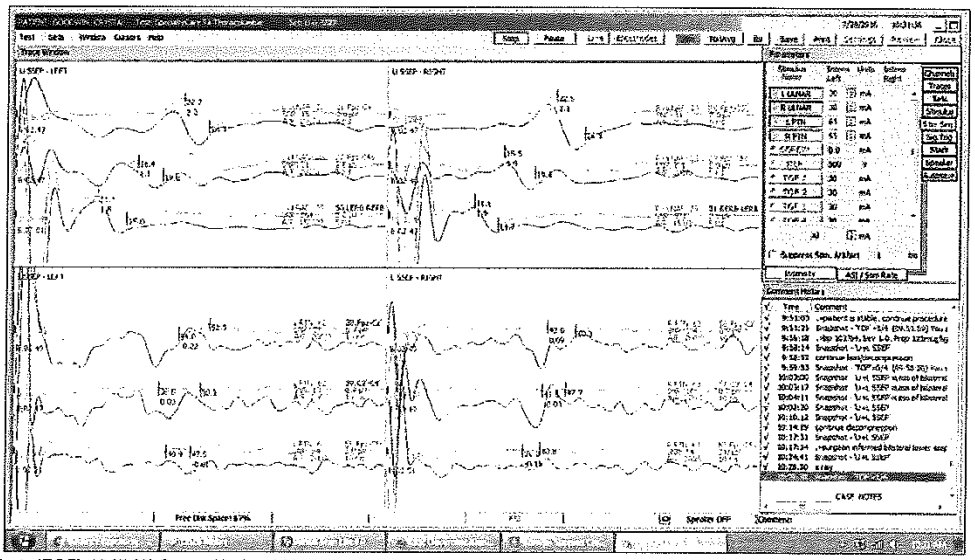


10:28:30 x ray

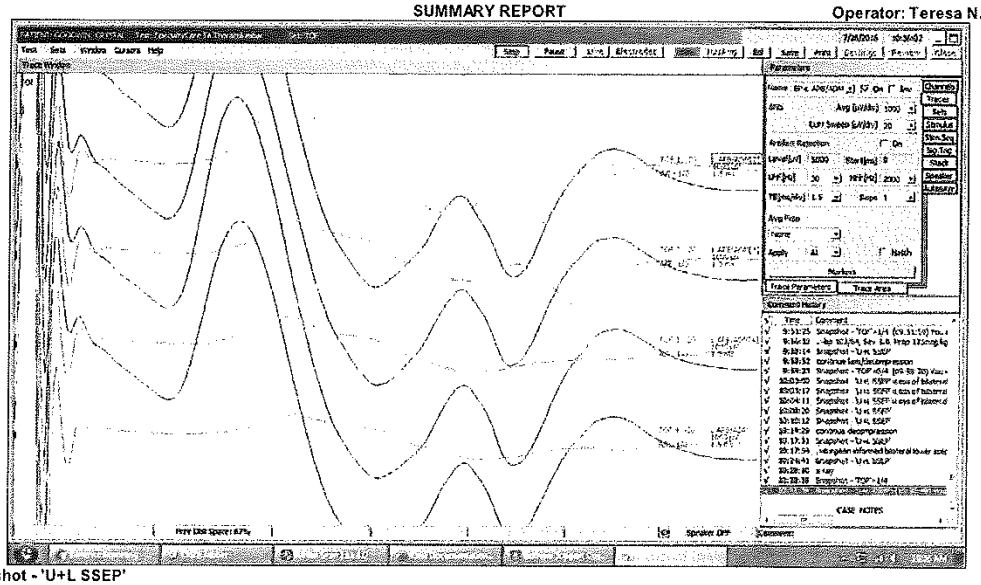
10:28:38 Snapshot - 'TOF'»1/4



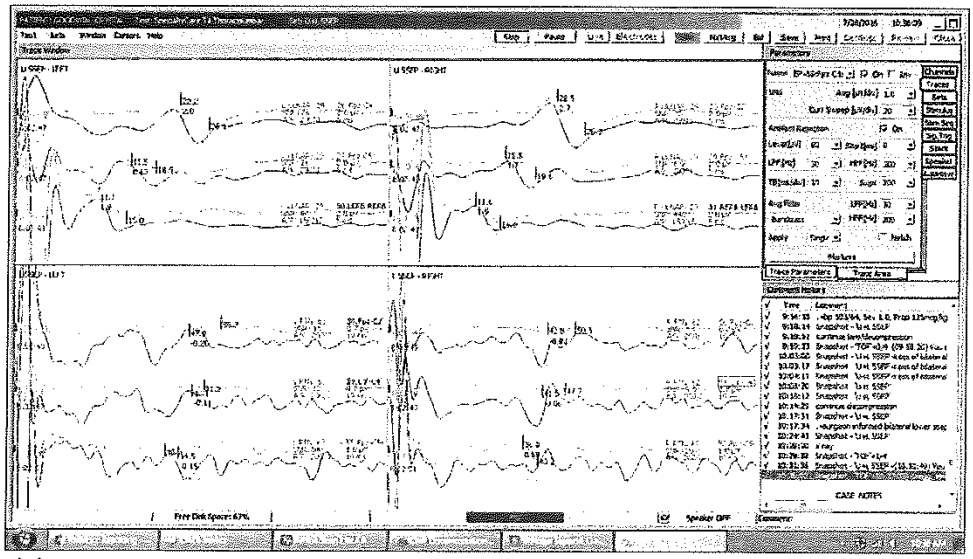
10:31:36 Snapshot - 'U+L SSEP'»(10:30:49) You said to Gregg, Herb:
L/upper is stable
(10:31:43) Gregg, Herb said to you:
yes



10:36:02 Snapshot - 'TOF'»10:37:03) Gregg, Herb said to you:
upper ssepps stable
(10:37:07) You said to Gregg, Herb:
ty agree



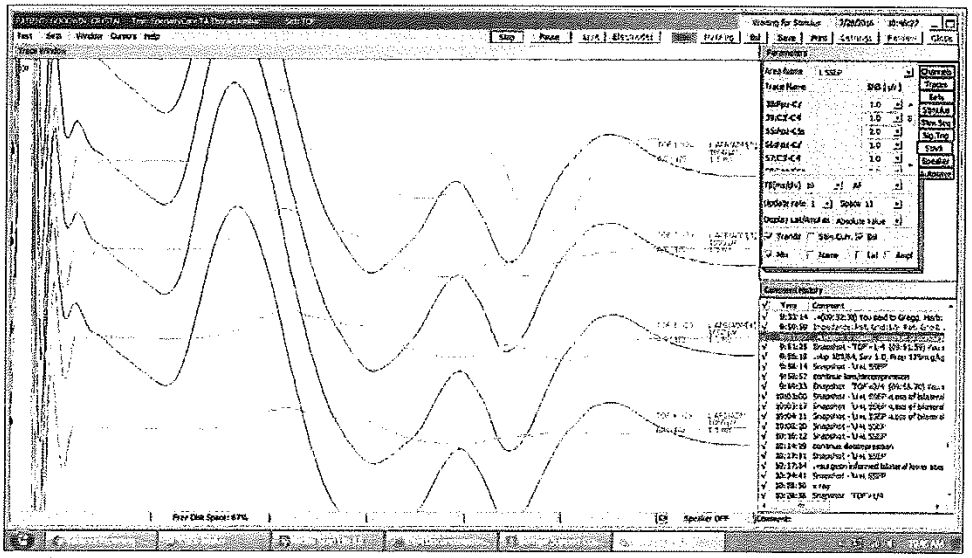
10:38:09 Snapshot - 'U+L SSEP'



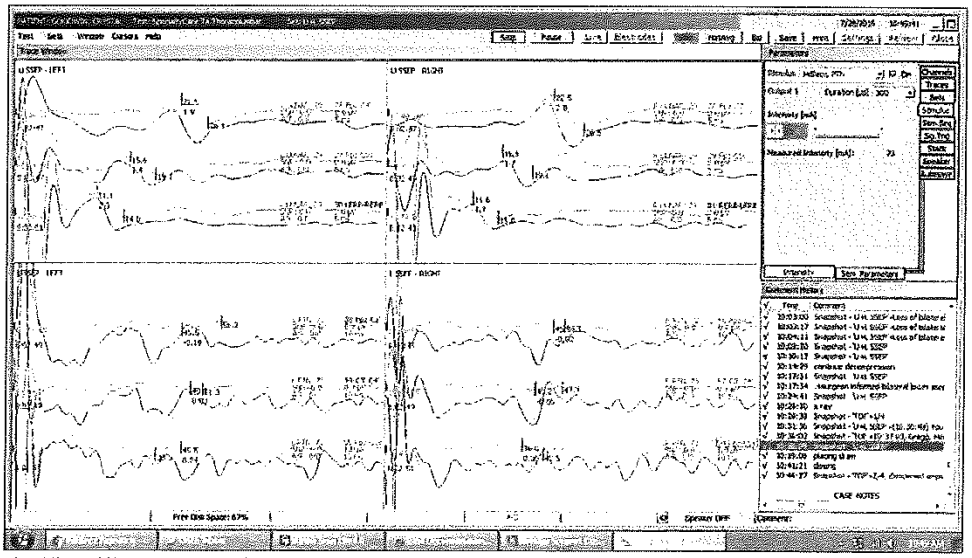
10:39:08 placing drain

10:41:21 closing

10:46:27 Snapshot - 'TOF'»2/4, dampened amps, bite block removed, due to patient airway issues.



10:49:41 Snapshot - 'U+L SSEP'

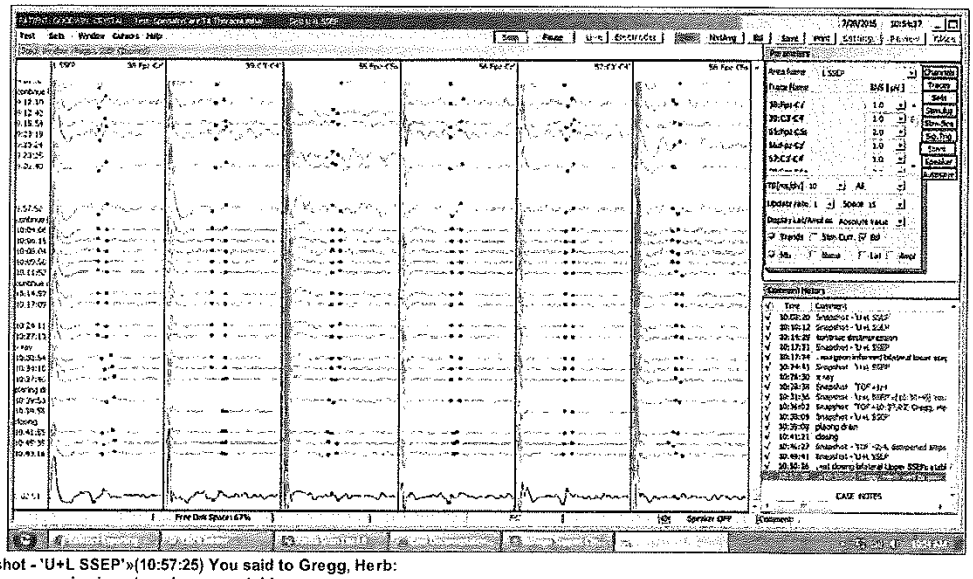


10:50:26 .»at closing bilateral Upper SSEPs stable and c/w BL, bilateral lower SSEPs remain absent
(10:50:40) Gregg, Herb said to you:
upper sseps stable
(10:50:46) Gregg, Herb said to you:
lowers absent bilaterally
(10:51:13) Gregg, Herb said to you:
motors not obtained post decompression/change in sseps
(10:51:42) You said to Gregg, Herb:
ty agree

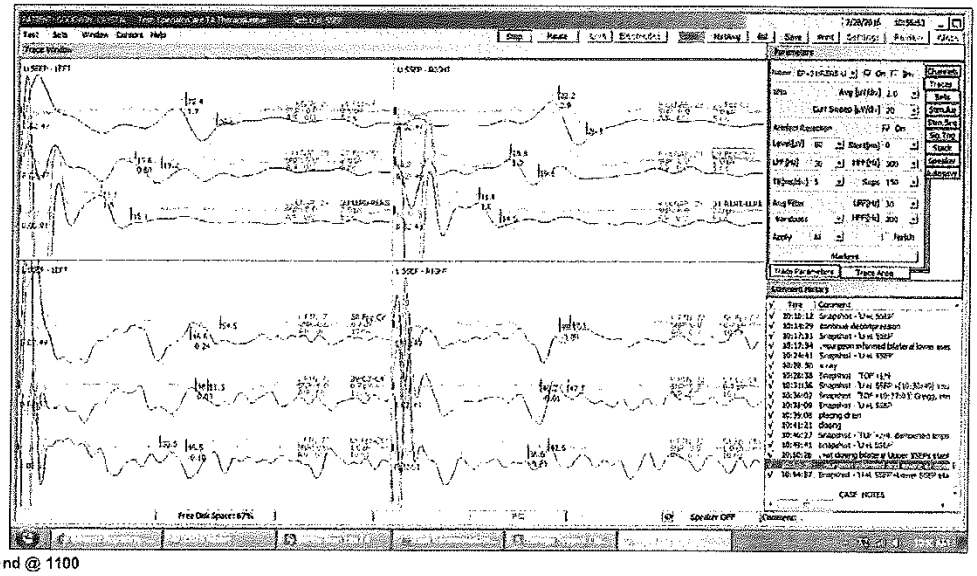
10:53:39 .»surgeon informed and aware of closing findings

10:54:37 Snapshot - 'U+L SSEP'»Lower SSEP stack

10:53:07) Gregg, Herb said to you:
957 present 1004 absent with no indication that we would lose them
(10:53:32) You said to Gregg, Herb:
agreed



10:56:53 Snapshot - 'U+L SSEP'»(10:57:25) You said to Gregg, Herb:
ok final run, lowers remain absent, and uppers stable
(10:57:52) Gregg, Herb said to you:
agree. thank you



10:59:30 IOM end @ 1100

COMMENT:

CONFIDENTIALITY NOTICE: This report may contain confidential health information that is privileged and legally protected from disclosure by federal law and the Health Insurance Portability and Accountability Act (HIPAA).This report may also contain other non-health information that is intended only for the use of the designated recipients. If you are not the intended recipient, you are hereby notified that reading, disseminating, disclosing, distributing, copying, acting upon or otherwise using the information contained in this facsimile is strictly prohibited. If you have received this report in error, please notify the sender immediately.

Thank you.

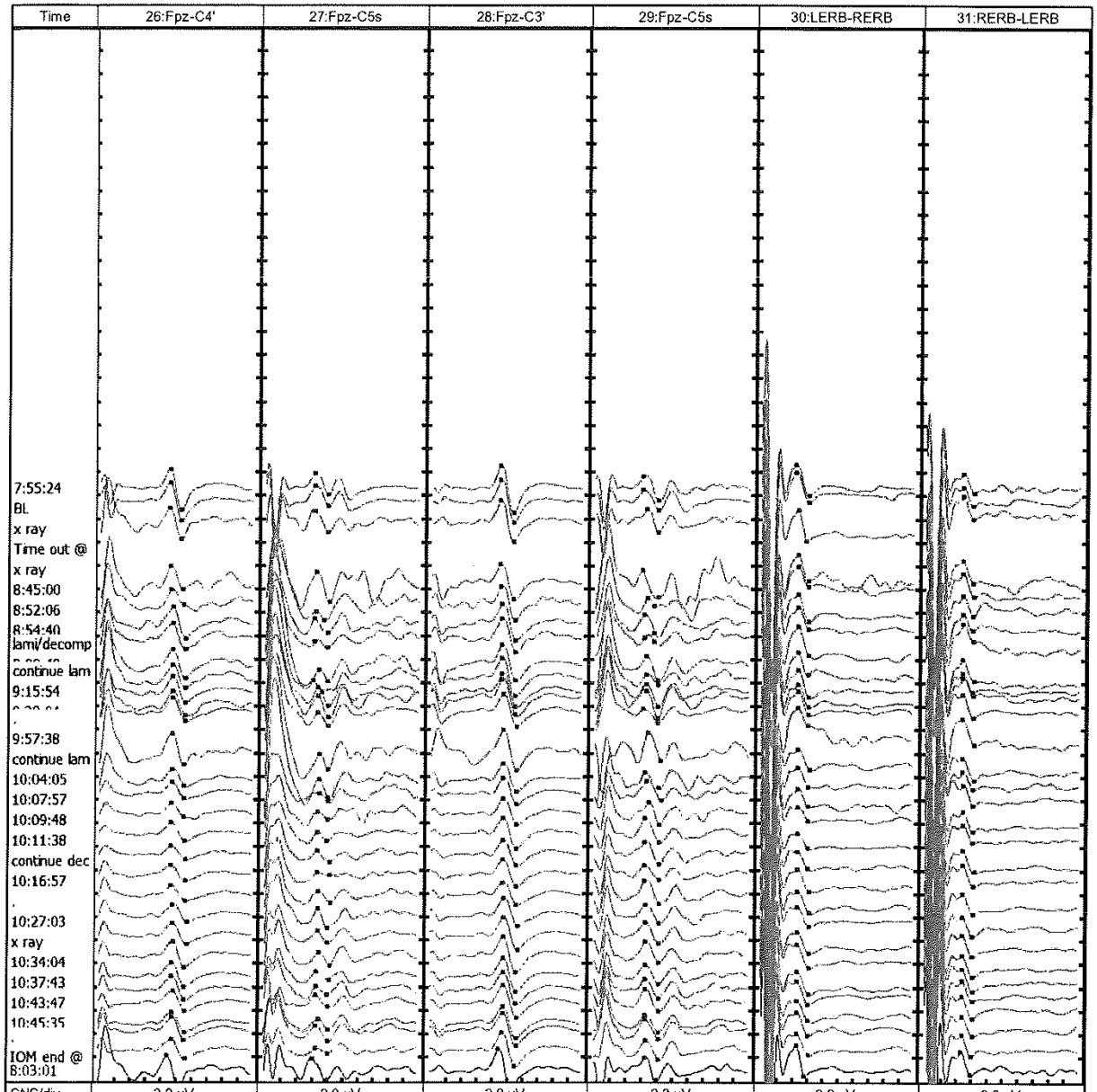
Pat: CRYSTAL GOODWIN
ID: 072816-1

SpecialtyCare TA Thoracolumbar

STACK REPORT

Data Time: 7/28/2016 11:00:56
Print Time: 7/28/2016 11:00:56
Operator: Teresa N. Adkins, CNIM

U SSEP



SNS/div	2.0 µV	2.0 µV	2.0 µV	2.0 µV	2.0 µV	2.0 µV
TB [ms/div]	5.0	5.0	5.0	5.0	5.0	5.0
StimName	L ULNAR	L ULNAR	R ULNAR	R ULNAR	L ULNAR	R ULNAR
LF-HF [Hz]	30 - 300	30 - 300	30 - 300	30 - 300	30 - 300	30 - 300
Notch/Avg.	Off / Bandpass	Off / Bandpass	Off / Bandpass	Off / Bandpass	Off / Bandpass	Off / Bandpass

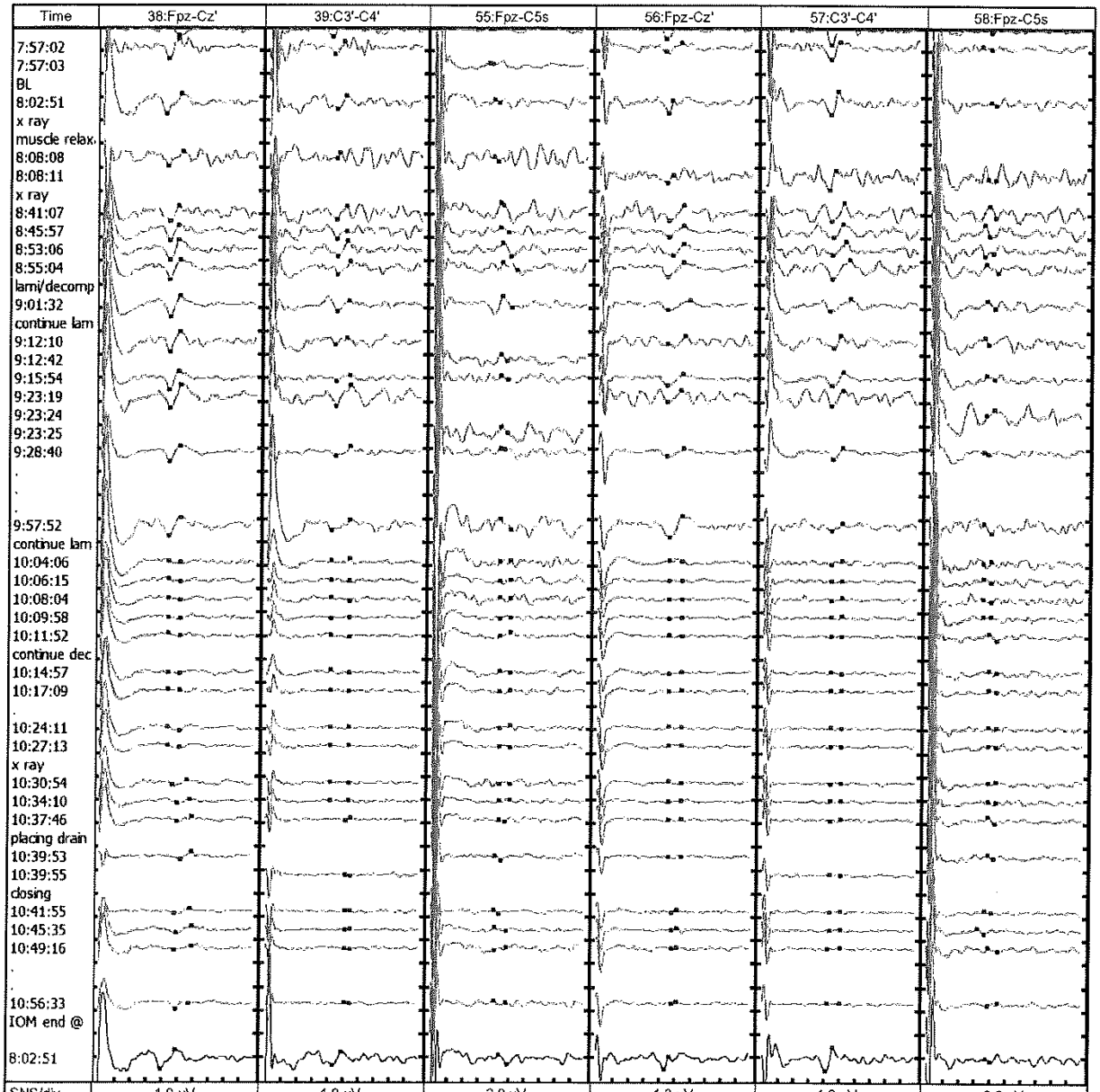
Pat: CRYSTAL GOODWIN
ID: 072816-1

SpecialtyCare TA Thoracolumbar

STACK REPORT

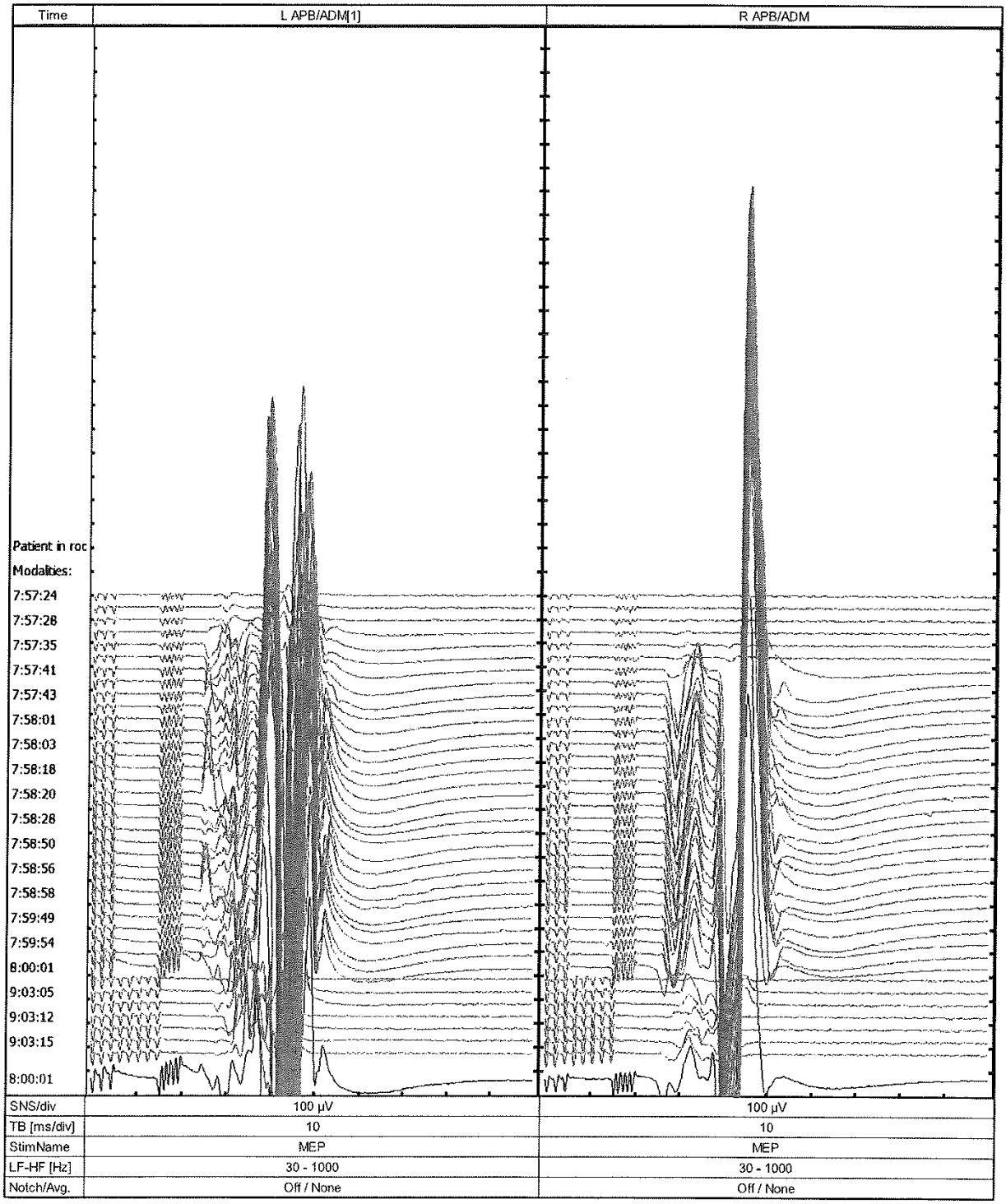
Data Time: 7/28/2016 11:00:57
Print Time: 7/28/2016 11:00:57
Operator: Teresa N. Adkins, CNIM

L SSEP



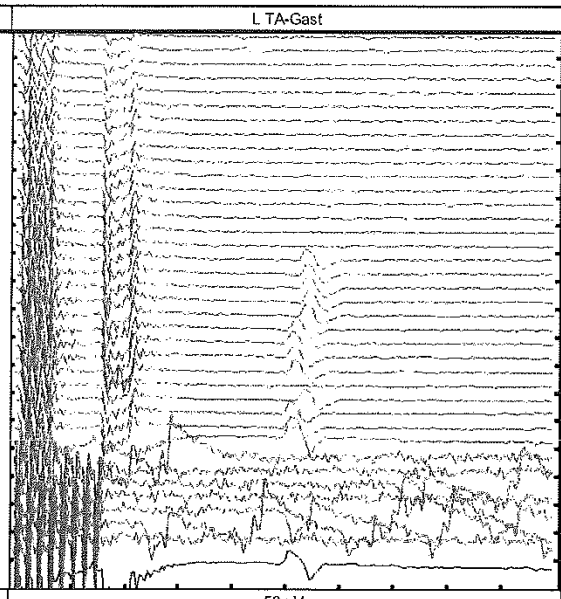
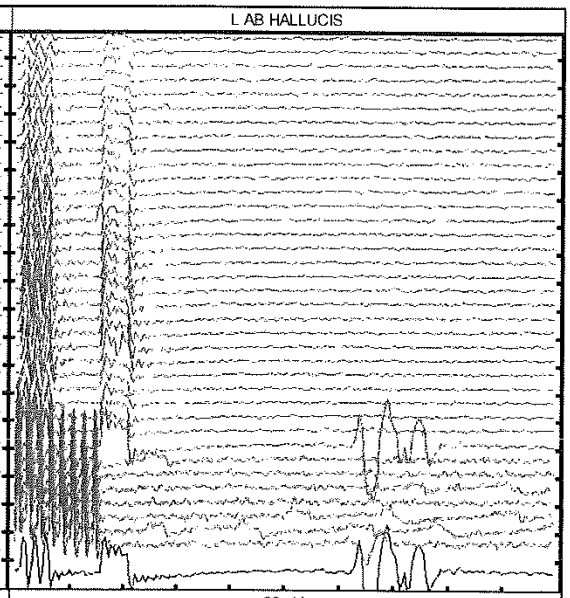
SNS/div	1.0 µV	1.0 µV	2.0 µV	1.0 µV	1.0 µV	2.0 µV
TB [ms/div]	10	10	10	10	10	10
StimName	L PTN	L PTN	L PTN	R PTN	R PTN	R PTN
LF-HF [Hz]	30 - 300	30 - 300	30 - 300	30 - 300	30 - 300	30 - 300
Notch/Avg.	Off / Bandpass	Off / Bandpass	Off / Bandpass	Off / Bandpass	Off / Bandpass	Off / Bandpass

U MEP

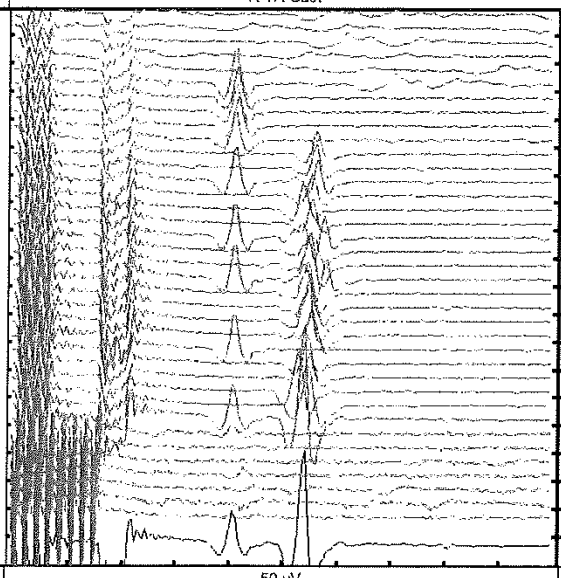
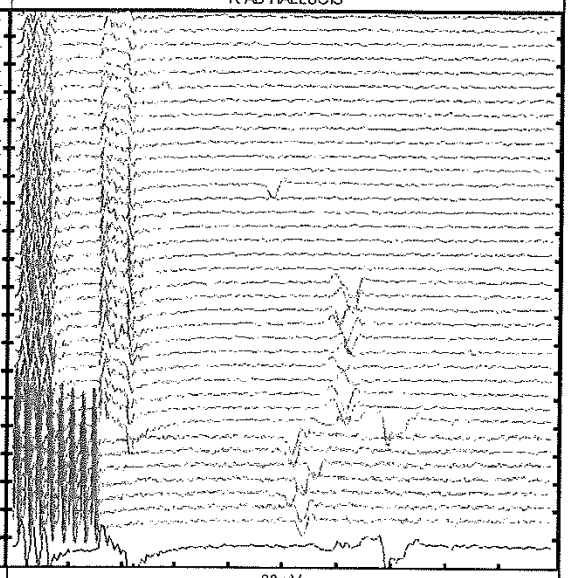


SNS/div	100 µV	100 µV
TB [ms/div]	10	10
StimName	MEP	MEP
LF-HF [Hz]	30 - 1000	30 - 1000
Notch/Avg.	Off / None	Off / None

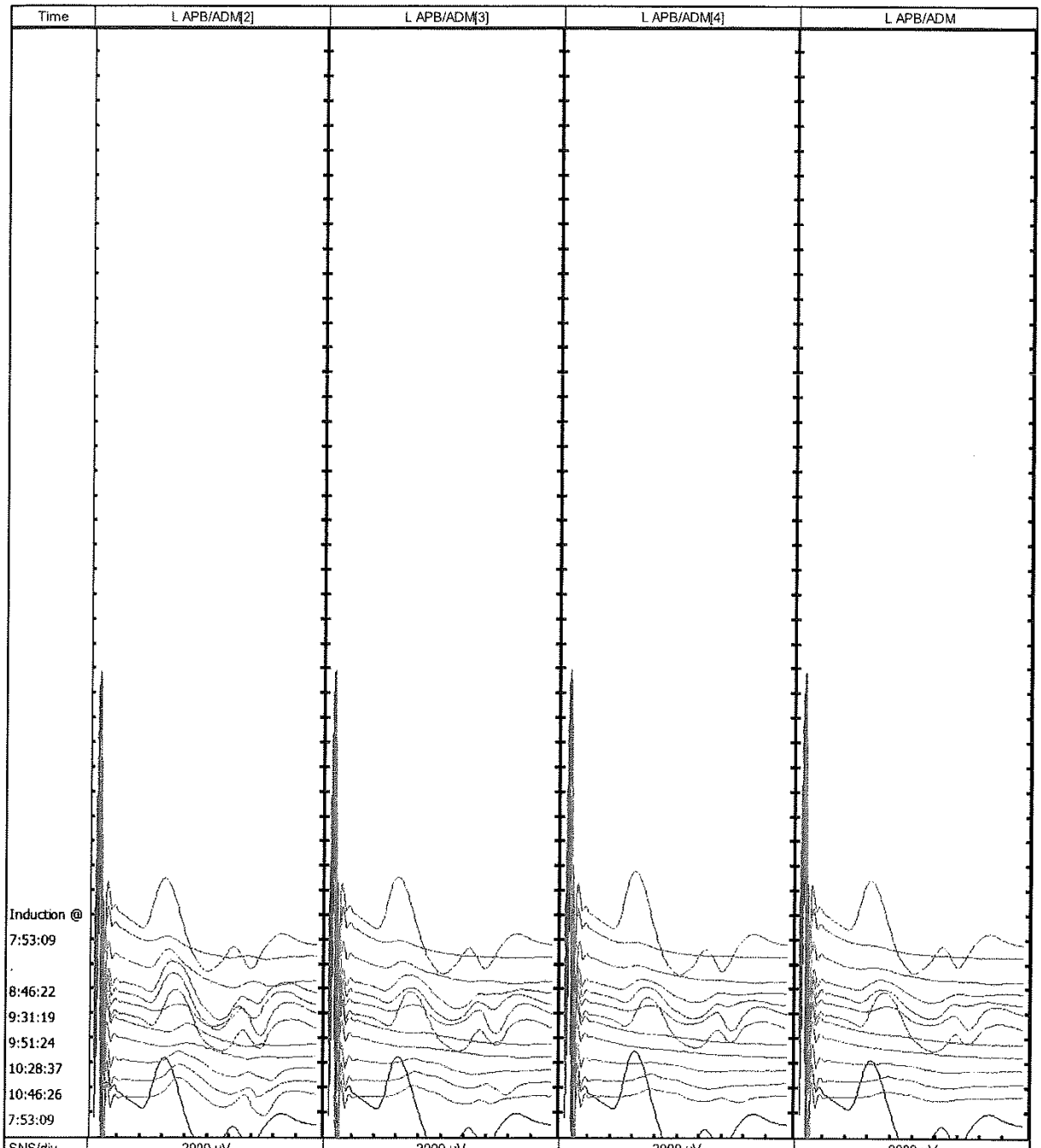
L MEP

Time	L TA-Gast	L AB HALLUCIS
7:57:28 7:57:35 7:57:41 7:57:44 7:58:01 7:58:03 7:58:18 7:58:20 7:58:28 7:58:50 7:58:56 7:58:58 7:59:49 7:59:55 8:00:01 9:03:05 9:03:12 9:03:15 8:00:01		
SNS/div	50 µV	20 µV
TB [ms/div]	10	10
StimName	MEP	MEP
LF-HF [Hz]	30 - 1000	30 - 1000
Notch/Avg.	Off / None	Off / None

L MEP

Time	R TA-Gast	R AB HALLUCIS
7:57:28 7:57:35 7:57:41 7:57:44 7:58:01 7:58:03 7:58:18 7:58:20 7:58:28 7:58:50 7:58:56 7:58:58 7:59:49 7:59:55 8:00:01 9:03:05 9:03:12 9:03:15 8:00:01		
SNS/div	50 µV	20 µV
TB [ms/div]	10	10
StimName	MEP	MEP
LF-HF [Hz]	30 - 1000	30 - 1000
Notch/Avg.	Off / None	Off / None

TOF



SNS/div	2000 µV	2000 µV	2000 µV	2000 µV
TB [ms/div]	1.5	1.5	1.5	1.5
StimName	TOF 1	TOF 2	TOF 3	TOF 4
LF-HF [Hz]	30 - 2000	30 - 2000	30 - 2000	30 - 2000
Notch/Avg.	Off / None	Off / None	Off / None	Off / None

COMMENT:

Bomgar Remote Monitoring Log

Bomgar Remote Monitoring Log

Session ID 182833
Start Time 07/28/16 6:47:05AM
Monitor (Physician/Audiologist/Consultant) Gregg, Herb E
Account Description Prisma Health Columbia
Neurophysiologist/Clinician Adkins, Teresa

Find | View 100 | First 1-50 of 118 Last

	Event Time	Performed By	Destination	Event Data Name	Event Data Value
1	07/28/2016 10:13:59AM	System	Everyone	body	Gregg, Herb has stopped viewing the customer's screen.
2	07/28/2016 10:13:56AM	Teresa Adkins, CNIM	Everyone	body	chat w/ you in a bit
3	07/28/2016 10:13:52AM	Teresa Adkins, CNIM	Everyone	body	yw
4	07/28/2016 10:13:46AM	Gregg, Herb E	Everyone	body	thank you
5	07/28/2016 10:07:10AM	Teresa Adkins, CNIM	Everyone	body	yes agreed, will find out something soon and will let you know
6	07/28/2016 10:04:39AM	Gregg, Herb E	Everyone	body	still have upper sseps so would have to be either so medial as not to affect them or low enough that they could possibly be spared
7	07/28/2016 10:03:44AM	Gregg, Herb E	Everyone	body	would have to be something that caused issue with medial portion of the posterior columns
8	07/28/2016 10:02:50AM	Teresa Adkins, CNIM	Everyone	body	that's really the only thing I can think of
9	07/28/2016 10:01:52AM	Gregg, Herb E	Everyone	body	yes
10	07/28/2016 10:01:37AM	Teresa Adkins, CNIM	Everyone	body	could it poss be from head repositioning and got extended?
11	07/28/2016 10:00:41AM	Teresa Adkins, CNIM	Everyone	body	yw, will do.
12	07/28/2016 10:00:32AM	Gregg, Herb E	Everyone	body	thanks. please let me know what happens post op
13	07/28/2016 9:59:35AM	Teresa Adkins, CNIM	Everyone	body	IOM end 11:00
14	07/28/2016 9:57:52AM	Gregg, Herb E	Everyone	body	agree. thank you
15	07/28/2016 9:57:25AM	Teresa Adkins, CNIM	Everyone	body	ok final run, lowers remain absent, and uppers stable
16	07/28/2016 9:53:40AM	Gregg, Herb E	Everyone	body	ok, thank you
17	07/28/2016 9:53:32AM	Teresa Adkins, CNIM	Everyone	body	agreed
18	07/28/2016 9:53:07AM	Gregg, Herb E	Everyone	body	957 present 1004 absent with no indication that we would lose them
19	07/28/2016 9:51:55AM	Gregg, Herb E	Everyone	body	may I see the lower stacks again around the time that lowers were lost
20	07/28/2016 9:51:42AM	Teresa Adkins, CNIM	Everyone	body	ty agree
21	07/28/2016 9:51:13AM	Gregg, Herb E	Everyone	body	motors not obtained post decompression/change in sseps
22	07/28/2016 9:50:46AM	Gregg, Herb E	Everyone	body	lowers absent bilaterally
23	07/28/2016 9:50:40AM	Gregg, Herb E	Everyone	body	upper sseps stable
24	07/28/2016 9:47:11AM	Teresa Adkins, CNIM	Everyone	body	and the bite block is out so will not be running anymore MEP, and ToF not fully back either.
25	07/28/2016 9:41:18AM	Teresa Adkins, CNIM	Everyone	body	he is starting closure
26	07/28/2016 9:39:55AM	Teresa Adkins, CNIM	Everyone	body	me too, poss subcort on right and cortical on left
27	07/28/2016 9:39:08AM	Gregg, Herb E	Everyone	body	The possible waves you are marking for the lowers are very concerning if correct. The absent lowers are making me anxious.

28	07/28/2016 9:37:07AM	Teresa Adkins, CNIM	Everyone	body	ly agree
29	07/28/2016 9:37:03AM	Gregg, Herb E	Everyone	body	upper ssepps stable
30	07/28/2016 9:31:43AM	Gregg, Herb E	Everyone	body	yes
31	07/28/2016 9:30:49AM	Teresa Adkins, CNIM	Everyone	body	Uupper is stable
32	07/28/2016 9:29:22AM	Teresa Adkins, CNIM	Everyone	body	yes, its starting to come back, it was 0/4 at 0959
33	07/28/2016 9:28:52AM	Gregg, Herb E	Everyone	body	see that there is still nmb
34	07/28/2016 9:28:22AM	Teresa Adkins, CNIM	Everyone	body	yes, he I just reported that the lowers remain out and he said they were no where near the cord when the loss was reported.
35	07/28/2016 9:27:39AM	Gregg, Herb E	Everyone	body	surgeon knows what we have?
36	07/28/2016 9:27:23AM	Gregg, Herb E	Everyone	body	would think vascular is less likely in the posterior columns if there is the usual pattern of separate vessels to each side
37	07/28/2016 9:26:11AM	Gregg, Herb E	Everyone	body	Also there was a sudden change in bilateral lower sseps. If that is not a technical issue would expect something that can happen quickly like a vascular or traumatic cause
38	07/28/2016 9:25:32AM	Teresa Adkins, CNIM	Everyone	body	nasal, which came out, so its inaccurate.
39	07/28/2016 9:24:06AM	Gregg, Herb E	Everyone	body	where are they getting that reading?
40	07/28/2016 9:23:35AM	Teresa Adkins, CNIM	Everyone	body	its at 32.1 right now
41	07/28/2016 9:23:26AM	Teresa Adkins, CNIM	Everyone	body	maybe temp?
42	07/28/2016 9:21:40AM	Gregg, Herb E	Everyone	body	ok
43	07/28/2016 9:20:43AM	Teresa Adkins, CNIM	Everyone	body	going to try a reboot
44	07/28/2016 9:19:58AM	Teresa Adkins, CNIM	Everyone	body	didnt see anything about C spine
45	07/28/2016 9:19:44AM	Teresa Adkins, CNIM	Everyone	body	they had to reposition her some to the the airway good. and head was turned slightly to the side.
46	07/28/2016 9:18:08AM	Gregg, Herb E	Everyone	body	do we know if the pt has any cspine disease?
47	07/28/2016 9:17:54AM	Gregg, Herb E	Everyone	body	the left upper is interesting, looks like cervical is also affected but not much change in erbs
48	07/28/2016 9:14:58AM	Teresa Adkins, CNIM	Everyone	body	left upper is starting to sag as well
49	07/28/2016 9:11:37AM	Teresa Adkins, CNIM	Everyone	body	I ran a set and they came in after hooking everything back up
50	07/28/2016 9:11:13AM	Teresa Adkins, CNIM	Everyone	body	get switched?

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Bomgar Remote Monitoring Log

Bomgar Remote Monitoring Log

Session ID 182833
Start Time 07/28/16 6:47:05AM
Monitor (Physician/Audiologist/Consultant) Gregg, Herb E
Account Description Prisma Health Columbia
Neurophysiologist/Clinician Adkins, Teresa

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	Event Time	Performed By	Destination	Event Data Name	Event Data Value
51	07/28/2016 9:10:59AM	Gregg, Herb E	Everyone	body	should show at the end anyhow
52	07/28/2016 9:10:40AM	Gregg, Herb E	Everyone	body	they are building avereges? that did not get switched?
53	07/28/2016 9:09:52AM	Teresa Adkins, CNIM	Everyone	body	decompression
54	07/28/2016 9:09:47AM	Gregg, Herb E	Everyone	body	what are they doing surgically?
55	07/28/2016 9:09:36AM	Teresa Adkins, CNIM	Everyone	body	I dont think so, they gave paralytics
56	07/28/2016 9:09:33AM	Gregg, Herb E	Everyone	body	still with NMB probably
57	07/28/2016 9:08:58AM	Gregg, Herb E	Everyone	body	are you getting twitches at the feet?
58	07/28/2016 9:08:10AM	Gregg, Herb E	Everyone	body	glad you informed surgeon
59	07/28/2016 9:07:52AM	Teresa Adkins, CNIM	Everyone	body	everything is hooked up
60	07/28/2016 9:07:45AM	Teresa Adkins, CNIM	Everyone	body	IDK, it was just in and then it went out
61	07/28/2016 9:07:36AM	Gregg, Herb E	Everyone	body	what happened to the lowers?
62	07/28/2016 9:07:11AM	Teresa Adkins, CNIM	Everyone	body	uppers are stable
63	07/28/2016 9:06:28AM	Teresa Adkins, CNIM	Everyone	body	lower sseps remain out
64	07/28/2016 9:05:00AM	Teresa Adkins, CNIM	Everyone	body	surgeon informed and aware
65	07/28/2016 9:02:48AM	Teresa Adkins, CNIM	Everyone	body	just lost lower sseps
66	07/28/2016 9:01:52AM	Teresa Adkins, CNIM	Everyone	body	yw!
67	07/28/2016 9:01:47AM	Gregg, Herb E	Everyone	body	agree. thanks
68	07/28/2016 8:58:20AM	Teresa Adkins, CNIM	Everyone	body	ssep stable at this time
69	07/28/2016 8:55:47AM	Teresa Adkins, CNIM	Everyone	body	yw!
70	07/28/2016 8:53:54AM	Gregg, Herb E	Everyone	body	ty
71	07/28/2016 8:51:59AM	Teresa Adkins, CNIM	Everyone	body	they got pt stable now and proceeding w/ procedure. will keep paralytics on board for remainder
72	07/28/2016 8:32:38AM	Teresa Adkins, CNIM	Everyone	body	anesthesia is having issues w/ moving airway, going to give paralytics.
73	07/28/2016 8:23:03AM	Teresa Adkins, CNIM	Everyone	body	Ty agree
74	07/28/2016 8:22:43AM	Gregg, Herb E	Everyone	body	sseps stable
75	07/28/2016 8:03:46AM	Teresa Adkins, CNIM	Everyone	body	ty agree, I made some adjustments, so will change back.
76	07/28/2016 8:03:23AM	Gregg, Herb E	Everyone	body	meps in all ext
77	07/28/2016 8:02:36AM	Teresa Adkins, CNIM	Everyone	body	ty!
78	07/28/2016 8:02:32AM	Gregg, Herb E	Everyone	body	sseps stable, agree
79	07/28/2016 8:02:26AM	Teresa Adkins, CNIM	Everyone	body	ssep stable at this time
80	07/28/2016 7:36:23AM	Teresa Adkins, CNIM	Everyone	body	troubleshooting all this noise.

81	07/28/2016 7:00:55AM	Teresa Adkins, CNIM	Everyone	body	agree on SSEP, mep present in all ext as well
82	07/28/2016 6:59:42AM	Gregg, Herb E	Everyone	body	and low amp right foot
83	07/28/2016 6:59:38AM	Teresa Adkins, CNIM	Everyone	body	400
84	07/28/2016 6:59:37AM	Gregg, Herb E	Everyone	body	meps present in bilateral upper ext, also with bilateral gastrocs - higher amplitude on the right
85	07/28/2016 6:57:25AM	Gregg, Herb E	Everyone	body	sseps present in all ext
86	07/28/2016 6:52:57AM	Teresa Adkins, CNIM	Everyone	body	ssep, mep, tof
87	07/28/2016 6:52:54AM	Teresa Adkins, CNIM	Everyone	body	Crystal Goodwin, dob 03.02.1978, CaseID: 100000927513, Thoracic lami decompression T9-T12
88	07/28/2016 6:52:46AM	Teresa Adkins, CNIM	Everyone	body	gm!
89	07/28/2016 6:48:46AM	Gregg, Herb E	Everyone	body	good morning
90	07/28/2016 6:48:18AM	System	Everyone	body	Gregg, Herb can now only view the customer's screen.
91	07/28/2016 6:48:17AM	System	All Customers	body	This session has been transferred to Gregg, Herb.
92	07/28/2016 6:48:17AM	System	All Representatives	body	This session has been transferred to Gregg, Herb.
93	07/28/2016 6:47:05AM	System	All Customers	body	Your reader will be with you shortly.
94	07/28/2016 6:47:05AM	System	All Customers	body	A secure encrypted SSL connection has been established.
95	07/28/2016 10:14:46AM	Gregg, Herb E			
96	07/28/2016 10:14:46AM				
97	07/28/2016 10:14:01AM	Teresa Adkins, CNIM			
98	07/28/2016 6:48:17AM	Gregg, Herb E		public_name	Gregg, Herb
99	07/28/2016 6:48:17AM	Gregg, Herb E		username	2062474
100	07/28/2016 6:48:17AM	Gregg, Herb E		private_ip	192.168.0.2

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Bomgar Remote Monitoring Log

Bomgar Remote Monitoring Log

Session ID 182833
Start Time 07/28/16 6:47:05AM
Monitor (Physician/Audiologist/Consultant) Gregg, Herb E
Account Description Prisma Health Columbia
Neurophysiologist/Clinician Adkins, Teresa

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	Event Time	Performed By	Destination	Event Data Name	Event Data Value
101	07/28/2016 6:48:17AM	Gregg, Herb E		public_ip	24.194.23.185:59251
102	07/28/2016 6:48:17AM	Gregg, Herb E		hostname	SC-WS-MG00FBA9
103	07/28/2016 6:48:17AM	Gregg, Herb E		os	Windows 7 Enterprise x64
104	07/28/2016 6:48:17AM	Gregg, Herb E		support_teams	;1=IONM Freeman;11=IONM Read Only;14=IONM Southeast;2=IONM GWUH;4=IONM Memphis;8=IONM North Central;
105	07/28/2016 6:48:17AM	Gregg, Herb E		user_id	32
106	07/28/2016 6:48:17AM		2062474	owner	Gregg, Herb
107	07/28/2016 6:48:17AM	Gregg, Herb E		private_name	Gregg, Herb
108	07/28/2016 6:47:13AM				
109	07/28/2016 6:47:05AM				
110	07/28/2016 6:47:05AM		IONM Southeast	owner	IONM Southeast
111	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		state	connected
112	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		customer_info	;name=Teresa Adkins, CNIM;company=Palmetto Health Baptist;company_code=Dr. Thomas J. Holbrook, MD;details=Gregg, Herb E\nthoracic lami decomp T9-T12;issue=Southeast Monitoring;
113	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		name	Teresa Adkins, CNIM
114	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		private_ip	10.20.75.120
115	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		public_ip	204.116.44.213:16581
116	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		hostname	SC-LT-4B136423H
117	07/28/2016 6:47:05AM	Teresa Adkins, CNIM		os	Windows 7 Enterprise x86
118	07/28/2016 6:47:05AM		System	owner	Customer Pre-wait Conference

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Intraoperative Neurophysiological Monitoring Report

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CASE INFORMATION

Patient Name	Goodwin, Crystal	**DOB**	03/02/1978
Patient ID	1620200813	**MRN**	000275536
Date of Surgery	07/28/2016		
Hospital	2102 Palmetto Hlth Baptist-Columbia		
IONM Recordings Started	07:53	**IONM Recordings Concluded**	11:00
Post Baselines Time	08:03		
Pre-Op Diagnosis	thoracic stenosis		
Post-Op Diagnosis	thoracic stenosis		
Procedure	Thoracic laminectomy decompression T9-T12		

SURGERY/ANESTHESIA

Role	Name
Anesthesiologist	Dr. Root
Surgeon	Holbrook, Thomas

NEUROMONITORING

Staff Type	Name	Staff Role
Neurophysiologist	Adkins, Teresa	Primary
Remote Monitor	Gregg, Herb E	Primary

INTRODUCTION

Intraoperative neurophysiological monitoring was conducted at the request of the surgeon to help identify and minimize risk of neurologic injury.
Somatosensory evoked potentials were recorded to monitor the integrity of the somatosensory pathways.
Train-of-four testing was performed to assess conduction across the neuromuscular junction.
Motor evoked potentials to transcranial electrical stimulation were recorded to monitor the integrity of the corticospinal pathways.

NEUROMONITORING TECHNIQUES AND BASELINE RESULTS

Neuromonitoring Modalities	Side	Description Nerve/Muscle/Level	Baseline Data
Somatosensory Evoked Potentials (SSEP) - Lower Extremity / Trunk (LE/T)	Bilateral	Posterior Tibial Nerve	All Recordings Monitorable -
Somatosensory Evoked Potentials (SSEP) - Upper Extremity (UE)	Bilateral	Ulnar Nerve	All Recordings Monitorable -
Train Of Four Testing (TOF)	Left	Abductor Pollicis Brevis	All Recordings Monitorable -
Transcranial Electric Motor Evoked Potentials (tcMEP) - Lower Extremity / Trunk	Bilateral	Tibialis Anterior, Gastrocnemius, Abductor Hallucis	All Recordings Monitorable -

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NEUROMONITORING TECHNIQUES AND BASELINE RESULTS

Neuromonitoring Modalities	Side	Description Nerve/Muscle/Level	Baseline Data
Transcranial Electric Motor Evoked Potentials (tcMEP) - Upper Extremity	Bilateral	Abductor Pollicis Brevis, Abductor Digiti Minimi	All Recordings Monitorable -

ADDITIONAL BASELINE NOTES

SSEP were reliable w/SNR>2 and amplitudes of 0.25uV or greater in all extremities, ToF 4/4, MEPs were present in all extremities.

INTRAOPERATIVE NEUROMONITORING COURSE

Neuromonitoring changes:

During the decompression portion of the procedure (and shortly after a repositioning and post administration of neuromuscular blockade for airway management reasons), there was a loss of the bilateral lower extremity SSEPs. The lower extremity SSEPs were present/stable at 9:57 a.m. and absent at 10:04 with no identified incident that would cause their loss (times per the on-site surgical neurophysiologist machine). The surgeon was notified. Troubleshooting to exclude any technical confounds was performed. The bilateral lower extremity SSEPs, however, remained absent through the remainder of monitoring.

Motor evoked potentials were not assessed again after the change in SSEPs because of the persistent of the effects of the neuro-motor blocking medications.

There were no other significant neuromonitoring changes during the procedure. The surgeon was informed of the patient's neurophysiologic status throughout the procedure.

IMPRESSION

There were remarkable neuromonitoring changes during the course of the procedure. The loss of bilateral lower extremity somatosensory evoked potentials suggests dysfunction in the bilateral sensory pathways to the lower extremities. While the findings cannot be precisely localized, they would be consistent with localizations that include the surgical site. Motor function could not be assessed because of the required neuromuscular blockade.

Thank you for the opportunity to participate in the surgical management of this patient. If you need any additional information, please do not hesitate to contact us.

Sincerely,

Remote Monitor	Gregg, Herb E - MD	eSigned on	08/02/2016 16:34:12	(Central Time)
Clinician	Adkins, Teresa - CNIM	eSigned on	08/03/2016 06:57:16	(Central Time)

Case | Clinical | Modalities | Alerts/PedScrew | Safety | Remote Log | Anesth | Billing | Attachments | Interp Rpt

Case Documentation System (CDS) Return to Search

Case ID 100000927513

INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING REPORT

Save

Edit Report

Patient Name Goodwin, Crystal
Patient ID 1620200813
Patient MRN 000275536
Patient DOB 03/02/1978
Date of Surgery 07/29/2016
Hospital 2102 Palmetto Hlth Baptist-Columbia **Interp Status** Finalized

Pre-Op Diagnosis thoracic stenosis

Post-Op Diagnosis thoracic stenosis

Procedure Thoracic laminectomy decompression T9-T12

Surgery / Anesthesia

Role	Name	NPI ID	Primary	If not in list, enter Name
Anesthesiologist			☑	Dr. Root
Surgeon	Holbrook, Thomas	1770695660	☑	

Neuromonitoring

Type	Staff Name	Empl ID	Staff Role
Remote Monitor	Gregg, Herb E	2062474	Primary
Clinician	Adkins, Teresa	2063585	Primary

Introduction

Intraoperative neurophysiological monitoring was conducted at the request of the surgeon to help identify and minimize risk of neurologic injury.
Somatosensory evoked potentials were recorded to monitor the integrity of the somatosensory pathways.
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Motor evoked potentials to transcranial electrical stimulation were recorded to monitor the integrity of the corticospinal pathways.

Neuromonitoring Techniques and Baseline Results

Neuromonitoring Modalities	Side	Description Nerve/Muscle/Level	Baseline Data
Somatosensory Evoked Potentials (SSEP) - Upper Extremity (UE)	Bilateral	Ulnar Nerve	All Recordings Monitorable -
Somatosensory Evoked Potentials (SSEP) - Lower Extremity / Trunk (LE/T)	Bilateral	Posterior Tibial Nerve	All Recordings Monitorable -
Train Of Four Testing (TOF)	Left	Abductor Pollicis Brevis	All Recordings Monitorable -
Transcranial Electric Motor Evoked Potentials (tcMEP) - Upper Extremity	Bilateral	Abductor Pollicis Brevis, Abductor Digiti Minimi	All Recordings Monitorable -
Transcranial Electric Motor Evoked Potentials (tcMEP) - Lower Extremity / Trunk	Bilateral	Tibialis Anterior, Gastrocnemius, Abductor Hallucis	All Recordings Monitorable -

Testing / Mapping Performed

Testing / Mapping Performed	Additional Description

Additional Baseline Notes

SSEP were reliable w/SNR>2 and amplitudes of 0.25uV or greater in all extremities, ToF 4/4, MEPs were present in all extremities.

Intraoperative Neuromonitoring Course

Neuromonitoring changes:

During the decompression portion of the procedure (and shortly after a repositioning and post administration of neuromuscular blockade for airway management reasons), there was a loss of the bilateral lower extremity SSEPs. The lower extremity SSEPs were present/stable at 9:57 a.m. and absent at 10:04 with no identified incident that would cause their loss (times per the on-site surgical neurophysiologist machine). The surgeon was notified. Troubleshooting to exclude any technical

confounds was performed. The bilateral lower extremity SSEPs, however, remained absent through the remainder of monitoring.

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Summary

There were remarkable neuromonitoring changes during the course of the procedure. The loss of bilateral lower extremity somatosensory evoked potentials suggests dysfunction in the bilateral sensory pathways to the lower extremities. While the findings cannot be precisely localized, they would be consistent with localizations that include the surgical site. Motor function could not be assessed because of the required neuromuscular blockade.

Thank you for the opportunity to participate in the surgical management of this patient. If you need any additional information, please do not hesitate to contact us.

Verification / eSignature

Type	Empl ID	Name	Verify	Status
Remote Monitor	2062474	Gregg, Herb E	Verify	Verified
Clinician	2083585	Adkins, Terese	Verify	Verified

Save

* Auth (Verified) *

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536 HOLBROOK, THOMAS J JR
03/02/1978 38Y F

DELBRIDGE GOODWIN, CRYSTAL 03/02/78 #2176596
07/18/2016 - - NOPA_PNE

* 6967584w7388 ClinDoc

Surgery Order

07/18/2016

From Provider	To Provider
THOMAS J. HOLBROOK, JR., MD ARCIS HEALTHCARE 1910 Blanding Street COLUMBIA, SC 29201-3520 Phone: (803) 256-4107 Fax: (803) 933-6100	PALMETTO HEALTH BAPTIST (POSTING) TAYLOR MARION ST COLUMBIA, SC 29201 Phone: (803) 296-5565 Fax: (803) 296-2623

Orders included: 1

Spinal stenosis of thoracic region
ICD-10: M48.04: Spinal stenosis, thoracic region
• LAMINECTOMY, THORACIC
Send To: PALMETTO HEALTH BAPTIST (POSTING)
Note to Provider:
Posterior thoracic laminectomy for decompression from T9-T12
23 HR OBS On 7/28/16 @ 7:30 am
NEEDS: midas rex, mccullough retractor, FLOURO
spinal monitoring - REP Teresa Adkins- Specialty Care
labs: CBC, BMP, ANY OTHER LABS PER ANESTHESIA
ALLERGIES: NKDA
PRE-OP Meds in holding: 1 GM ANCEF IV
SCD'S

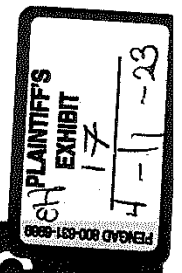
LF = 29

Date: 07/28/2016
Time: 7:30 am
Name of Instrument Rep/Company: Teresa Adkins - Specialty Care Monitoring

Patient	NAME: DELBRIDGE GOODWIN, CRYSTAL J ** PATIENT ID: 2176596 ** PATIENT SSN: 251492070 Gender: F ** DOB: 03/02/1978 ** AGE: 38yo
Address	903 GREENLAWN DR, COLUMBIA, SC 29209
Phone	H: (803) 743-9407 M: (803) 477-5465

Electronically Signed by: THOMAS J. HOLBROOK, JR., MD

PLAINTIFF'S EXHIBIT 16 4-11-23



Office Visit Blood Pressures in 2016

June 20th
152/112 = MAP of 125

July 18th
129/81 = MAP of 97

Average of 111

Hospital Blood Pressures in 2016

July 22nd
156/92 = MAP of 113

July 28th
160/99 = MAP of 119

Average of 116

ROA_2150

PLAINTIFF'S EXHIBIT
18
4-11-23
PENGAD 800-631-6989

Pre-Operative Blood Pressures in 2016

June 20th
152/112 = MAP of 125

July 18th
129/81 = MAP of 97

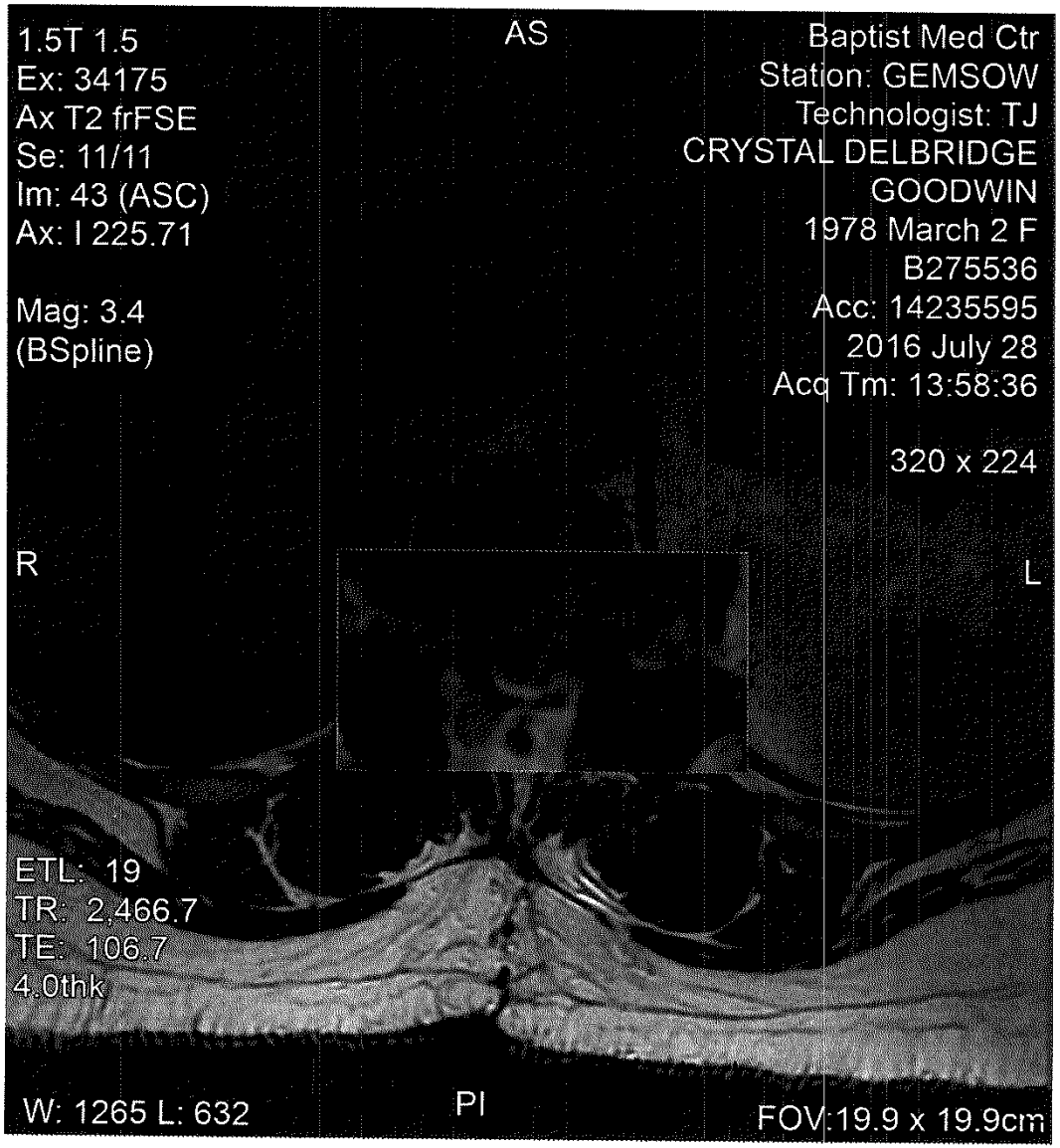
July 22nd
156/92 = MAP of 113

July 28th
160/99 = MAP of 119

Average of 113.5

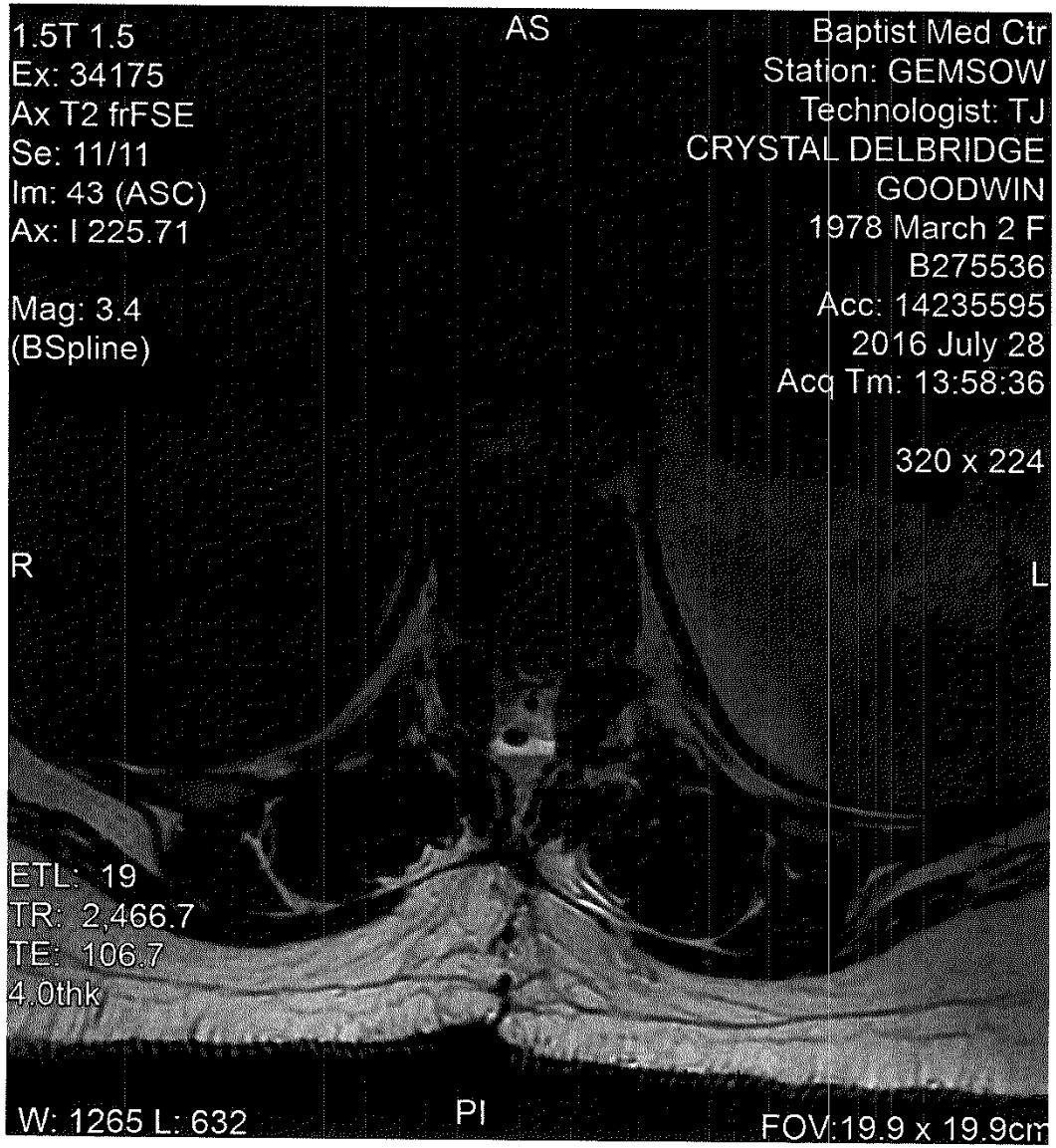
PLAINTIFF'S EXHIBIT
19
4-17-23
PENGAD 800-631-6989

AXIAL VIEW



PLAINTIFF'S EXHIBIT 20 4-12-23

AXIAL VIEW



ROA_2153

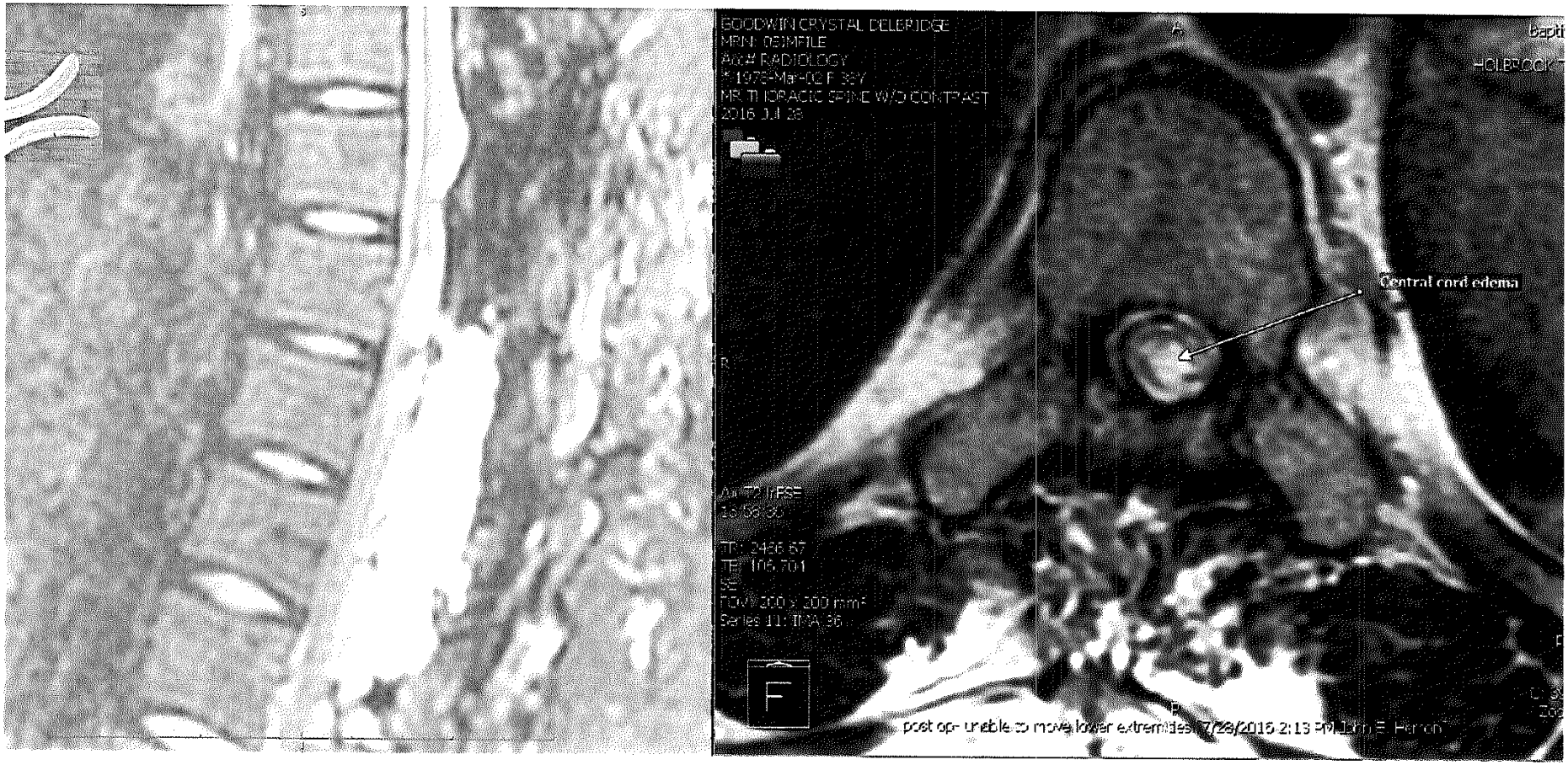
ROA_2154

Central Cord Infarction (dead issues) <u>Above</u> the Operative Site



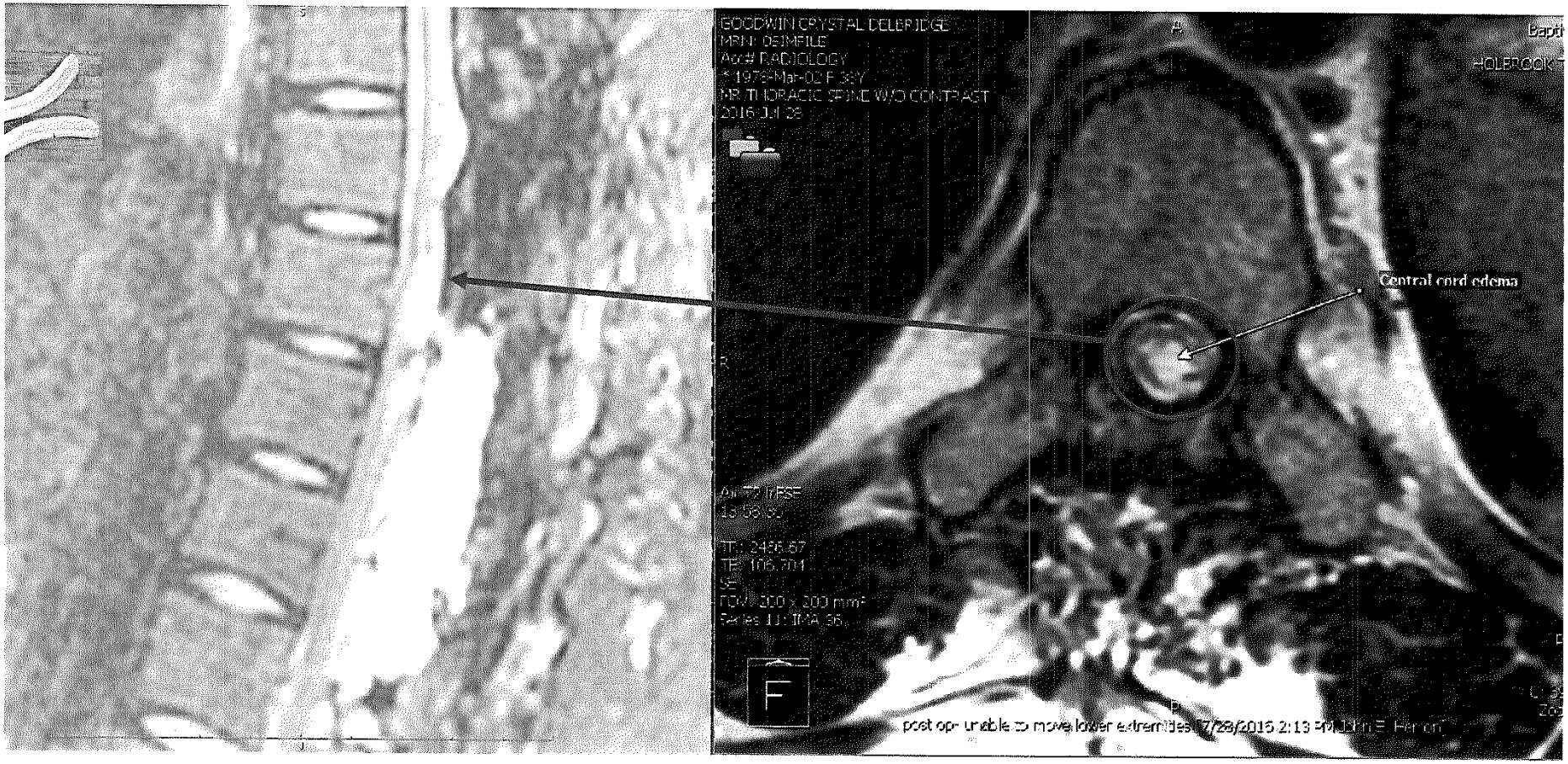
ROA_2155

Central Cord Infarction (dead issues) NEAR the Operative Site



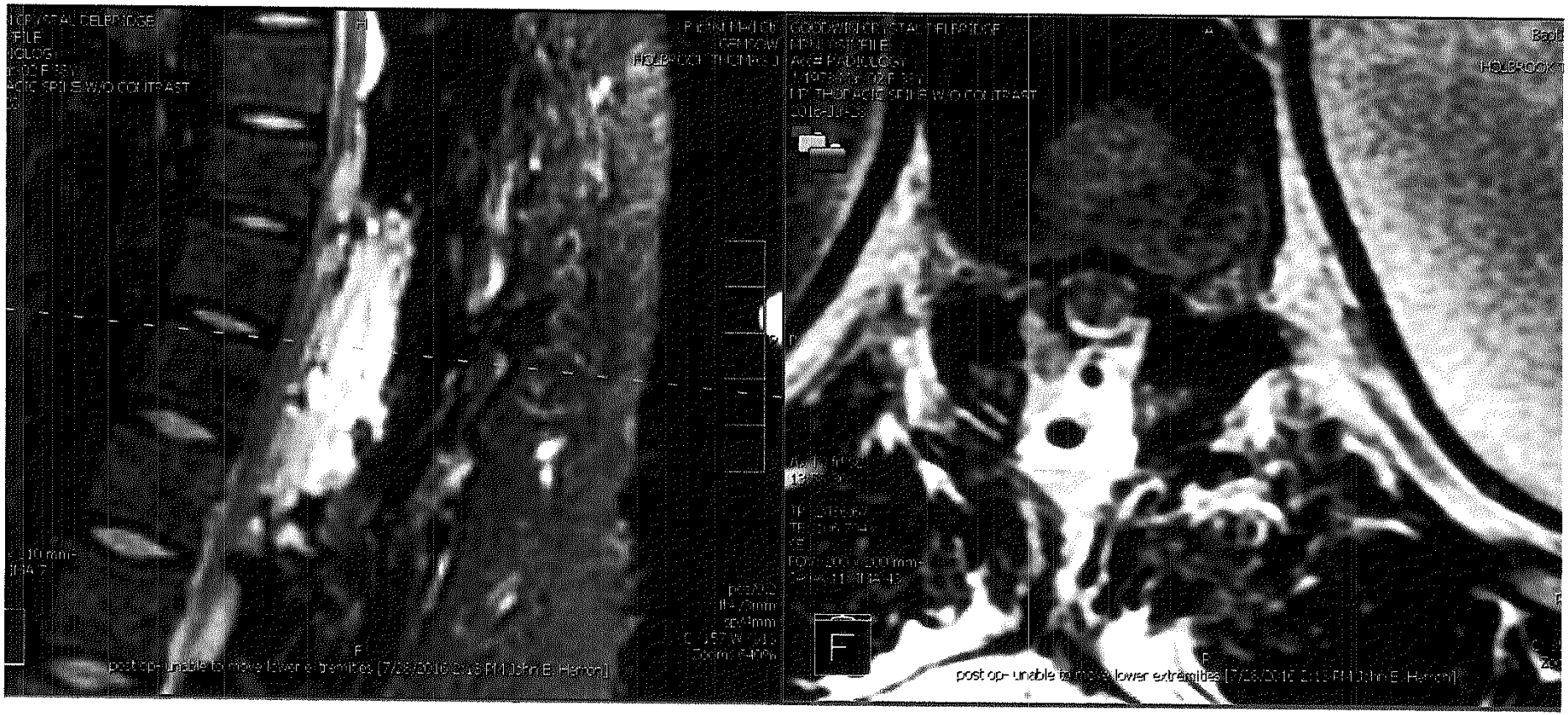
ROA_2156

Central Cord Infarction (dead issues) NEAR the Operative Site

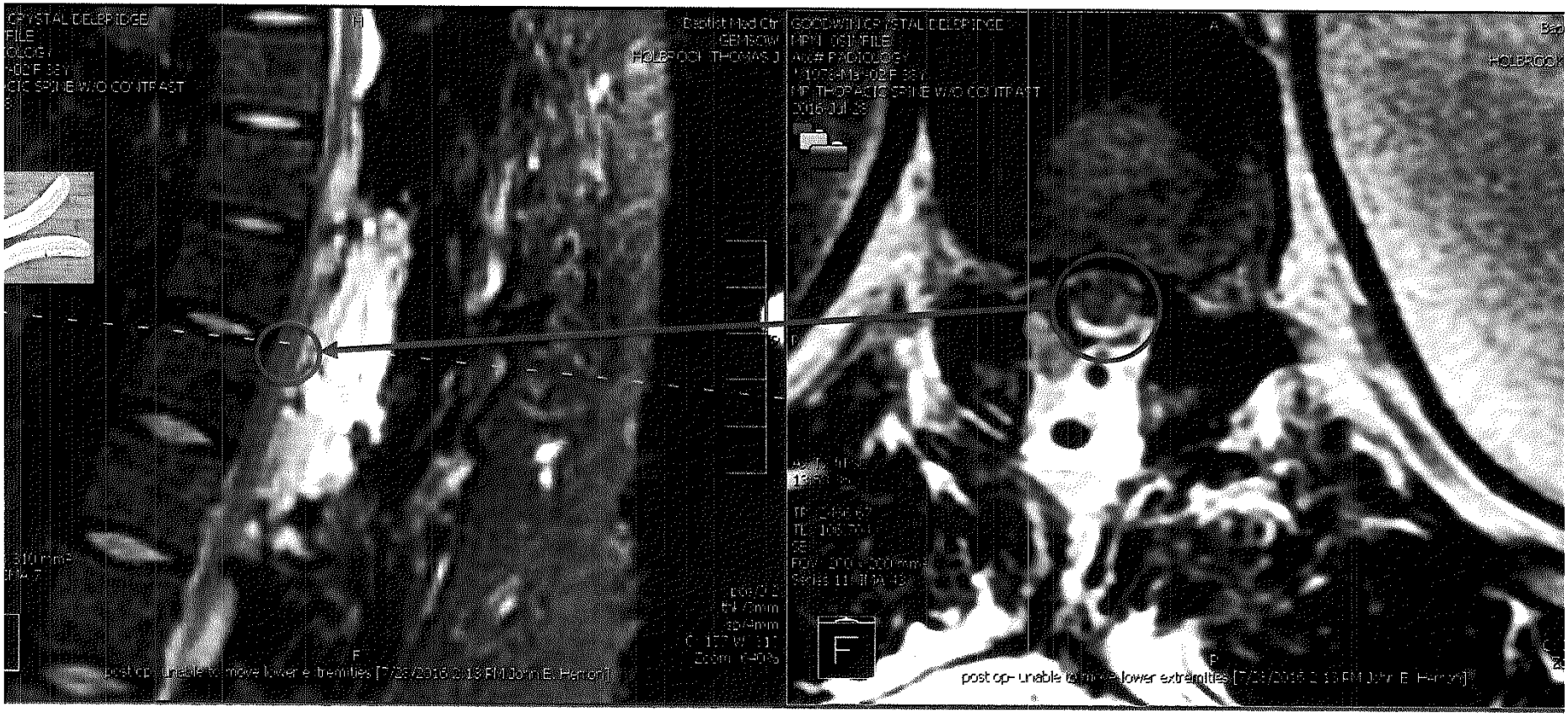


ROA_2157

Central Cord Infarction (dead issues) <u>Below</u> the Operative Site



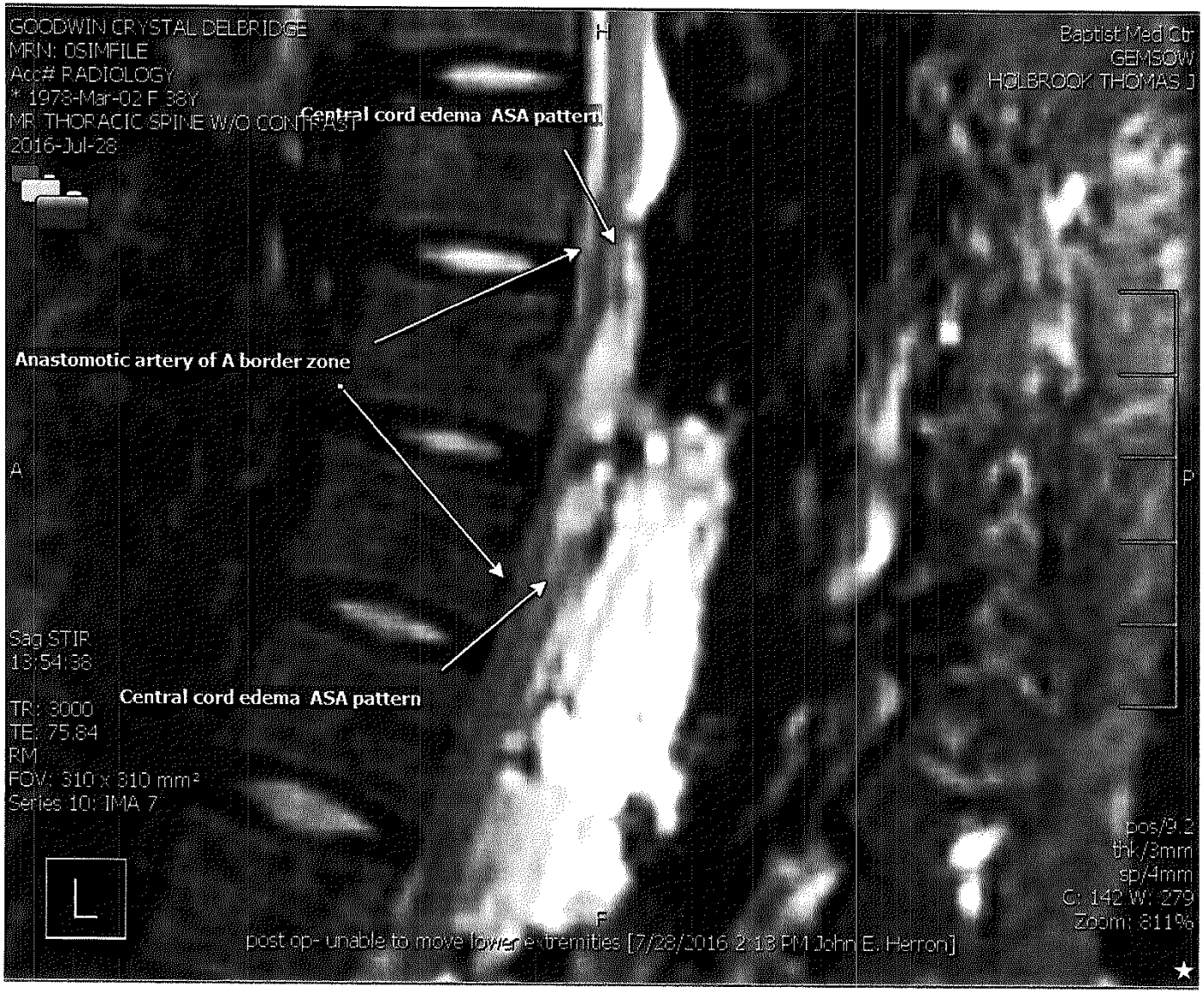
Central Cord Infarction (dead issues) <u>Below</u> the Operative Site



ROA_2159

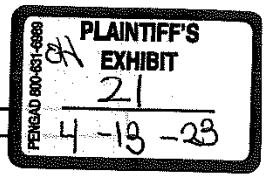

SAGITTAL VIEW
"Snake Eye / Owl's Eye" would appear throughout tail
Length: 6.231 cm
Length of Infarction (dead issue) : 6.231 cm

ROA_2160


GOODWIN CRYSTAL DELBRIDGE
MRN: 0SIMFILE
Acc# RADIOLOGY
* 1978-Mar-02 F 38Y
MR THORACIC SPINE W/O CONTRAST
2016-Jul-28
H
Baptist Med Ctr
GEMSOW
HOLBROOK THOMAS J
Central cord edema ASA pattern
Anastomotic artery of A border zone
A
P
Sag STIR
13:54:36
Central cord edema ASA pattern
TR: 3000
TE: 75.64
RM
FOV: 310 x 310 mm²
Series 10: IMA 7
pos/9.2
thk/3mm
sp/4mm
C: 142 W: 279
Zoom: 811%
L
F
post op- unable to move lower extremities [7/28/2016 2:13 PM John E. Herron]

ROA_2161

SAGITTAL VIEW
Axial Slice
"Snake Eye / Owl's Eye" would appear throughout tail
Length: 6.231 cm



Surgical Documentation

SN - B - IO - Case Attendee

	Entry 1	Entry 2	Entry 3
Case Attendee	Holbrook MD, Thomas J	Root MD, Jennifer R	Starn CRNA, Erich R
Role Performed	Surgeon - Primary	Anesthesiologist	CRNA - Primary
Time In	07/28/16 07:24:00	07/28/16 07:24:00	07/28/16 07:24:00
Time Out	07/28/16 11:47:00	07/28/16 11:47:00	07/28/16 11:47:00
Procedure	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)
Signing Attendee	No	No	No
Last Modified By:	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04

	Entry 4	Entry 5	Entry 6
Case Attendee	Todd RN, Michael B	Fletcher RN, Amber D	Robinson, Dannette A
Role Performed	Circulator - Primary	Circulator - Other	Scrub 1 - Primary
Time In	07/28/16 07:24:00	07/28/16 07:24:00	07/28/16 07:24:00
Time Out	07/28/16 11:47:00	07/28/16 11:47:00	07/28/16 11:47:00
Procedure	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)
Signing Attendee	No	No	No
Last Modified By:	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04

	Entry 7	Entry 8	Entry 9
Case Attendee	Gales ST, Jessica S	Switzer ST, Sunny L	Nichols SN, Joanna D
Role Performed	Scrub - Other	Scrub 2	Student Surgical Tech
Time In	07/28/16 07:24:00	07/28/16 07:24:00	07/28/16 07:24:00
Time Out	07/28/16 11:47:00	07/28/16 11:47:00	07/28/16 08:15:00
Procedure	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)
Signing Attendee	No	No	No
Last Modified By:	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04

	Entry 10	Entry 11	Entry 12
Case Attendee	Bobb CRNA, Donna K	Adkins, Teresa Nguyen	Riley PA, Maurio A
Role Performed	CRNA - Relief	Neuro-Intraop Monitor	Physician Assistant
Time In	07/28/16 08:25:00	07/28/16 07:24:00	07/28/16 10:33:00
Time Out	07/28/16 09:12:00	07/28/16 11:47:00	07/28/16 11:47:00
Procedure	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)	Thoracic Laminectomy(Posterior)
Signing Attendee	No	No	No
Last Modified By:	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04	Fletcher RN, Amber D 07/28/16 11:47:04

SN - B - IO - Case Times

	Entry 1		
Start Times			
Patient In Room Time	07/28/16 07:24:00	**Surgery Start Time**	07/28/16 08:08:00
Stop Times			
Surgery Stop Time	07/28/16 11:15:00	**Patient Out Room Time**	07/28/16 11:47:00
PostOp Destination	PACU		

SMITH-GRAGG
REHABILITATION, INC.
Cathy Gragg-Smith, RN, CRRN, CCM, CLCP
Julie K. Burgess, M.Ed., CRC
Beth Roach, Practice Mgr./Accounting

1109 South Park Street Suite 504 #318
Carrollton, Georgia 30117
Phone: 770.277.9235
Fax: 470.777.2779
Email: smithgragg1@gmail.com

August 6, 2020

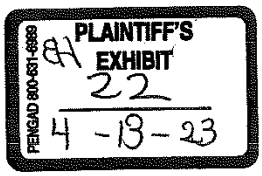
REHABILITATION AND LIFE CARE PLAN FOR CRYSTAL GOODWIN

Demographic/Identifying Information:
Name: Crystal Goodwin
DOB: 3/2/1978

Referral Information:
Ms. Goodwin is a 42-year old female who was referred for development of a Rehabilitation and Life Care Plan by her attorney. Ms. Goodwin's plan was developed in consultation with Ms. Goodwin, her husband, and Dr. Michael Schaufele, Physiatrist and Pain Management Specialist.

Medical Records Reviewed:
6/20/2016: Midlands Orthopaedics and Neurosurgery, Encounter by Thomas J. Holbrook, Jr., MD
7/28/2016: Palmetto Health Baptist, Operative Report by Thomas J. Holbrook Jr., MD
8/2/2016: Palmetto Health Baptist, Consultation Report by Stanley Greenberg, MD
8/5/2016: Palmetto Health Baptist, Consultation Report by James G. Bouknight, MD
8/5/2016: Palmetto Health Baptist, Physician Progress Notes by Maurio A. Riley, PA
8/8/2016: Palmetto Health Baptist, Transfer Summary by Thomas J. Holbrook, MD
8/11/2016: Palmetto Health History and Physical by Thomas Holbrook, MD
8/29/2016: Midlands Orthopaedics and Neurosurgery, Encounters and Procedures by Thomas J. Holbrook, Jr., MD
9/5/2018: Columbia Rehabilitation Clinic Inc., Plan of Care (unable to locate signature of author)

Current Status/Recommendations:
Ms. Goodwin is a 42-year old female who incurred a thoracic 9-12 spinal cord injury . No ASIA score is noted to determine if her injury is a complete or an incomplete injury. She demonstrates motor and sensory intact below her documented level of injury. Ms. Goodwin has a past medical history which includes two previous back surgeries for back pain, hypertension, and a gastric sleeve two years ago for weight loss. She reports that she has lost 150 pounds since the gastric sleeve surgery. She currently is followed by her primary care physician for her medical care. She requires medical management by Physical Medicine and Rehabilitation and Urology to manage the sequela from due to her spinal cord injury. Her current medication regimen includes medications to treat her spasticity, pain, mood and pain, prophylactic antibiotics for her neurogenic bladder and recurrent urinary tract infections, and anxiety. These medications are anticipated to require adjustments to dosage and frequency to treat the chronic conditions they are being used to treat.



Ms. Goodwin currently requires assistance with bathing due to her bathroom being inaccessible. She and her husband report that she is having to bathe in the living room using a kiddie pool. Her family assists her with set up and clean up at this time. She can perform her own intermittent catheterizations and bowel program on a bedside commode. This interviewer noted that she has a bedside commode in the den of the home that she uses during the day and one in her bedroom that she uses at night. She demonstrates the ability to transfer herself independently from her wheelchair to the bedside commode. She reports that she can dress herself after her family gets her clothes out of her inaccessible closet. Attendant care is required at this time to assist her with her activities of daily living due to her inaccessible home environment. She will continue to require assistance with heavy house cleaning. Currently, Ms. Goodwin has not had an adapted driving assessment and once this has been completed, she may be cleared to drive a vehicle with hand controls. Ms. Goodwin reports that she bakes and sells her baked goods to the community to help support her family. She reports that she has baked for years prior to being wheelchair bound, and found that she could sell her baked goods initially to family and friends then word spread to the community.

Ms. Goodwin has a neurogenic bowel and bladder secondary to her spinal cord injury. She reports that her bowel program is a digital stimulation every other day and she denies rectal sensation. She reports that she does her bowel program independently on a bedside commode. She reports no issues with her bowel program, no constipation or diarrhea. She manages her neurogenic bladder with intermittent catheterization every five to six hours. She demonstrates independence with her intermittent catheterizations on the bedside commode. Ms. Goodwin reports frequent urinary tract infections and was placed on prophylactic antibiotics for this complication. She will require routine urological following up including diagnostics to monitor her bladder/renal health.

Ms. Goodwin is wheelchair dependent for mobility. She demonstrates the ability to transfer using both a sliding board and depression transfers. She reports that she was working on standing with physical therapy to assist with transfers, however, she will not be a functional ambulator. Ms. Goodwin will require a power wheelchair at age 60 in order to decrease the wear and tear on her shoulders because of the repetitive motion of pushing a manual wheelchair, as well as transferring. She will require ongoing evaluations with physical and occupational therapies to address her home exercise program and equipment needs. A home accessibility specialist is required to assess her living environment and give recommendations to make her environment safe and accessible for her wheelchair dependence. Once her home is appropriately modified, she will require occupational therapy treatment to ensure her independence in the modified environment along with providing compensatory strategies for her daily living. A right ankle-foot orthosis is required for any standing / transferring, as well as, to assist with correcting her foot drop with right extremity.

Ms. Goodwin reports that she has pain on a daily basis. She reports pain in her bilateral lower extremities that is constant and burning in nature. She reports that it "feels like nerve pain" and that "they are on fire right now". She also reports that this pain wakes her at night from her sleep. She reports constant pain in her low back that is stabbing in nature and is aggravated by lying down and is alleviated by changing position. She reports this has made sleep difficult. She reports bilateral hand numbness that occurs frequently. Ms. Goodwin underwent an Independent Medical Evaluation by Dr. Michael Schaufele, a Physiatrist/Pain Management specialist on July 15, 2020. He recommends electromyography/nerve conduction study to address these pain sites and which will guide appropriate treatment for these issues. A

baclofen pump trial is recommended to address the pain that is caused by her spasticity, if the trial is successful she will require placement of an implanted baclofen pump with periodic refills and replacement of the pump itself. Pain management will be used to address her pain and adjust medications, perform diagnostics, and optimize the management of her pain. Ms. Goodwin has not participated in a Spinal Cord Injury Comprehensive Rehabilitation program, and it was discussed that a 1-2 week course would be appropriate for her to maximize her function and learn additional compensatory strategies to assist her in her daily life.

Ms. Goodwin is a 42-year old woman who currently lives with her husband and two of her three daughters in Columbia, South Carolina. Her home is not accessible for her wheelchair and requires modifications in order to maximize her independence and safety in the home. Ms. Goodwin is easily tearful when discussing her lack of independence and the ongoing sequela of her spinal cord injury. Psychological counseling is recommended to assist her with the adjustment to her spinal cord injury. She reports that this injury has impacted her entire family including her husband and three daughters. They have all been very supportive and assist when they are able, however, this makes her feel like a burden to her family. As Ms. Goodwin ages, she again will require attendant care to physically assist her with her activities of daily living. Case management by an individual with experience working with individuals with a spinal cord injury is recommended to assist her with her medical, rehabilitation care coordination and available resources.

Cathy Gragg-Smith RN,CRRN,CCM,CLCP

Re: Crystal Goodwin
I have reviewed the Rehabilitation and Life Care Plan regarding Crystal Goodwin. I find the plan dated August 3, 2020 to be an appropriate reflection of the future medical / rehabilitation care needs.

Michael Schaufele, MD

8/5/2020
Date

Smith-Gragg Rehabilitation, Inc.
1109 S. Park St.
Suite 504 #318

Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

Projected Evaluations

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Driving Evaluation	Beginning 42 2020 Ending 42 2020	1 time.	Assess for modifications and safety	Per Unit $400.00 to $600.00 Per Year	Approx unit cost per evaluation. Add'l training services may be required.	Prisma Health Columbia SC 1
GYN	Beginning 42 2020 Ending Life Exp.	Minimum of 1 time.	Assessment / menstrual supression	Per Unit $200.00 to $250.00 Per Year	Approx unit cost per evaluation.	Columbia SC 2
Home Accessibility Specialist	Beginning 42 2020 Ending Life Exp.	1 time.	Assess home for accessibility and safety	Per Unit $840.00 to $1,260.00 Per Year	Approx unit cost per evaluation.	Rehab Without Walls 3
Occupational Therapist	Beginning 42 2020 Ending Life Exp.	Every 2 - 3 years.	Assess function, home exercise program and equipment needs	Per Unit $300.00 to $630.00 Per Year	Approx unit cost per evaluation.	Prisma Health, Columbia SC Rehab Without Walls 4
Orthopedist / Spine Surgeon	Beginning 42 2020 Ending Life Exp.	1 time per year.	Spine management	Per Unit $200.00 to $250.00 Per Year	Approx unit cost per evaluation.	Columbia SC 5

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ROA_2168

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Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Projected Evaluations

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Physiatrist/ Pain Management Specialist	Beginning 42 2020 Ending Life Exp.	6-12 times /yr for 2 yrs. Then 1-2 times /yr thereafter.	Rehab and pain management	Per Unit $175.00 to $250.00 Per Year	Approx unit cost per evaluation.	Columbia SC 6
Physical Therapist	Beginning 42 2020 Ending Life Exp.	Every 2 - 3 years.	Assess function, home exercise program and equipment needs	Per Unit $300.00 to $630.00 Per Year	Approx unit cost per evaluation.	Prisma Health, Columbia SC Rehab Without Walls 7
Urologist	Beginning 42 2020 Ending Life Exp.	1 time per year.	Urological management	Per Unit $175.00 to $250.00 Per Year	Approx unit cost per evaluation.	Columbia SC 8
Wheelchair Seating Specialit	Beginning 42 2020 Ending Life Exp.	Every 5 - 7 years.	Assess wheelchair equipment needs	Per Unit $500.00 to $800.00 Per Year	Approx unit cost per evaluation.	Prisma Health Columbia SC 9

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ROA_2169

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Suite 504 #318

Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Projected Therapeutic Modalities

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Case Manager	Beginning 42 2020 Ending Life Exp.	20-30 hrs per year for the next 1- 2 years. Then as needed.	Medical, rehab and care coordination	Per Unit $100.00 Per Year	Approx. unit cost per hr. Add'l services may be required.	To be determined. 10
Day Rehabilitation Program	Beginning 42 2020 Ending 42 2020	5 - 10 days	Comprehensive Spinal Cord Injury Rehab	Per Unit $1,200.00 Per Year	Approx. unit cost per day.	Shepherd Center 11
Occupational Therapist- In Home	Beginning 42 2020 Ending Life Exp.	6-10 visits per occurrence. Minimum of 1 occurrence.	Maximize function	Per Unit $567.00 to $756.00 Per Year	Approx. unit cost per visit. Following home modifications.	Rehab Without Walls 12
Physical Therapist	Beginning 42 2020 Ending Life Exp.	12 - 20 visits per occurrence. Minimim of 3 - 4 occurrences.	Maximize function	Per Unit $250.00 to $567.00 Per Year	Approx. unit cost per visit.	Prisma Health Rehab Without Walls 13
Primary Care Physician	Beginning 42 2020 Ending Life Exp.	3- 4 times per year.	Medical management	Per Unit $100.00 to $150.00 Per Year	Approx. unit cost per visit.	Palmetto Primary Care 14

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ROA_2170

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Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Projected Therapeutic Modalities

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Psychologist / Counselor	Beginning 42 2020 Ending Life Exp.	12 - 20 visits per occurrence. Minimum of 2 -3 occurrences.	Adjustment to injury	Per Unit $60.00 to $150.00 Per Year	Approx. unit cost per visit.	Columbia SC 15

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ROA_2171

Smith-Gragg Rehabilitation, Inc.
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Suite 504 #318

Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

Wheelchair(s) / Mobility / Maintenance

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Manual Wheelchair with Java Back	Beginning 41 2019 Ending Life Exp.	Every 5 - 7 years to age 60. Then every 7 - 10 years thereafter.	Mobility	Per Unit $2,895.00 Per Year	Approx. unit cost per occurrence.	National Seating and Mobility 16
Manual Wheelchair with Java Back - Maintenance	Beginning 42 2020 Ending Life Exp.	Annually, except year of purchase to age 60. Then every 2 - 3 years thereafter.	Service and repair.	Per Unit $150.00 to $200.00 Per Year	Approx. unit cost per occurrence.	National Seating and Mobility 17
Power Wheelchair	Beginning 60 2038 Ending Life Exp.	Every 5 - 7 years.	Mobility	Per Unit $8,000.00 to $12,000.00 Per Year	Approx. unit cost per occurrence.	National Seating and Mobility 18
Power Wheelchair Maintenance	Beginning 61 2039 Ending Life Exp.	Annually, except year of purchase.	Service and repair.	Per Unit $600.00 to $800.00 Per Year	Approx. unit cost per occurrence.	National Seating and Mobility 19
Sliding Board	Beginning 42 2020 Ending Life Exp.	Every 10 years.	Transfers.	Per Unit $50.00 to $70.00 Per Year	Approx. unit cost per occurrence.	Enablemart.com Rehabmart.com 20

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ROA_2172

Smith-Gragg Rehabilitation, Inc.
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Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

Wheelchair(s) / Mobility / Maintenance

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Wheelchair Cushion	Beginning 41 2019 Ending Life Exp.	Every 2 - 3 years.	Positioning	Per Unit $200.00 to $300.00 Per Year	Approx. unit cost per occurrence.	National Seating and Mobility 21

ROA_2173

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770.277.9235

Life Care Plan

Crystal Goodwin

Orthotics/Prosthetics

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Right Ankle Foot Orthotic	Beginning 42 2020 Ending Life Exp.	Every 3 - 5 years.	Positioning	Per Unit $600.00 to $800.00 Per Year	Approx. unit cost per occurrence.	Hanger 22

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ROA_2174

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Suite 504 #318

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770.277.9235

Life Care Plan

Crystal Goodwin

Durable Medical Items

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Bedside Commode	Beginning 42 2020 Ending Life Exp.	Every 10 years.	Bowel / bladder management	Per Unit $55.00 to $75.00 Per Year	Approx. unit cost per occurrence.	Rehabmart.com 23
Transfer Tub Bench	Beginning 42 2020 Ending Life Exp.	Every 5 - 7 years.	Accessibility / safety	Per Unit $160.00 to $180.00 Per Year	Approx. unit cost per occurrence.	Rehabmart.com 24
Walker	Beginning 42 2020 Ending Life Exp.	1 - 2 occurrences.	Therapy	Per Unit $80.00 to $110.00 Per Year	Approx. unit cost per occurrence.	Rehabmart.com 25

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Smith-Gragg Rehabilitation, Inc.
1109 S. Park St.
Suite 504 #318

Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Aids for Independent Function

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Adaptive Aids	Beginning 42 2020 Ending Life Exp.	Every 2 - 3 years.	Maximize independence	Per Unit $50.00 Per Year	Approx. unit cost per occurrence.	Enablemart.com Rehabmart.com 26

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Life Care Plan

Crystal Goodwin

Supplies

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Disposable Underpads	Beginning 42 2020 Ending Life Exp.	30 per month.	Hygiene	Per Unit $15.00 to $20.00 Per Year	Approx. unit cost per month.	Walmart 27
Intermittent Catheters	Beginning 42 2020 Ending Life Exp.	150 - 180 per month.	Bladder management	Per Unit $225.00 to $315.00 Per Year	Approx. unit cost per month.	At Home Medical 28
Nonsterile Disposable Gloves	Beginning 42 2020 Ending Life Exp.	1 - 2 boxes per month.	Hygiene	Per Unit $8.00 to $16.00 Per Year	Approx unit cost per month.	Walmart 29
Vaseline	Beginning 42 2020 Ending Life Exp.	1 jar per month.	Bowel program	Per Unit $3.00 Per Year	Approx unit cost per month.	Walmart 30
Washable Underpads	Beginning 42 2020 Ending Life Exp.	2 - 4 per year.	Hygiene	Per Unit Per Year $30.00 to $80.00	Approx. unit cost per year.	Walmart 31

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Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Medication(s)

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
*Antibiotics**	Beginning 42 2020 Ending Life Exp.	2 - 4 occurrences per year.	Injection	Per Unit $4.00 to $50.00 Per Year	Approx. unit cost per occurrence.	Walmart 32
*Baclofen 20 - 30 mg.**	Beginning 42 2020 Ending Life Exp.	3 times per day.	Spasticity	Per Unit $75.00 to $135.00 Per Year	Approx. unit cost per month.	Walmart 33
*Dantrolene 25 mg.**	Beginning 42 2020 Ending Life Exp.	3 times per day.	Spasticity	Per Unit $86.00 Per Year	Approx. unit cost per month.	Walmart 34
*Diazepam 5 mg.**	Beginning 42 2020 Ending Life Exp.	Daily	Anxiety	Per Unit $9.00 Per Year	Approx. unit cost per month.	Walmart 35

*Medications may vary; conditions for which they are prescribed are considerd chronic.

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Life Care Plan

Crystal Goodwin

Medication(s)

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
*Duloxetine 30 - 90 mg.**	Beginning 42 2020 Ending Life Exp.	Daily	Mood / Pain	Per Unit $15.00 to $194.00 Per Year	Approx. unit cost per month.	Walmart 36
*Escitalopram 10 - 20 mg. **	Beginning 42 2020 Ending Life Exp.	Daily for a minimum 3 month trial.	Mood	Per Unit $15.00 to $20.00 Per Year	Approx. unit cost per month. Continued use dependent upon effectiveness.	Walmart 37
*Meloxicam 7.5 - 15 mg.**	Beginning 42 2020 Ending Life Exp.	Daily	Pain	Per Unit $3.00 to $5.00 Per Year	Approx. unit cost per month.	Walmart 38
*Pregabalin 75-225 mg bid or Gabapentin 300-600 mg. tid**	Beginning 42 2020 Ending Life Exp.	Daily for a minimum 3 month trial.	Neuropathic pain	Per Unit $30.00 to $139.00 Per Year	Approx. unit cost per month. Continued use dependent upon effectiveness.	Walmart 39

*Medications may vary; conditions for which they are prescribed are considered chronic.

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Carrollton, GA 30117
770.277.9235

Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Medication(s)

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
*Senna 8.6 mg.**	Beginning 42 2020 Ending Life Exp.	3 times per day.	Pain	Per Unit $9.00 to $10.00 Per Year	Approx. unit cost per month.	Walmart 40
*Suppository**	Beginning 42 2020 Ending Life Exp.	As needed. Approx. 10 - 15 per month.	Bowel program	Per Unit $18.00 to $20.00 Per Year	Approx. unit cost per #15.	Walmart 41
*Tizanidine 4 - 8 mg.**	Beginning 42 2020 Ending Life Exp.	3 times per day for a 3 month trial.	Spasticity	Per Unit $41.00 to $81.00 Per Year	Approx. unit cost per month. Continued use dependent upon effectiveness.	Walmart 42
*Tramadol 50 mg. **	Beginning 42 2020 Ending Life Exp.	Approx. 2 times per week.	Pain	Per Unit $25.00 Per Year	Approx. unit cost per every 3 months.	Walmart 43

*Medications may vary; conditions for which they are prescribed are considered chronic.

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Life Care Plan

Crystal Goodwin

Home Care

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
*Attendant Care**	Beginning 42 2020 Ending 64 2042	4 hrs per day for a minimum of the next 6 - 12 months. Then as needed.	Assistance with activities of daily living / driving	Per Unit $21.00 to $24.00 Per Year	Approx. unit cost per hr. Dependent upon physicial gains & an accessible environment.	BrightStar Right at Home Interim Health Care 44
*Attendant Care**	Beginning 65 2043 Ending Life Exp.	4 hrs per day.	Assistance with activities of daily living / driving	Per Unit $21.00 to $24.00 Per Year	Approx. unit cost per hr. Dependent upon current function.	BrightStar Right at Home Interim Health Care 45
Domestic Assistance	Beginning 42 2020 Ending Life Exp.	2 times per month.	Heavy house cleaning	Per Unit $110.00 to $120.00 Per Year	Approx. unit cost per visit.	To be determined. 46
House and Yard Maintenance	Beginning 42 2020 Ending Life Exp.	8 - 10 hrs per month.	House and yard care	Per Unit $12.00 to $14.00 Per Year	Approx. unit cost per hr. Required in absence of spouse.	To be determined. 47

*Client currently requires 4 hrs per day of assistance with activities of daily living. However, following participation at a spinal cord injury comprehensive rehab program at The Shepherd Center, an accessible home environment and passing an adaptive driving evaluation, attendant care will be as needed.

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Life Care Plan

Crystal Goodwin

Future Medical Care Routine

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
CBC/ CMP	Beginning 42 2020 Ending Life Exp.	1 - 2 times per year.	Monitor medication effects	Per Unit $125.00 Per Year	Approx. unit cost per occurrence.	Quest Diagnostics 48
EMG / Nerve Conduction Study - Bilateral Lower Extremities	Beginning 42 2020 Ending Life Exp.	Minimum of 1 time.	Assessment	Per Unit $700.00 to $1,000.00 Per Year	Approx. unit cost per occurrence.	Prisma Health 49
EMG / Nerve Conduction Study - Bilateral Upper Extremities	Beginning 42 2020 Ending Life Exp.	Minimum of 1 time.	Assessment	Per Unit $700.00 to $1,000.00 Per Year	Approx. unit cost per occurrence.	Prisma Health 50
MRI - Thoracic Spine	Beginning 42 2020 Ending Life Exp.	Every 2 - 3 years.	Assessment	Per Unit $1,000.00 to $4,020.00 Per Year	Approx. unit cost per occurrence.	Open MRI Prisma Health 51
Renal Ultrasound	Beginning 42 2020 Ending Life Exp.	1 time per year.	Monitor urological function.	Per Unit $500.00 Per Year	Approx. unit cost per occurrence.	Prisma Health 52

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Smith-Gragg Rehabilitation, Inc.
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770.277.9235

Life Care Plan

Crystal Goodwin

Future Medical Care Routine

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Urinalysis/ Urine Culture	Beginning 42 2020 Ending Life Exp.	2 - 4 times per year.	Monitor for infection	Per Unit $200.00 to $250.00 Per Year	Approx. unit cost per occurrence.	Prisma Health 53
Urodynamics	Beginning 42 2020 Ending Life Exp.	Every 5 years.	Monitor urological function.	Per Unit $2,500.00 Per Year	Approx. unit cost per occurrence.	Prisma Health 54

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Life Care Plan

Crystal Goodwin

Transportation

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Hand Controls	Beginning 41 2019 Ending Life Exp.	Every 10 - 15 years.	Accessible driving	Per Unit $900.00 Per Year	Approx. unit cost per occurrence.	Mobility Works 55

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Life Care Plan

Crystal Goodwin

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Architectural Renovation(s)

Item / Service	Age / Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Housing Modifications	Beginning 42 2020 Ending 42 2020	1 time.	Accessibility and safety	Per Unit $85,645.00 Per Year	Approx. unit cost per occurrence.	56

One floor house. Carport or garage with covered walkway. Accessible entrances with 36" doorways throughout. Emergency access off bedroom. Accessible bathroom.

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Life Care Plan

Crystal Goodwin

Surgical Intervention

DOB: Mar 2, 1978
D/E:
Date Prepared: Aug 3, 2020
Primary Disability: Spinal Cord Injury

Item / Service	Age Year	Frequency/ Replacement	Purpose	Cost	Comment	Vendor
Baclofen Pump Trial	Beginning Unknown Ending Unknown	1 time.	Spasticity management	Per Unit $5,000.00 to $6,000.00 Per Year	Approx. cost per occurrence.	Medtronic 57
Baclofen Pump Placement	Beginning Unknown Ending Unknown	To be determined.	Spasticity management	Per Unit $50,000.00 to $70,000.00 Per Year	Approx. cost per occurrence.	Medtronic 58

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Smith Gragg Rehabilitation
1109 S Park St.
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Life Care Plan

Crystal Goodwin

Potential Complications

DOB: 3/2/1978
D/A:
Date Prepared: 8/3/2020
Primary Disability: Spinal Cord Injury

Complication	Cost of Complication	Comment
Additional Attendant Care / Skilled Nursing Care	Undetermined.	Additional services may be required.
Additional Therapies / Physiatry Services	Undetermined.	Additional services may be required.
Case Management	Undetermined.	Additional services may be required for medical complications and problems with care coordination.
Orthopedic Complications (Falls)	Undetermined.	Additional physician consults, diagnostics, therapies and procedures may be required.
Psychological / Depression Complications	Undetermined.	Additional consults and or medications may be required.

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Life Care Plan

Crystal Goodwin

Potential Complications

DOB: 3/2/1978
D/A:
Date Prepared: 8/3/2020
Primary Disability: Spinal Cord Injury

Complication	Cost of Complication	Comment
Skin Integrity Complications	Undetermined.	Additional physician consults, supplies and procedures may be required.
Spasticity Complications	Undetermined.	Additional physician consults, medications and procedures may be required.
Urological Complications	Undetermined.	Additional physician consults, diagnostics, medications and procedures may be required.

ROA_2188

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CATHY GRAGG-SMITH, RN, CRRN, CCM, CLCP

CURRICULUM VITAE

EDUCATION:

8/2014: Bachelor of Science in Nursing
University of Phoenix
Phoenix, Arizona

2/2014 – 5/2014: Life Care Planning Certification Course
University of FL – eLearning
Gainesville, FL

1989: Associates of Science, Nursing
University of West Georgia
Carrollton, Georgia

CERTIFICATIONS:

Certified Case Manager (2014)
Commission for Case Manager Certification

Certified Life Care Planner (2014)
Commission on Health Care Certification

Certified Rehabilitation Registered Nurse (2014)
The Rehabilitation Nursing Certification Board

PROFESSIONAL EXPERIENCE:

1/2016- Present:
Smith-Gragg Rehabilitation, Inc.
Carrollton, Ga.
Life Care Planner
Nurse Case Manager
Legal Nurse Consultant

Specialty Areas: Rehabilitation evaluation, life care planning, catastrophic case management, State Board of Workers' Compensation catastrophic rehab supplier.

1/2014- Present:

Ahrendt Rehabilitation, Inc.
Lawrenceville, Georgia
Life Care Planner
Nurse Case Manager
Consultant

Specialty Areas: Rehabilitation evaluation, life care planning, catastrophic case management, State Board of Workers' Compensation catastrophic rehab supplier

5/2012- 11/2013:

Piedmont Hospital Atlanta
Atlanta, Georgia
Case Manager/Utilization Manager

Specialty Areas: Oversight of case management and disease management, and performed audits to ensure billing compliance.

3/2010- 4/2012:

Accord Services, LLC
Marietta, Georgia
Director of Nursing

Specialty Areas: Evaluation of patients in the home setting, supervision of nursing supervisors as well as 300 external staff, developed nursing policies and procedures for patients and staff.

6/1986- 3/2010:

Shepherd Center
Atlanta, Georgia
6/1986-1/1990 Nurse Extern
Specialty Areas: Spinal Cord Injury/ Medical-Surgical unit

1/1990- 12/1994 Staff Nurse
Specialty Areas: Spinal Cord Injury/Medical-Surgical unit

12/1994-2/2002 Education Coordinator
Specialty Areas: ICU, Medical-Surgical unit, and Acquired Brain Injury unit
Adjunct faculty for Georgia State University School of Nursing, University of West Georgia School of Nursing, Georgia Perimeter College School of Nursing.

2/2002-3/2010 Unit Manager for Outpatient Services

- Shepherd Pain Institute
- Carlos Multiple Sclerosis Center
- Multispecialty Clinic
- Urology Clinic
- Wound Clinic

PROFESSIONAL ASSOCIATIONS:

Association of Rehabilitation Nurses

American Nurses Association

International Association of Life Care Planners

International Association of Rehabilitation Professionals

PRESENTATIONS:

2005-Present- "Sexuality after Disability"
Nell Hodgson School of Nursing, Emory University, Atlanta, Georgia
This lecture is done yearly at the request of Dr. Sally Lehr.

1994-2012- "First 72 Hours of Spinal Cord Injury"
Presented to :
University of West Georgia School of Nursing, Carrollton, Georgia

Georgia State University School of Nursing, Atlanta, Georgia

Macon State College School of Nursing, Macon, Georgia

Georgia Perimeter School of Nursing, Decatur, Georgia

Mississippi Trauma Conference

Decatur Trauma Conference

Florida Health Systems at Shands, Jacksonville, Florida

Shepherd Center Nursing Conference

Accord Services sponsored, Journey Back to Life conference, Savannah, Georgia

2002- "Nature of catastrophic injury as related to spinal cord injury"
Beech Street Managed Care Company, Orange County, California

2003- "Guillian Barre: Case study presentation"
Advance for Nurses Career Fair, Atlanta, Georgia

2010- "Potential Medical Complications After Spinal Cord Injury"
Journey Back to Life Conference, Savannah, Georgia

2011-2012- "Aging with a spinal cord injury"
Journey Back to Life Conference, Atlanta, Georgia, sponsored by State of Georgia Workers Compensation Board

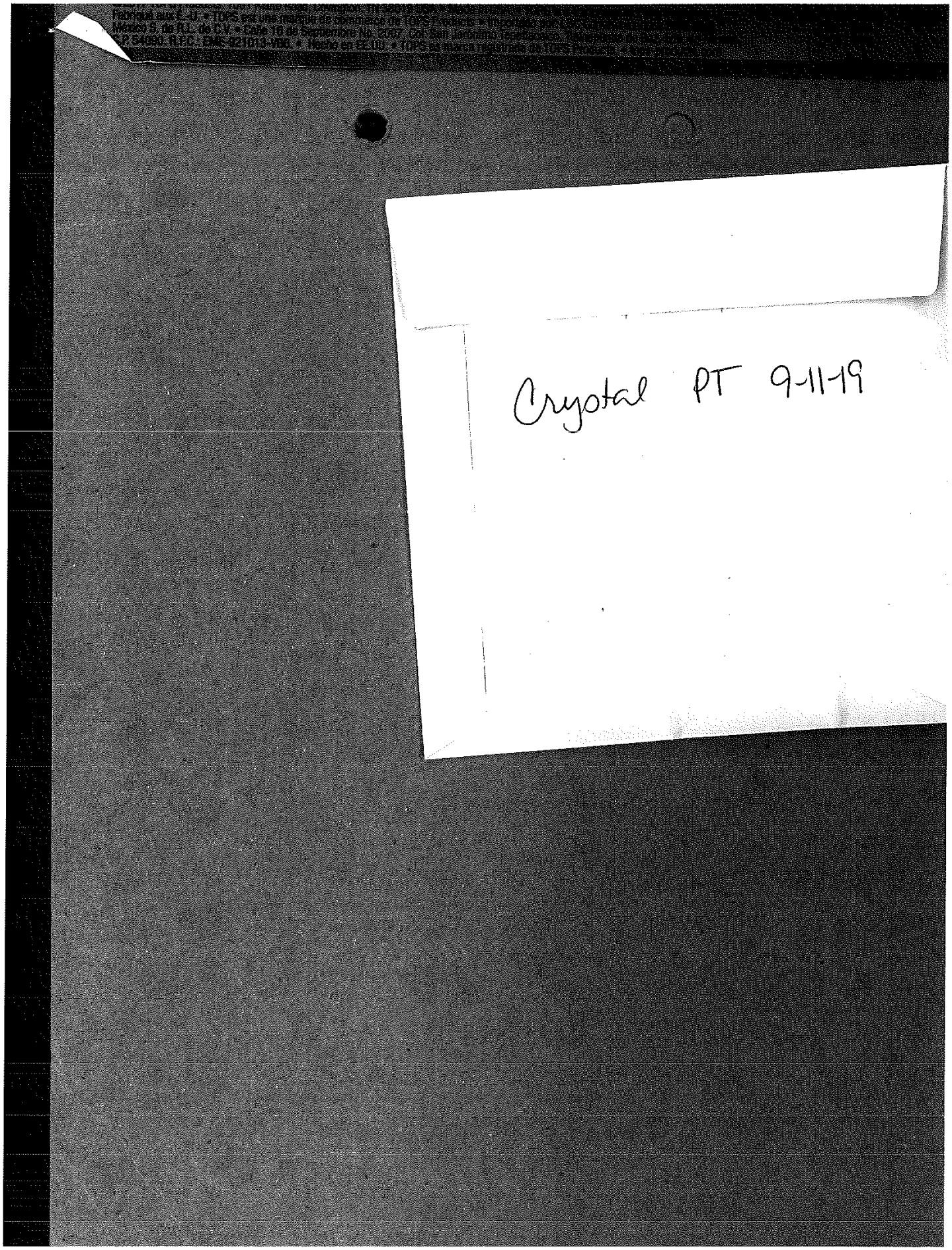
PAST MEMBER:

2007- Genentech Advisory Board, San Francisco, California

PAST REVIEWER:

2007- *Mosby's Guide to Trauma,* Spinal Cord Injury chapter (16), 4th edition.

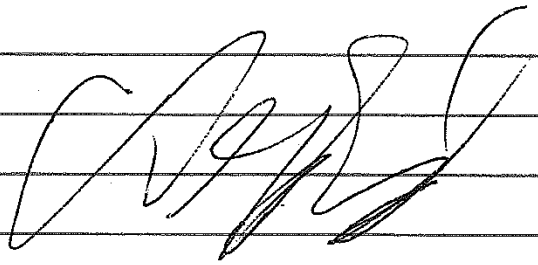

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4-13-23
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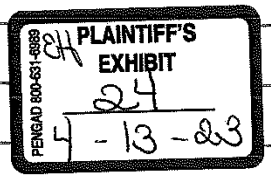

Crystal PT 9-11-19

Future Economic Losses

$1,366,512

$2,611,525

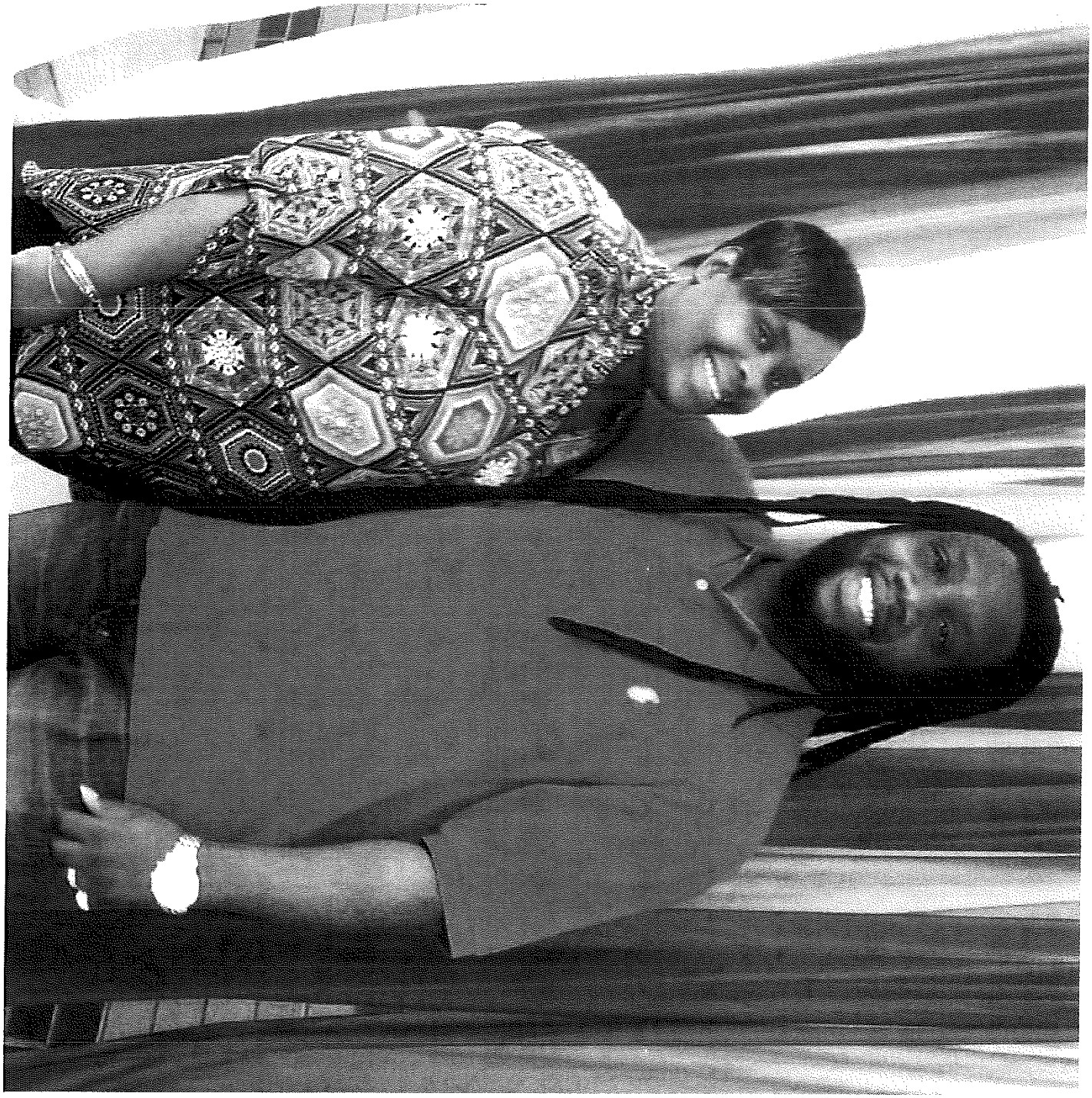


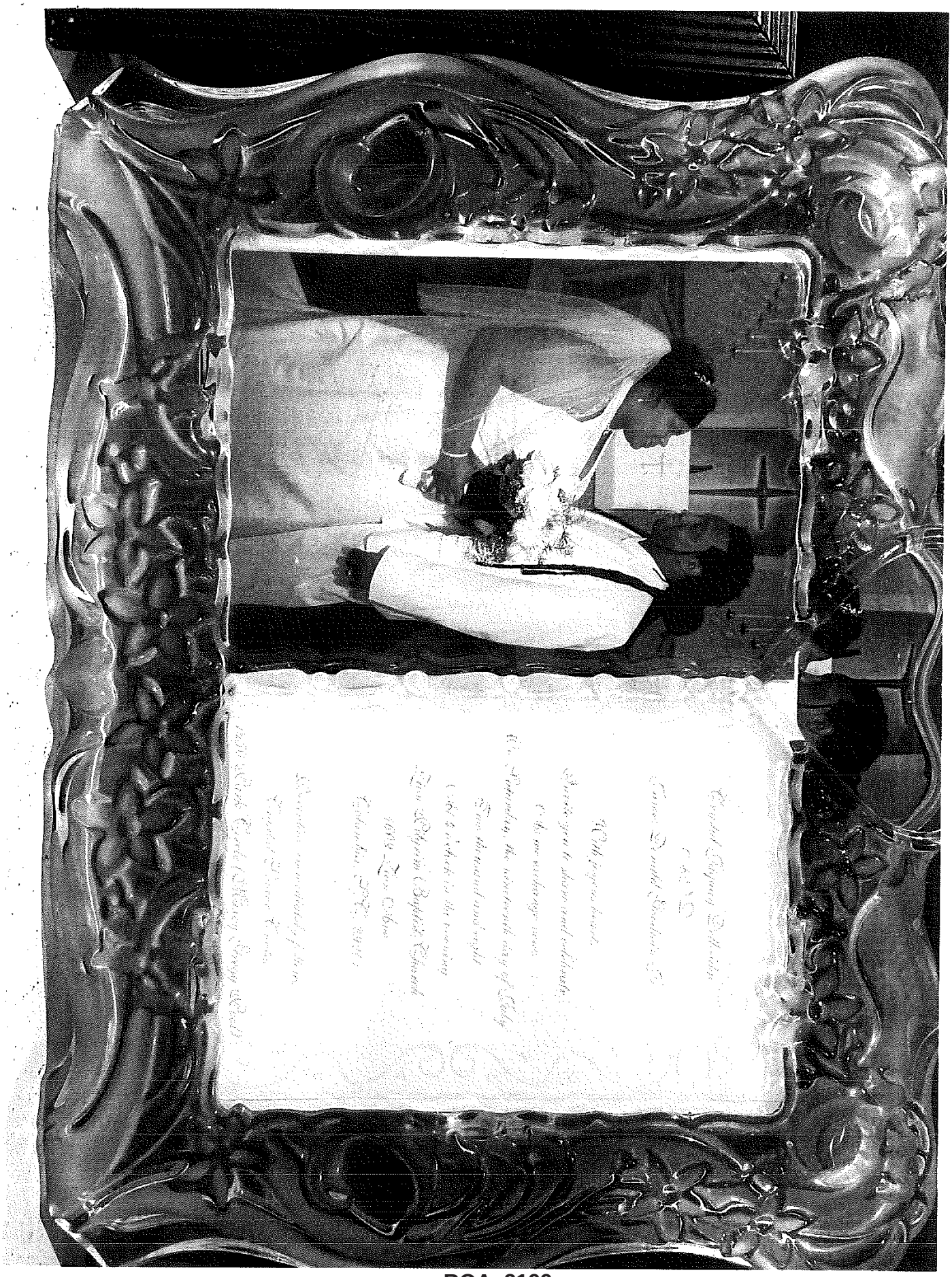




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25
4-14-23



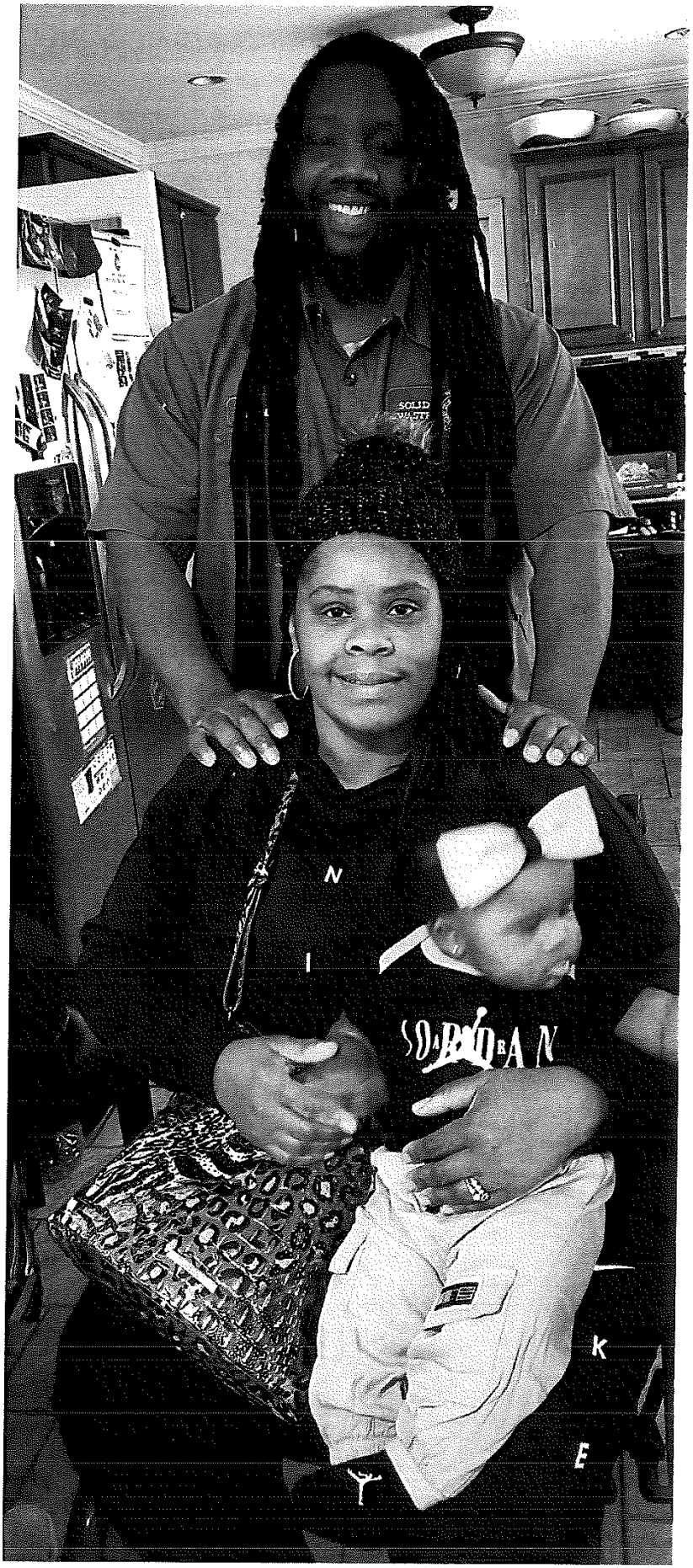






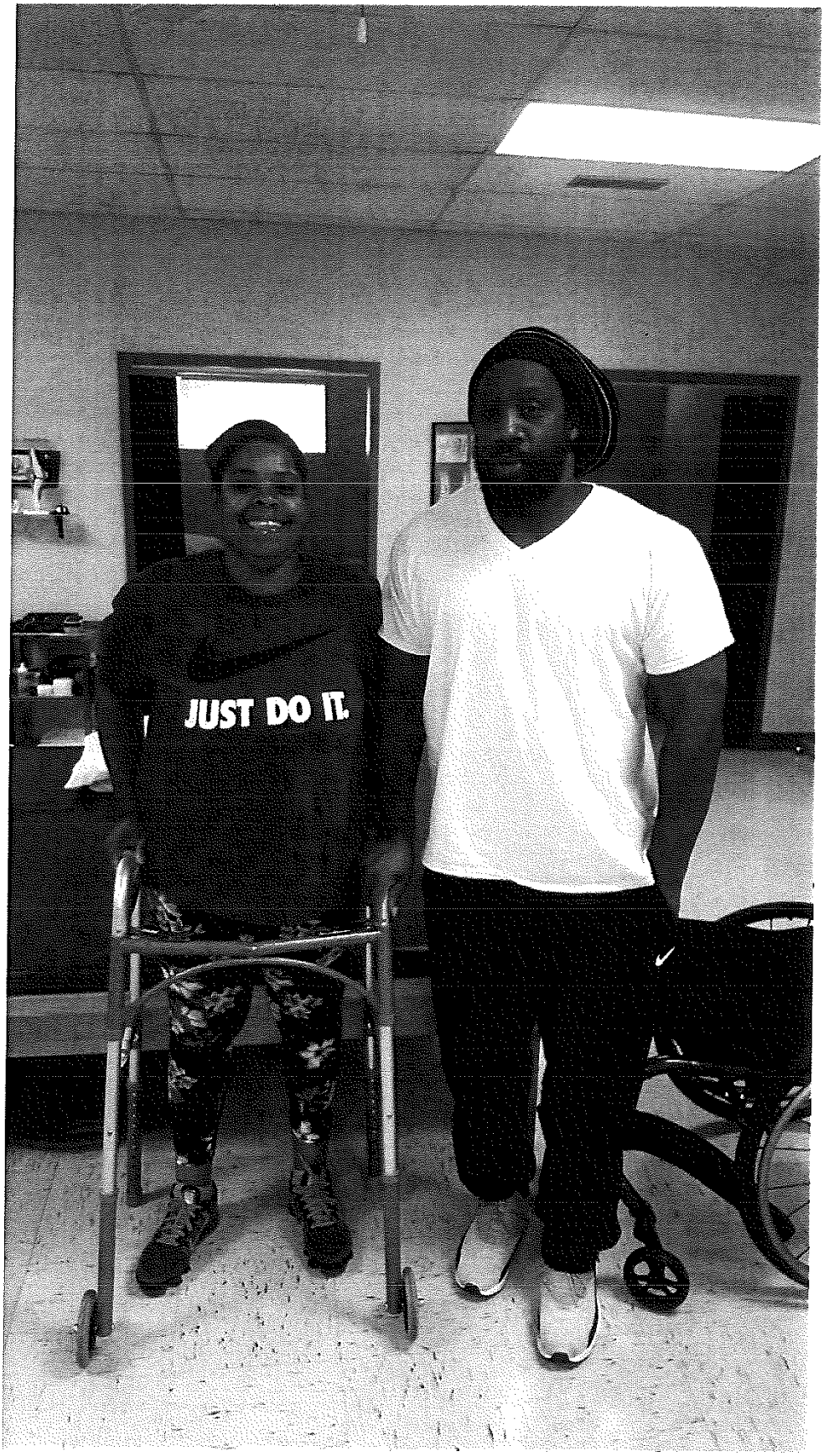
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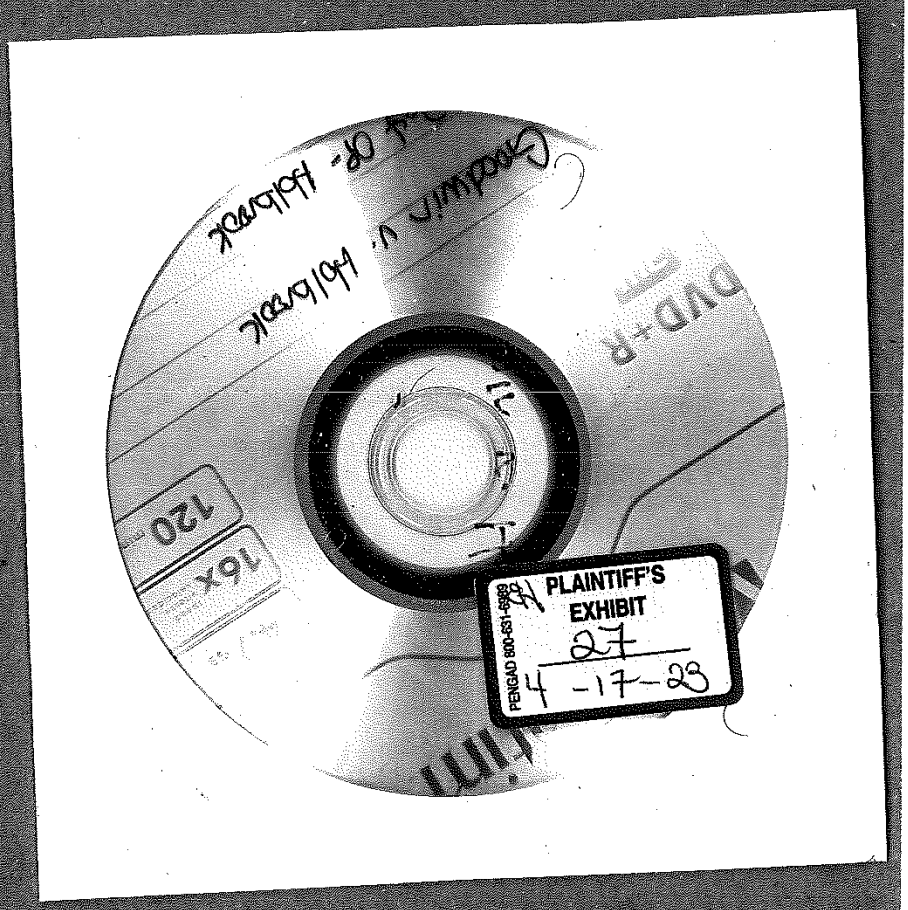


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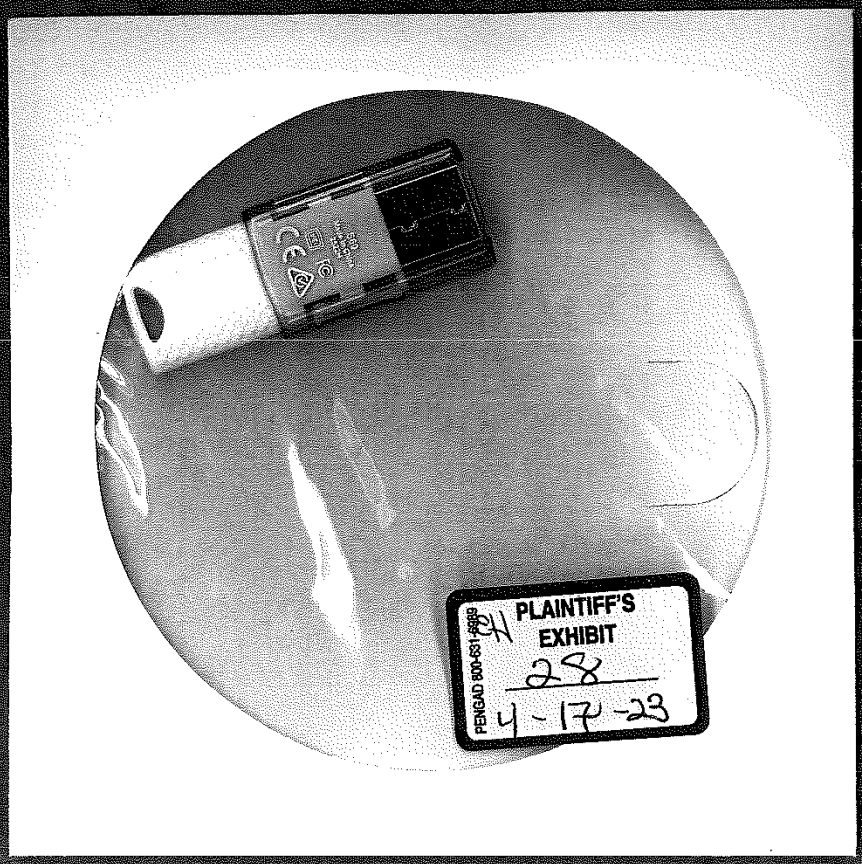

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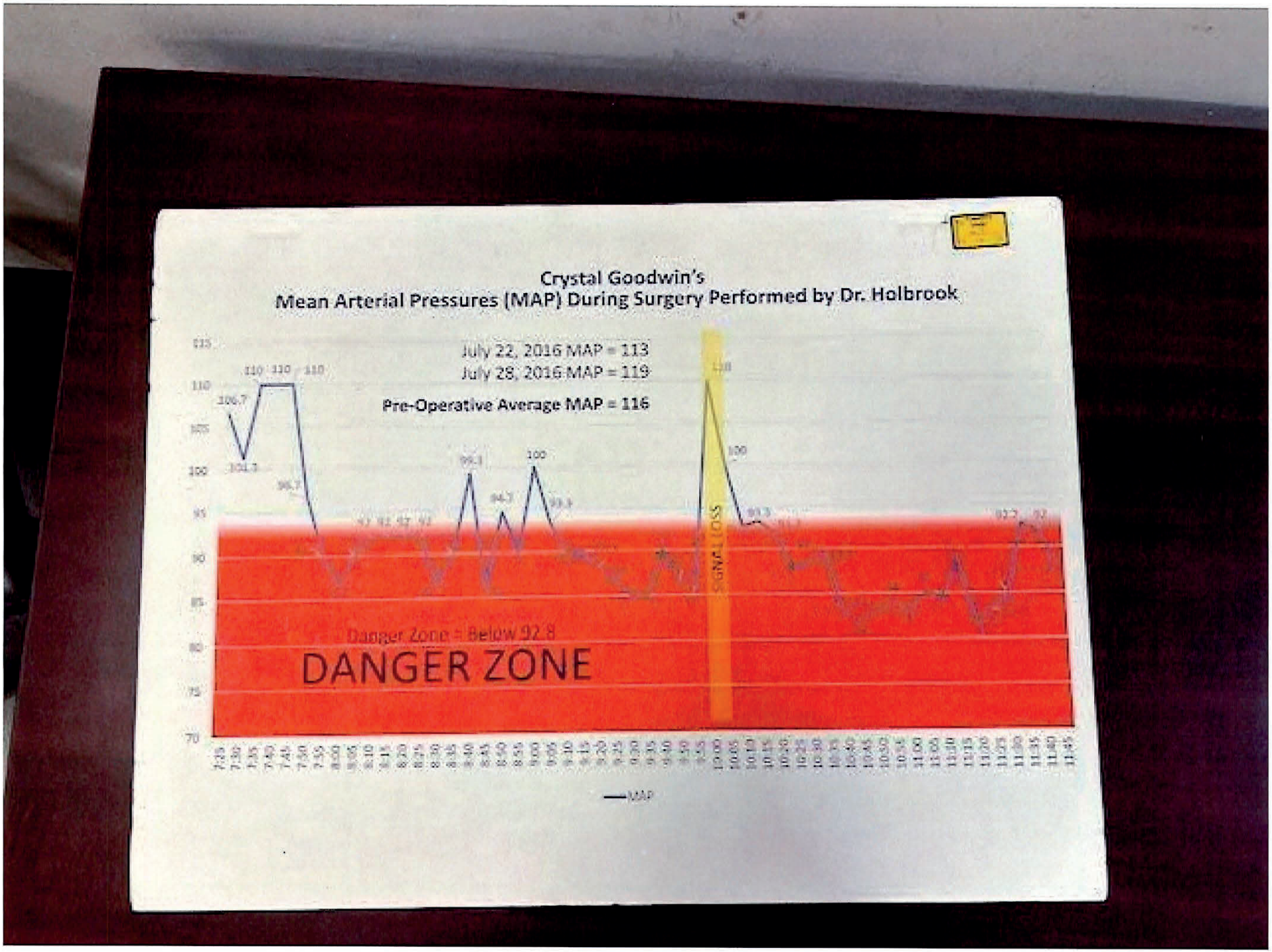


Goodwin v. Holbrook

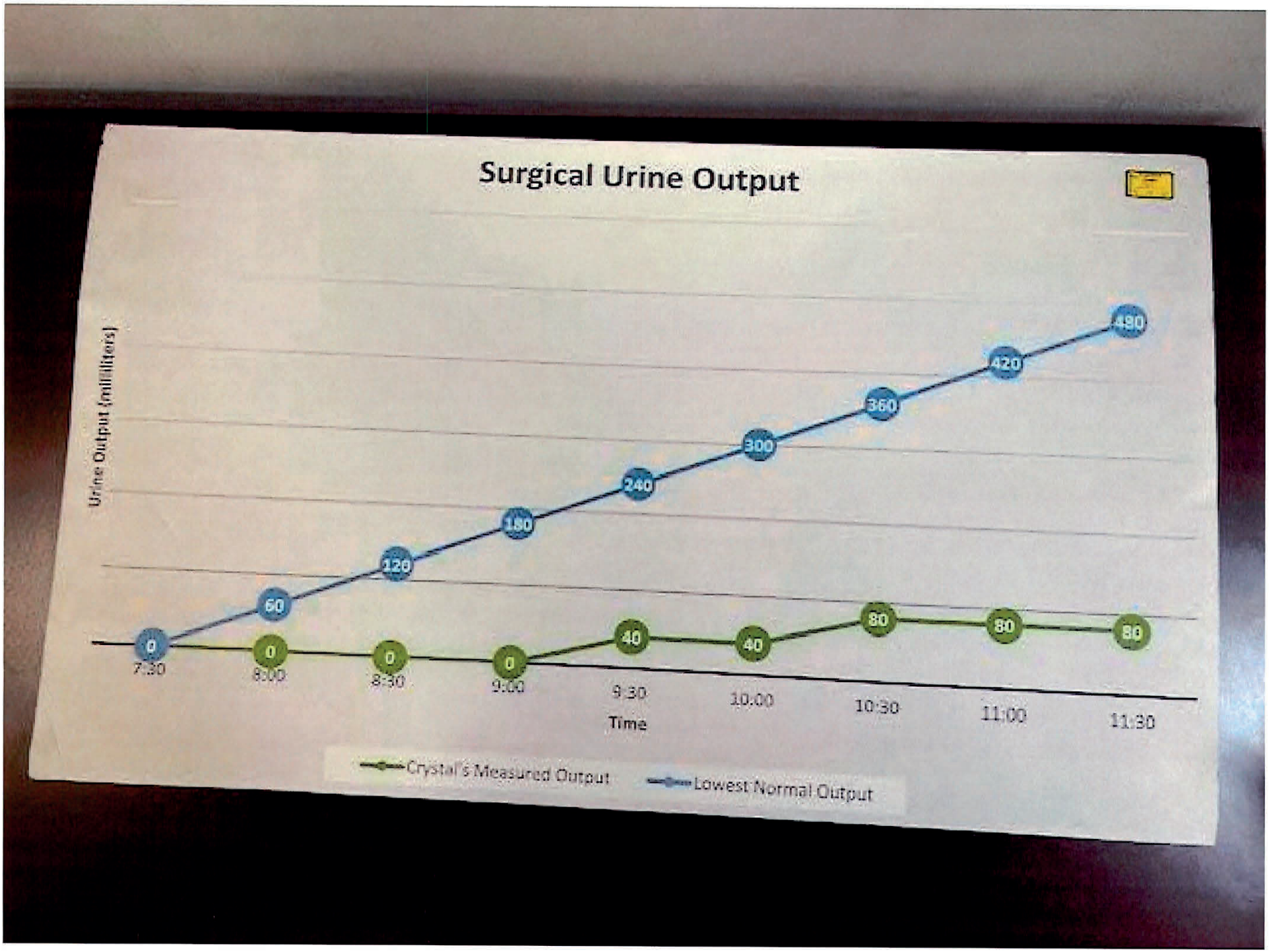

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Auto regulation

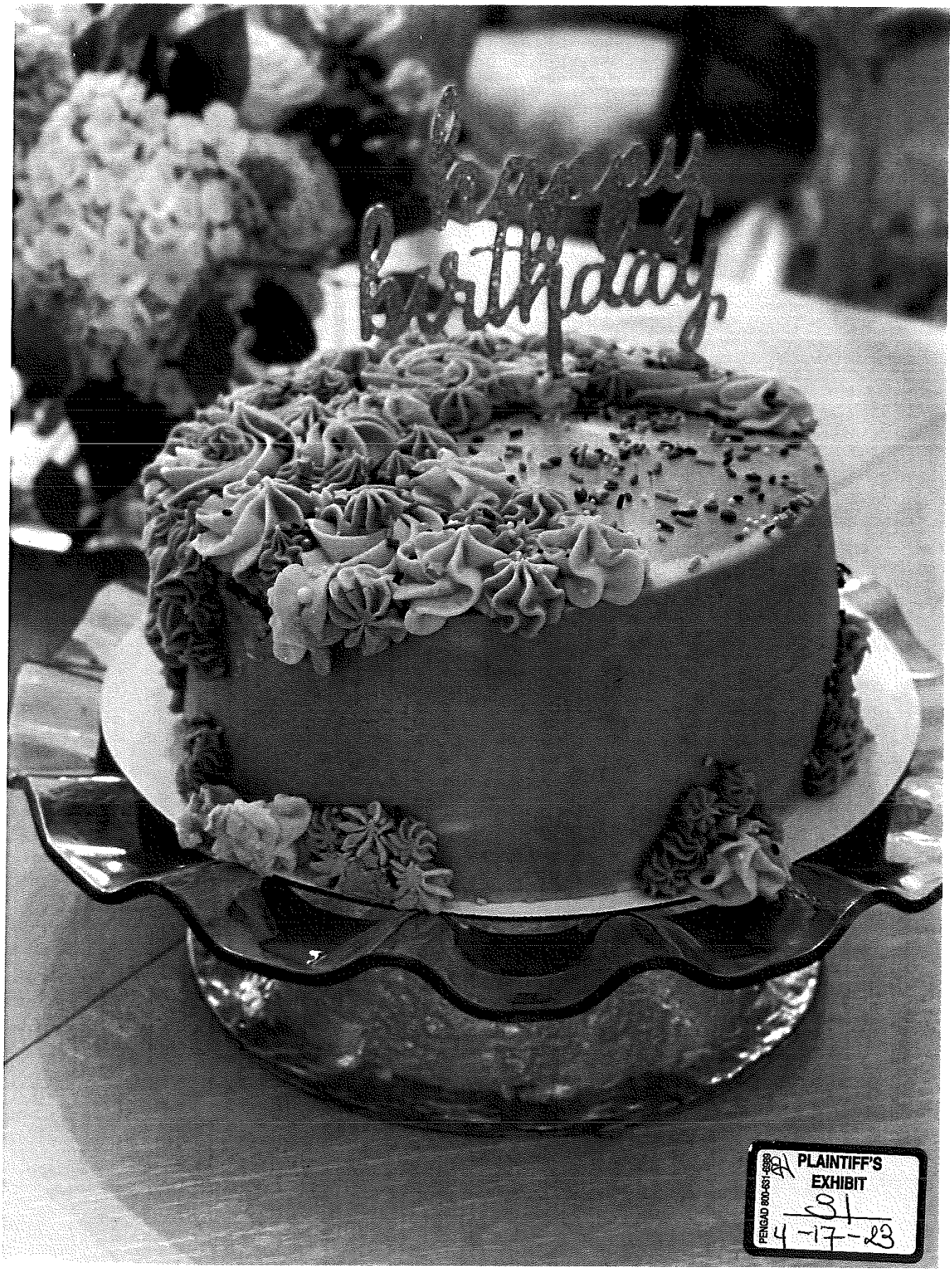
Film


Crystal Goodwin's
Mean Arterial Pressures (MAP) During Surgery Performed by Dr. Holbrook
July 22, 2016 MAP = 113
July 28, 2016 MAP = 119
Pre-Operative Average MAP = 116
SIGNAL LOSS
Danger Zone = Below 92.8
DANGER ZONE
MAP

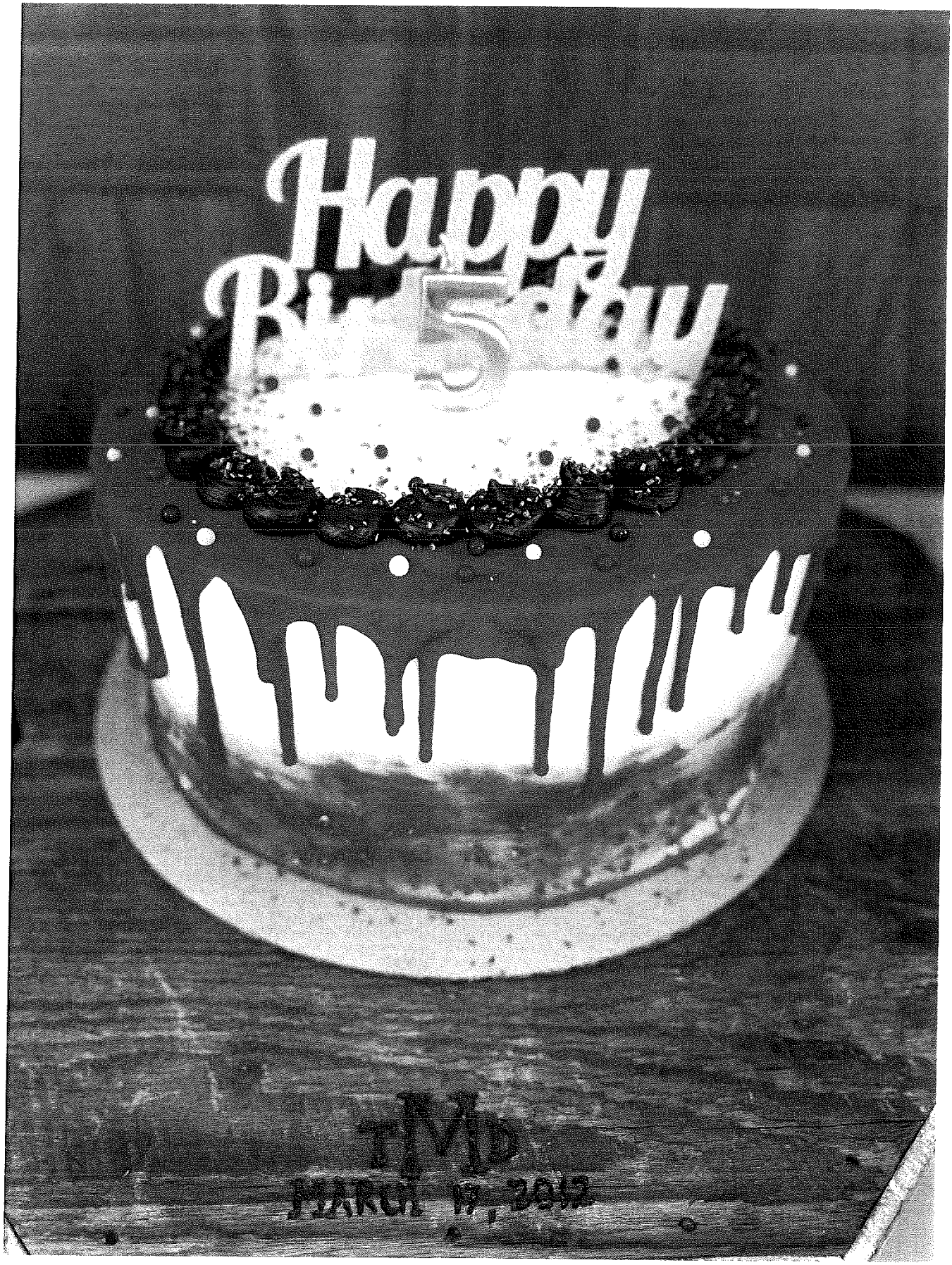
ROA_2208


Surgical Urine Output
Urine Output (milliliters)
0
60
120
180
240
300
360
420
480
0
0
0
40
40
80
80
80
7:30
8:00
8:30
9:00
9:30
10:00
10:30
11:00
11:30
Time
Crystal's Measured Output
Lowest Normal Output

ROA_2209



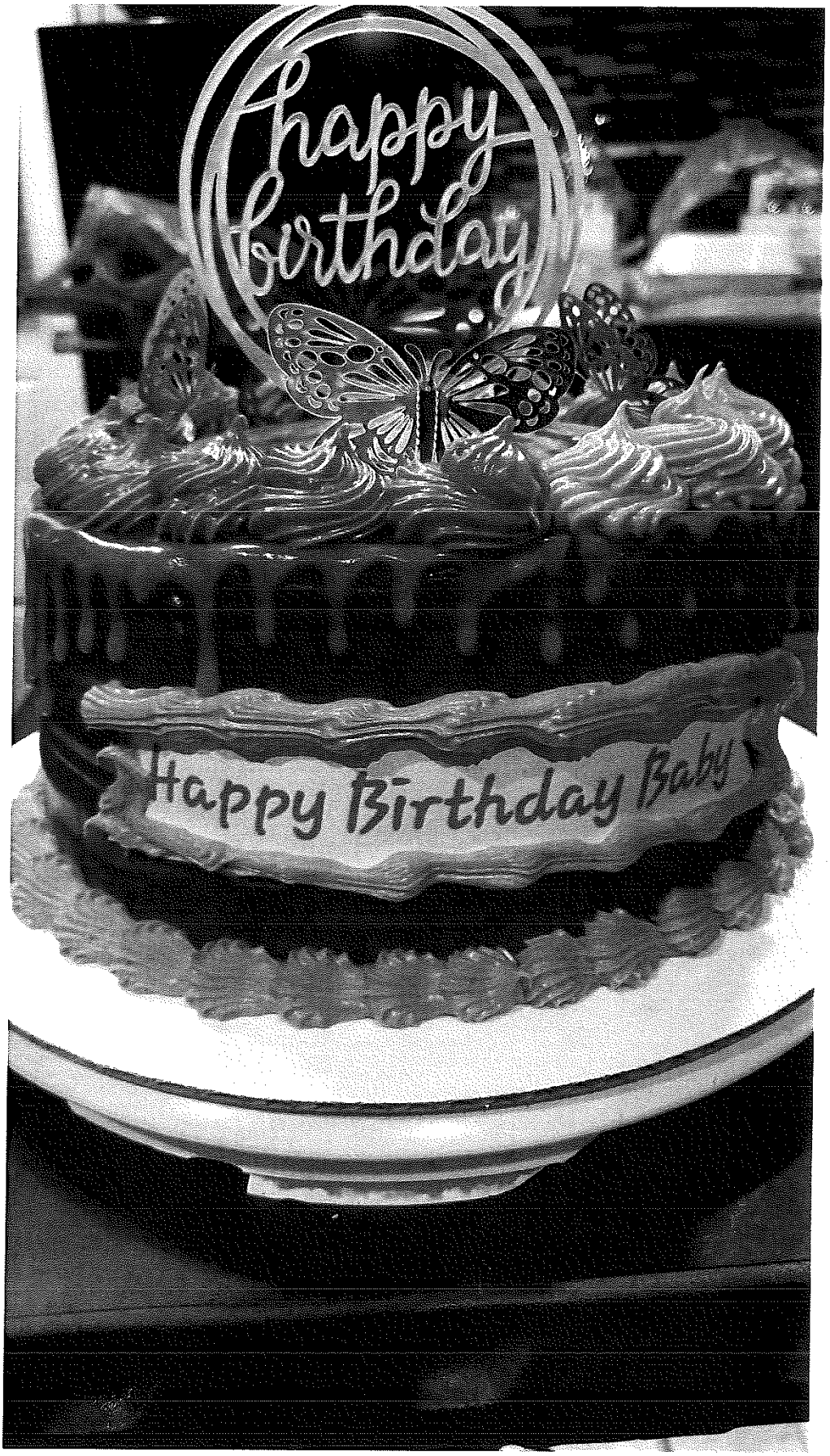
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91
4-17-23

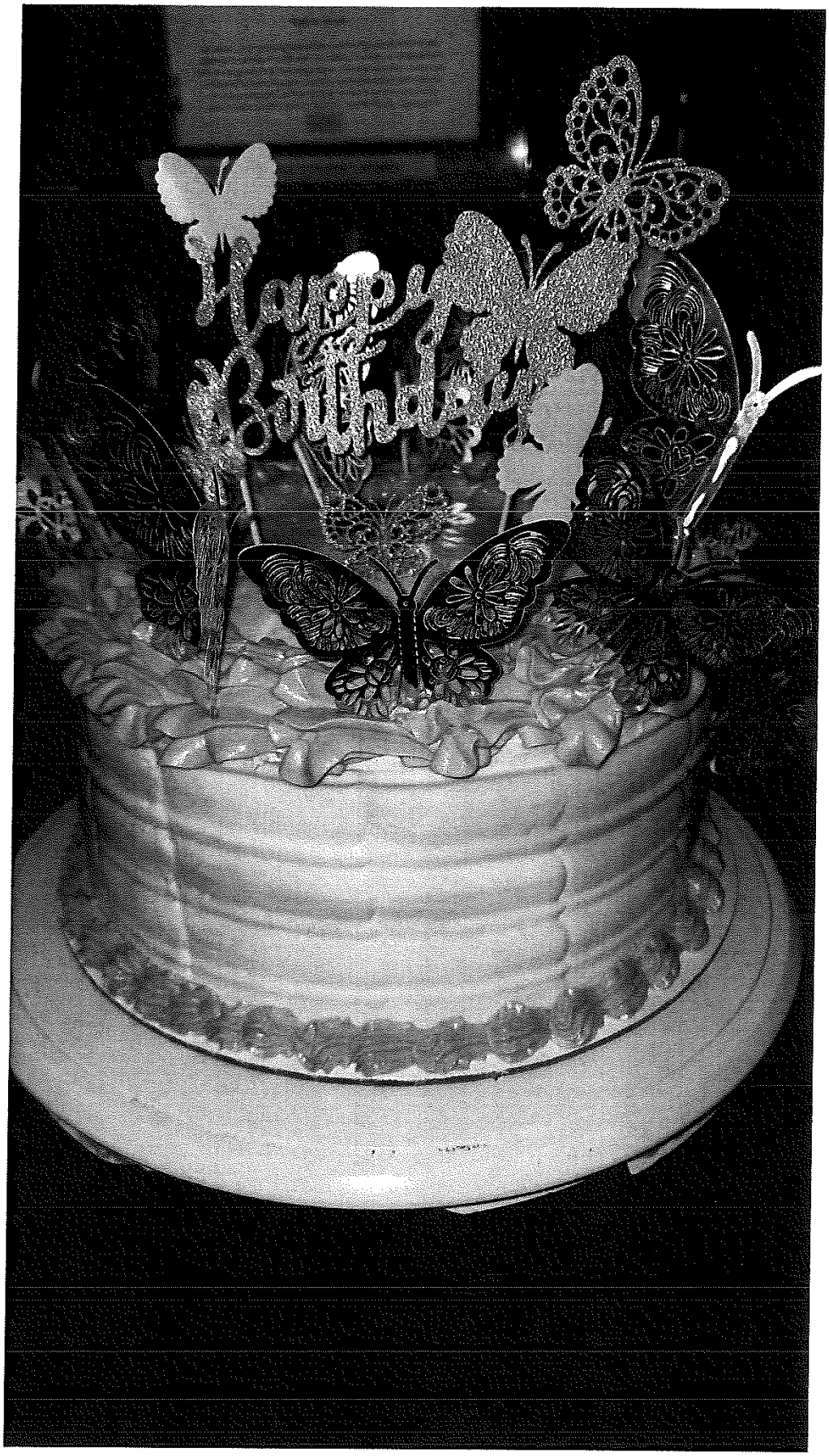

Happy
MARCH 17, 2012

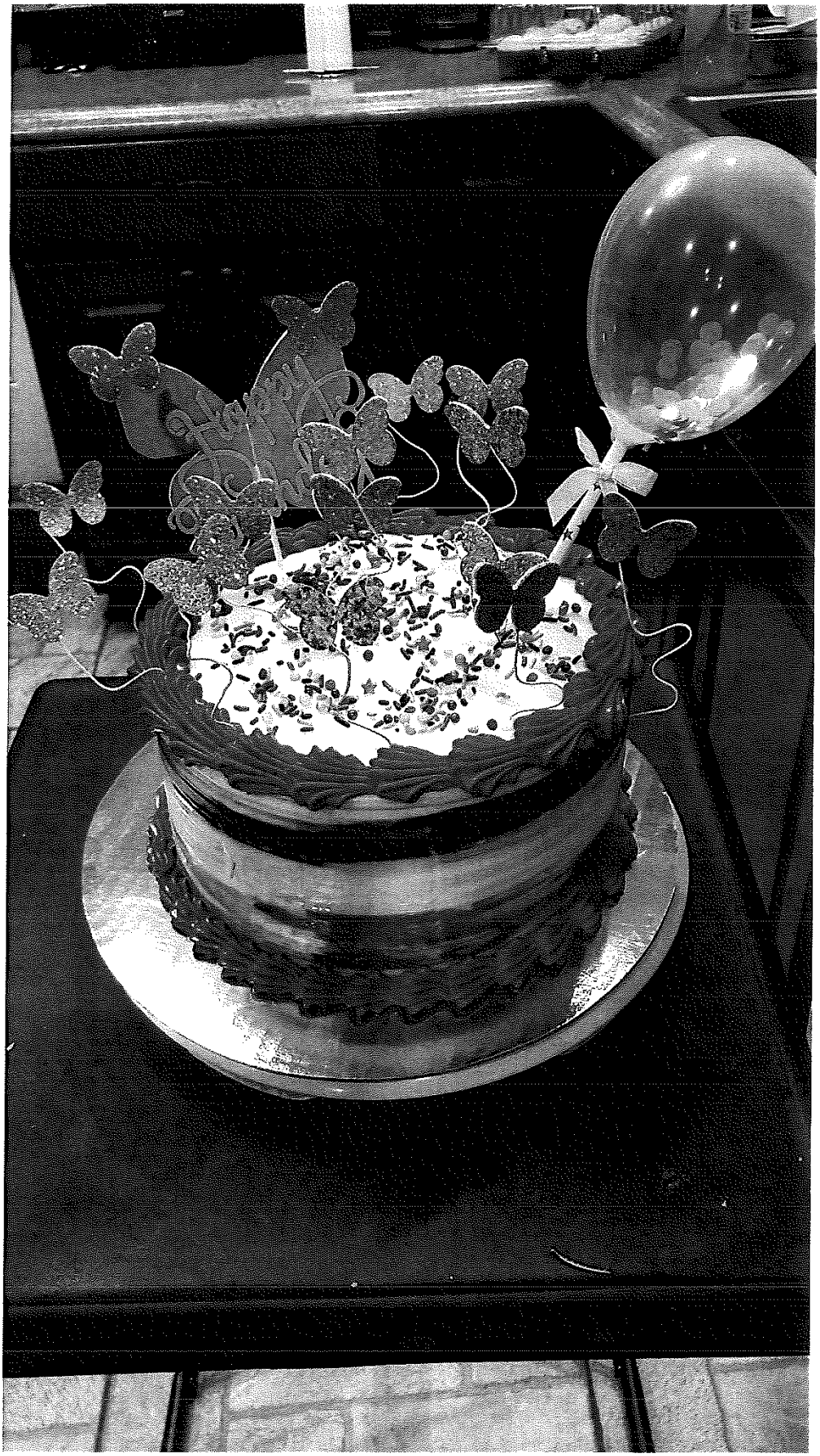

Happy
Birthday

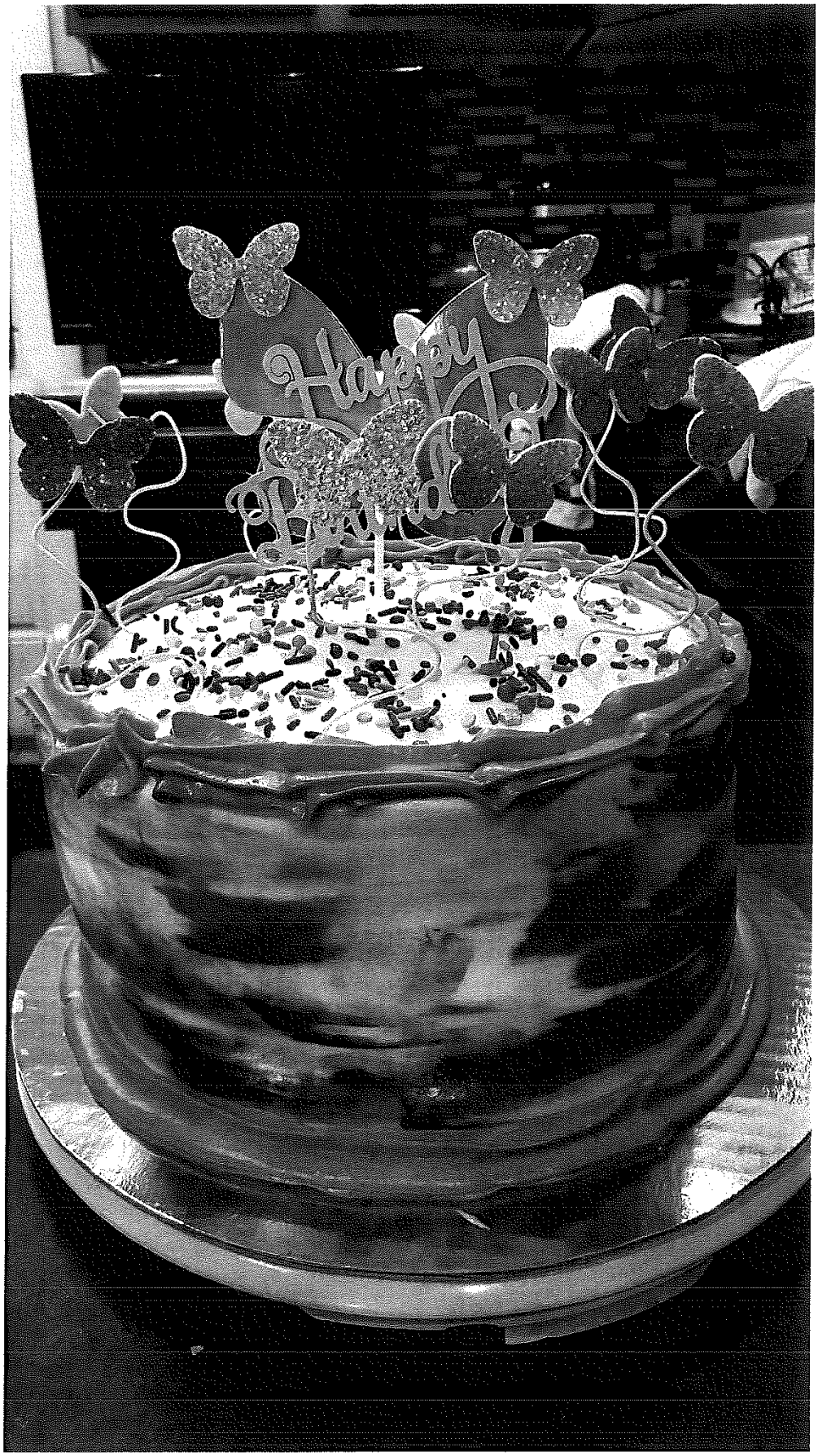
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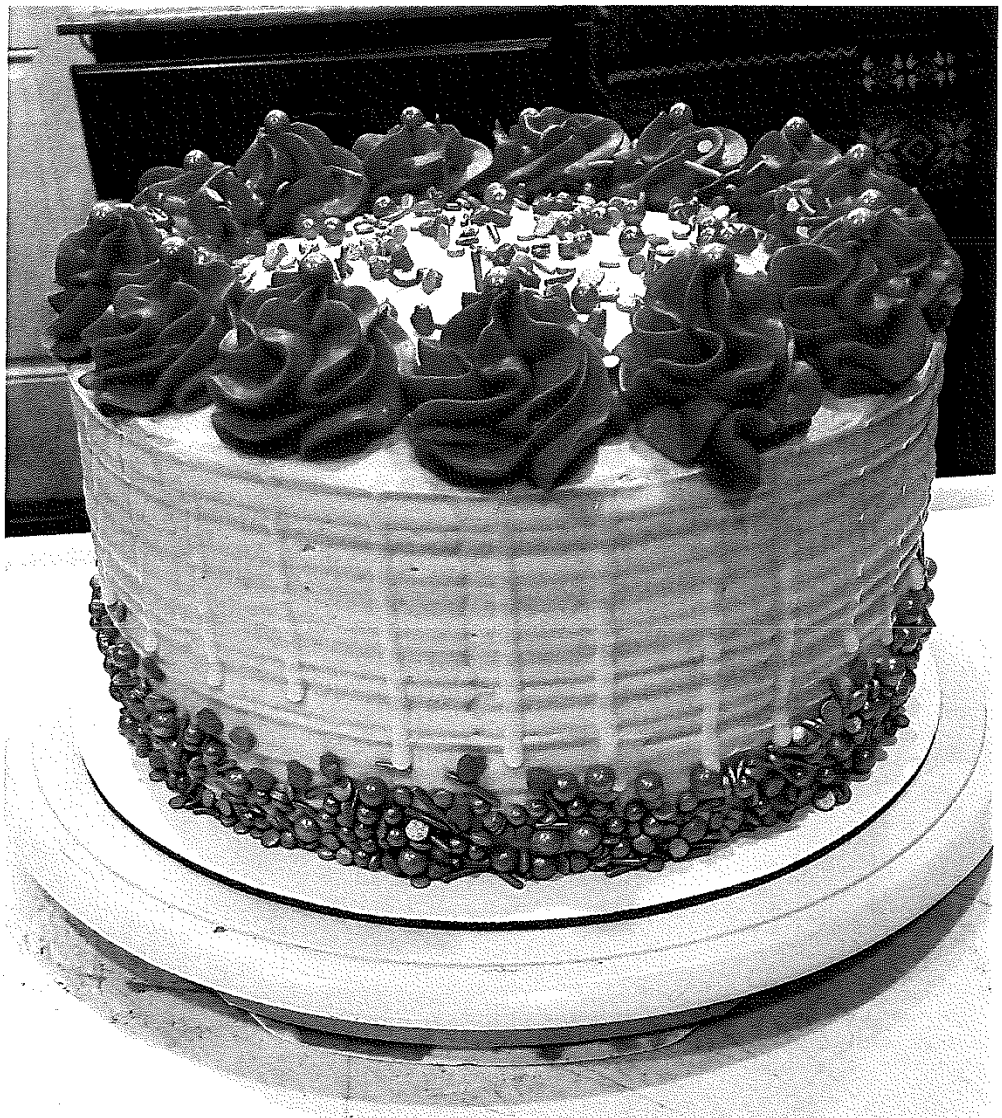

Happy Birthday
Happy Birthday Baby


Happy Birthday

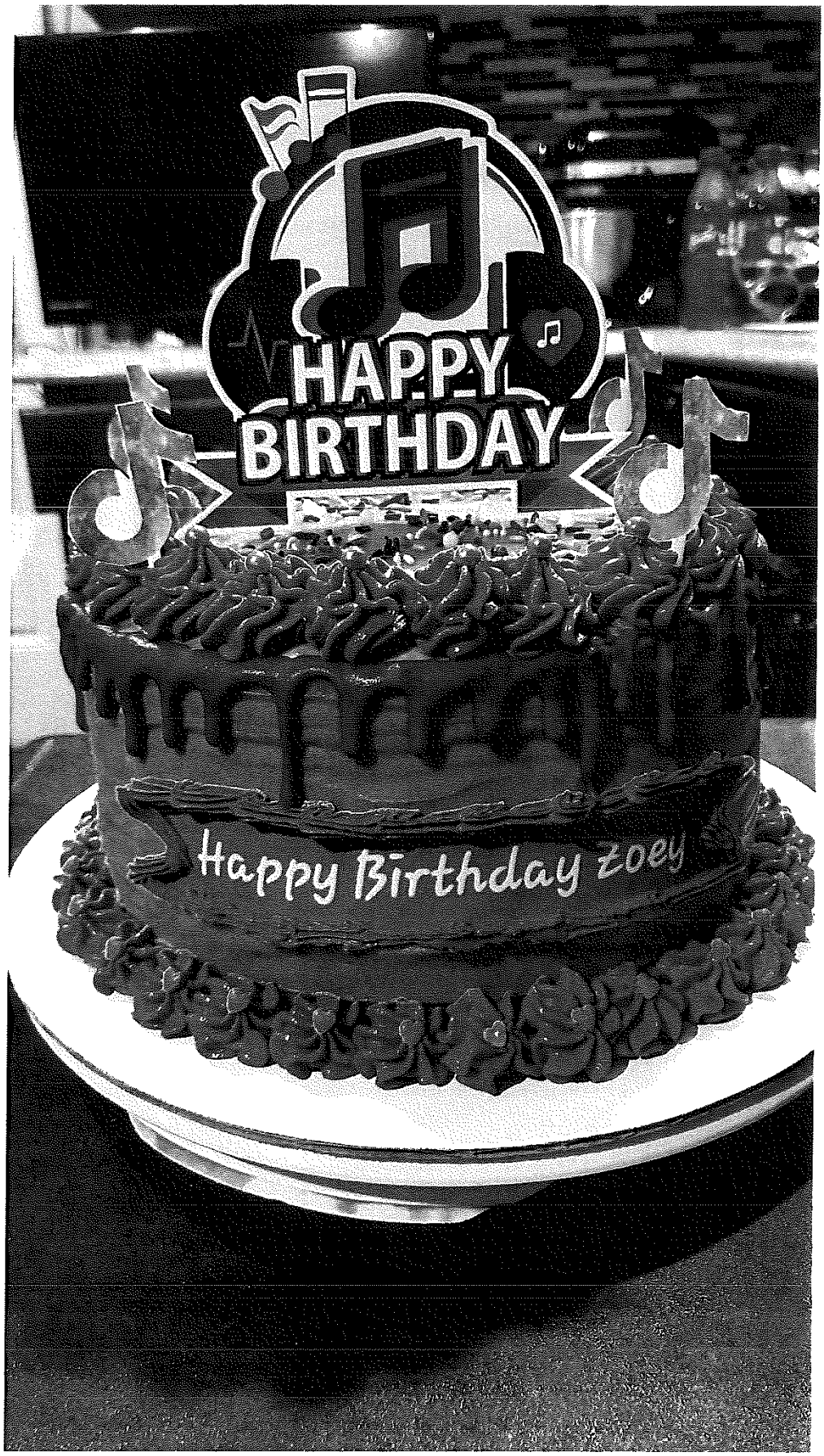


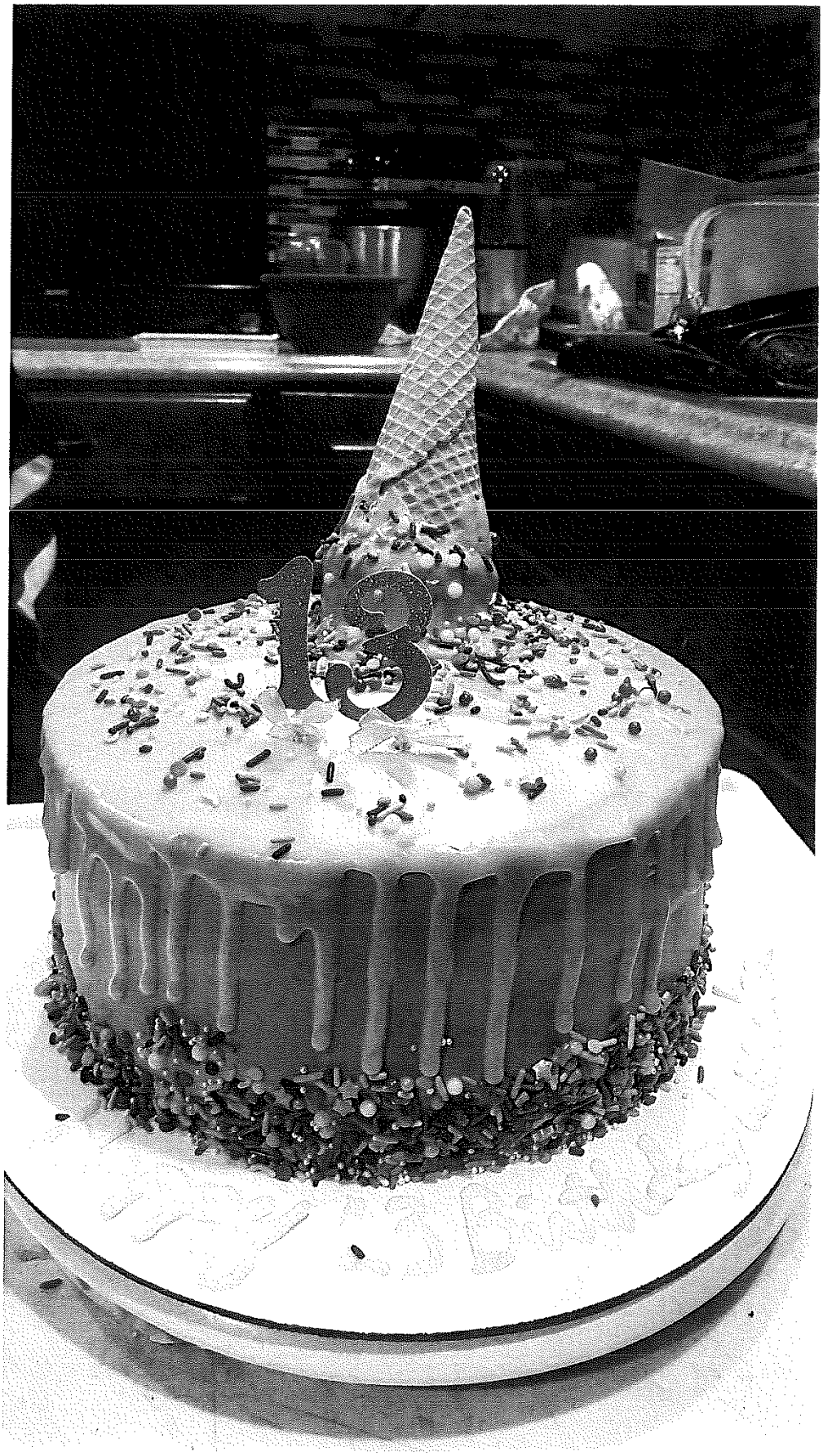

Happy

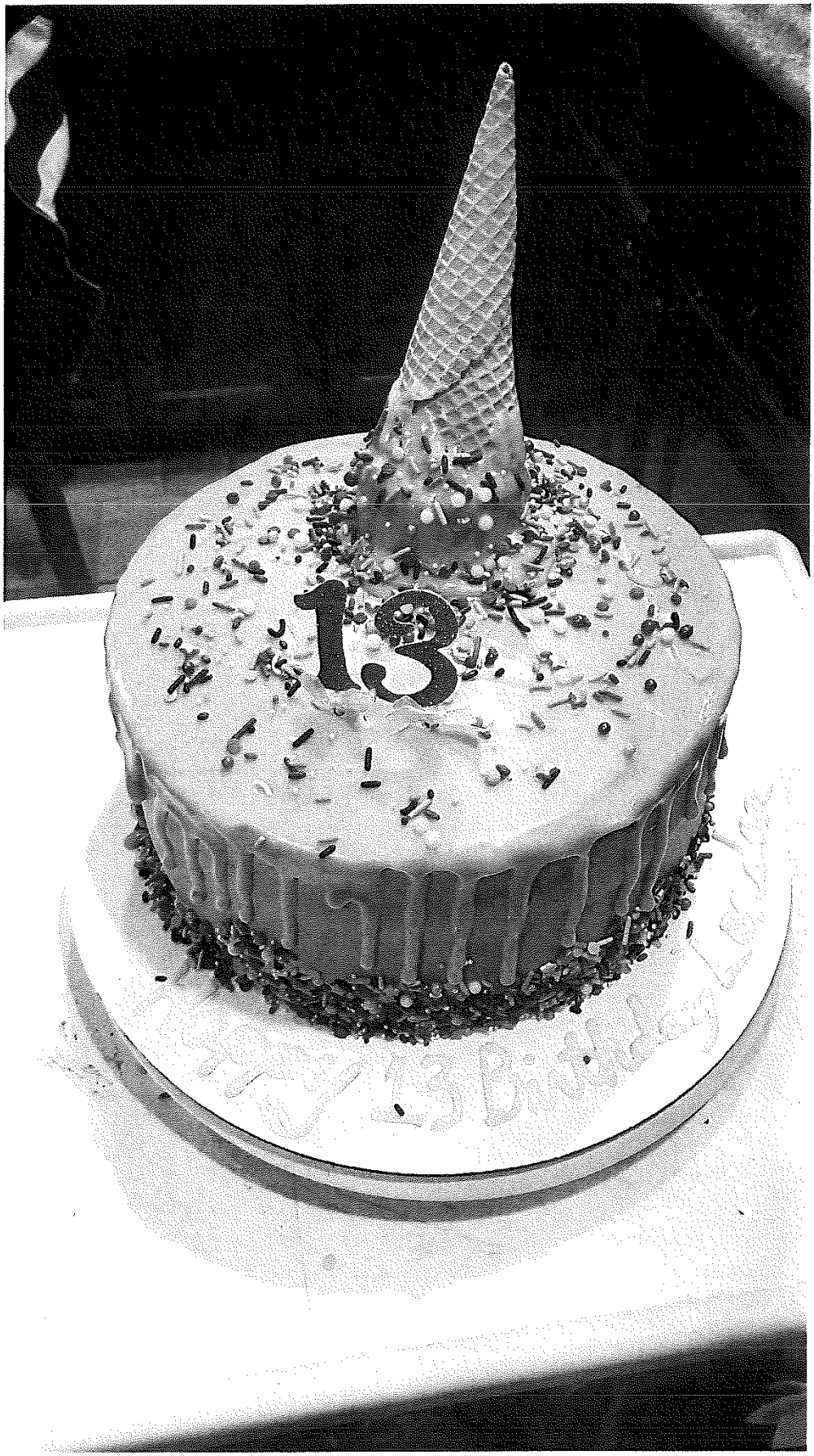




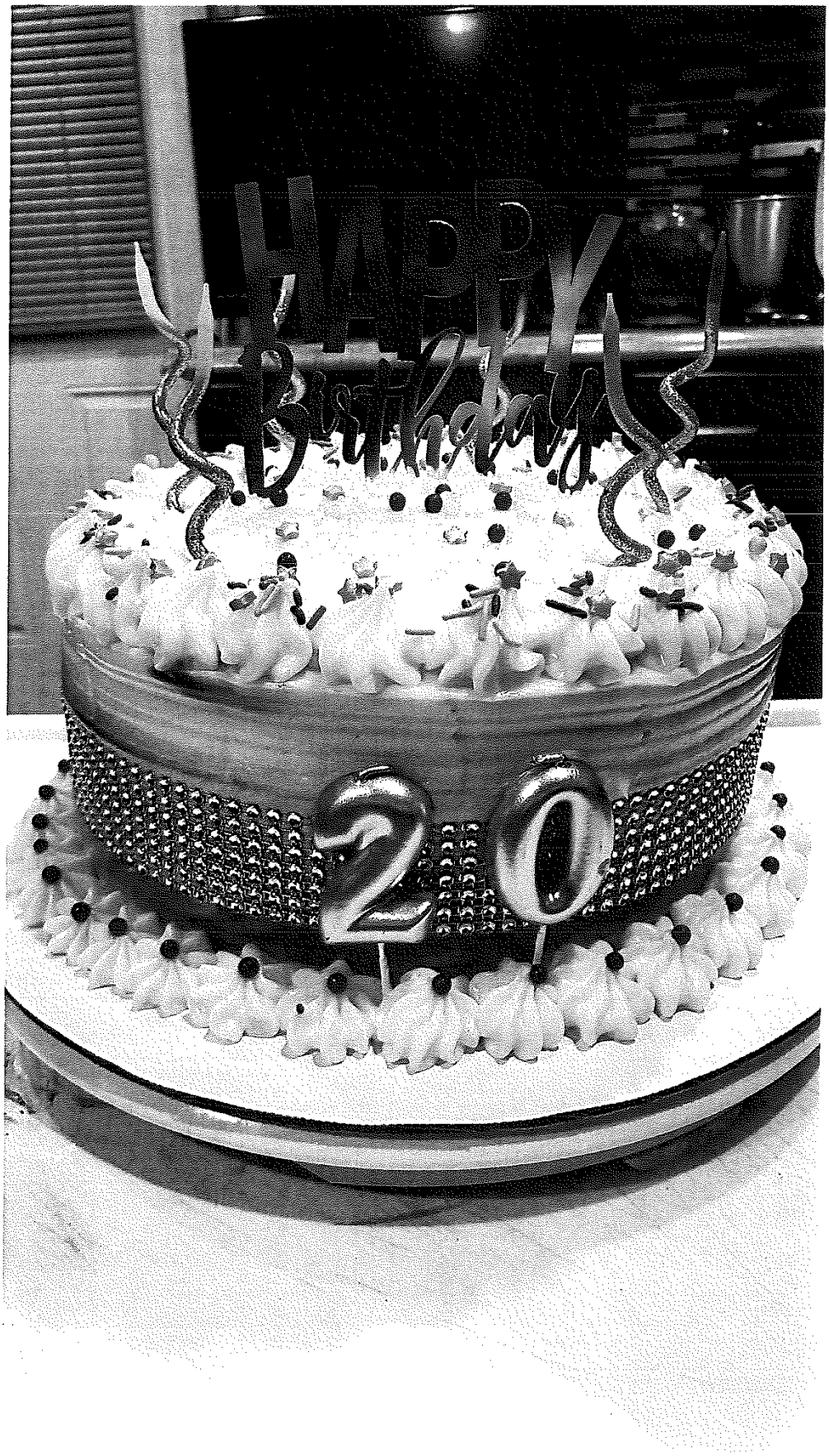


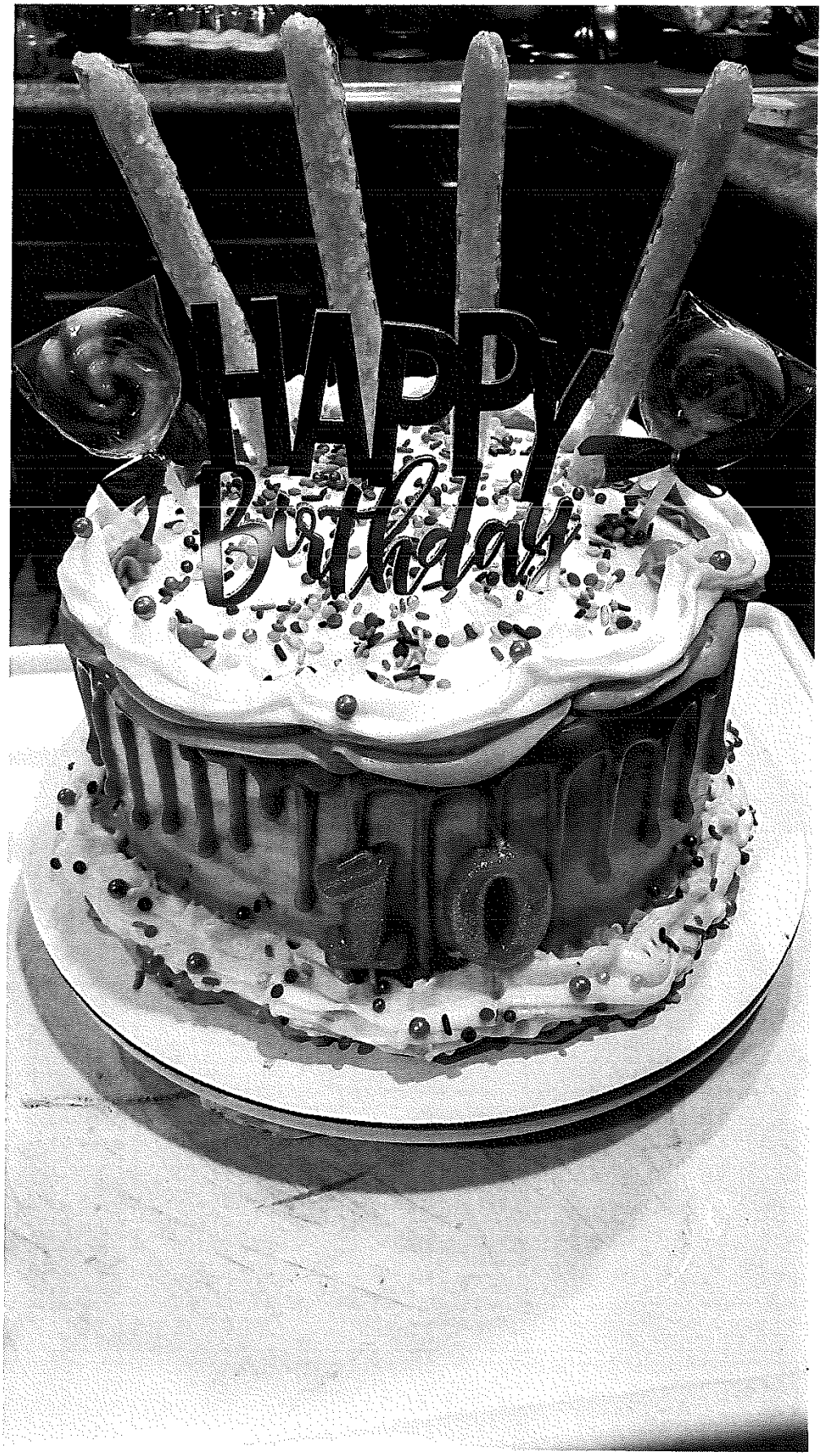

HAPPY
BIRTHDAY
Happy Birthday Zoey


13


13

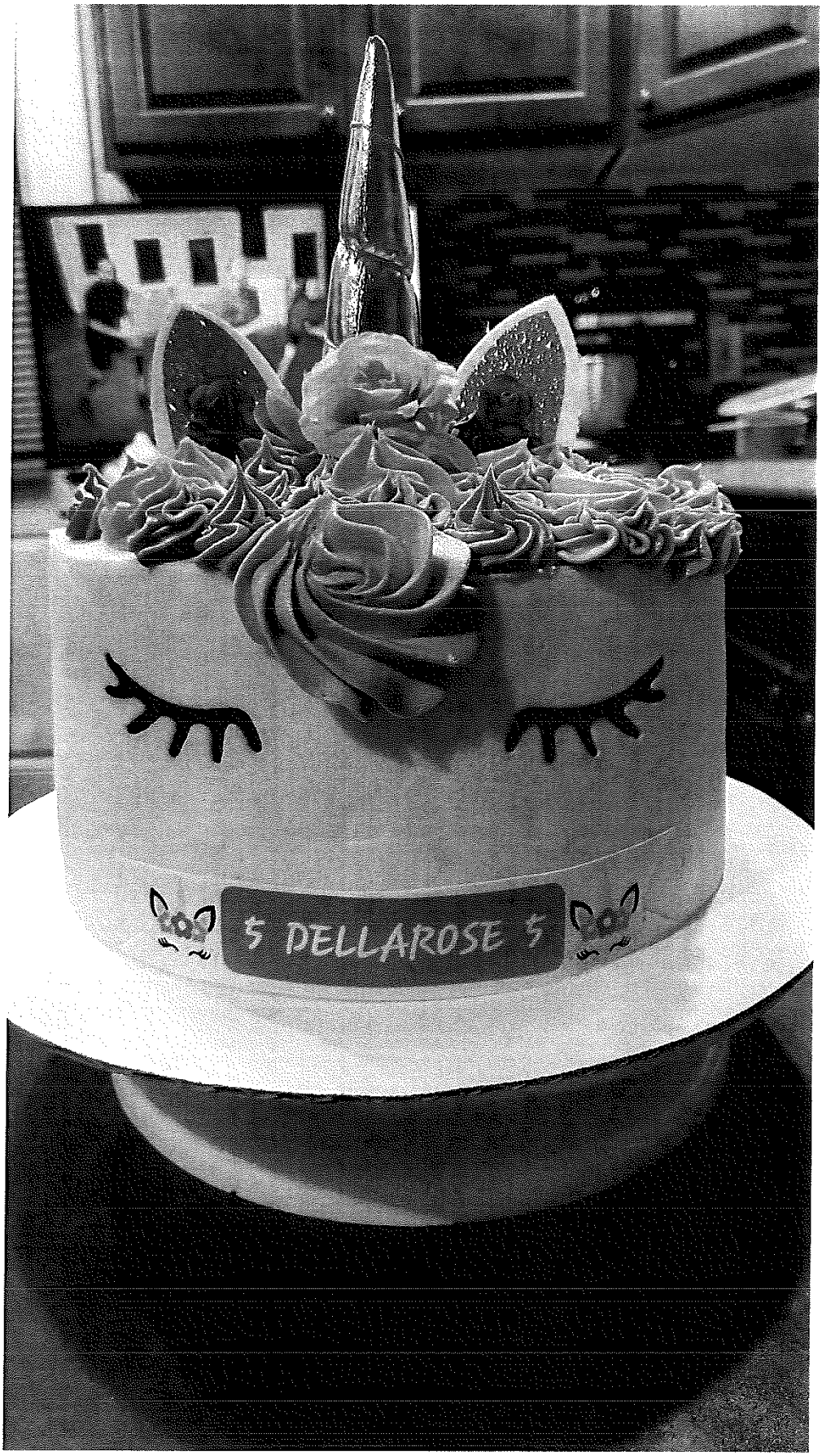

Happy Birthday Tia


HAPPY
Birthday
20

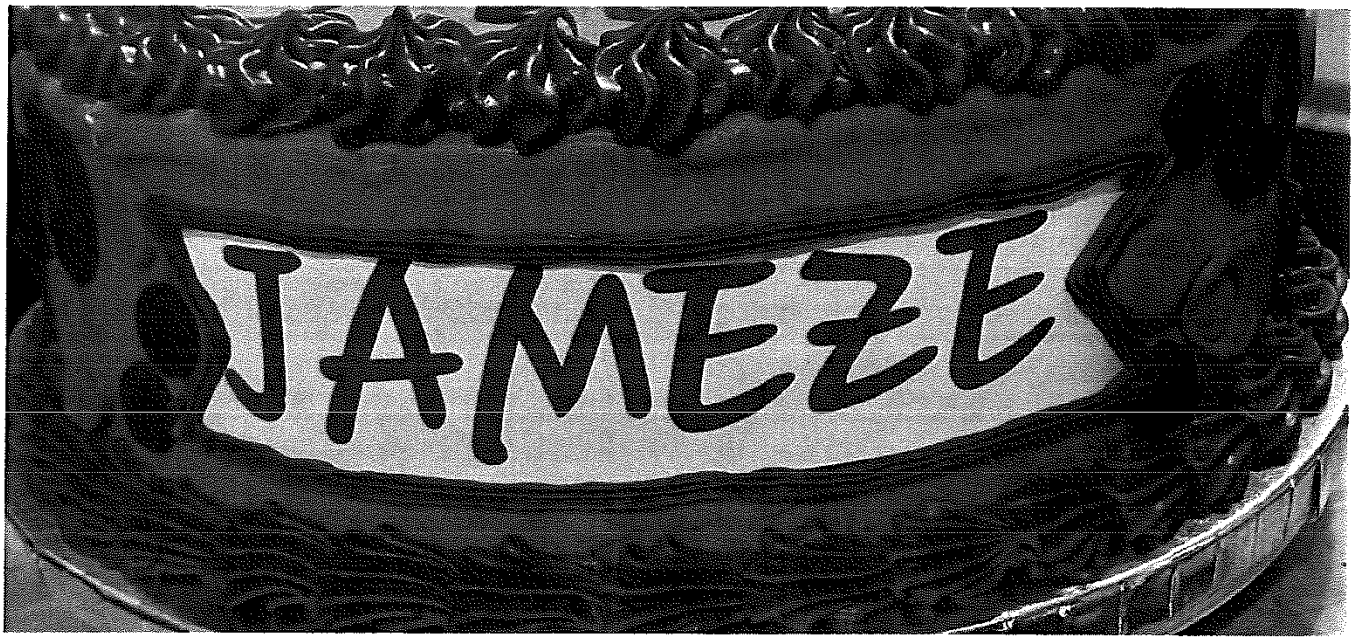

HAPPY
Birthday



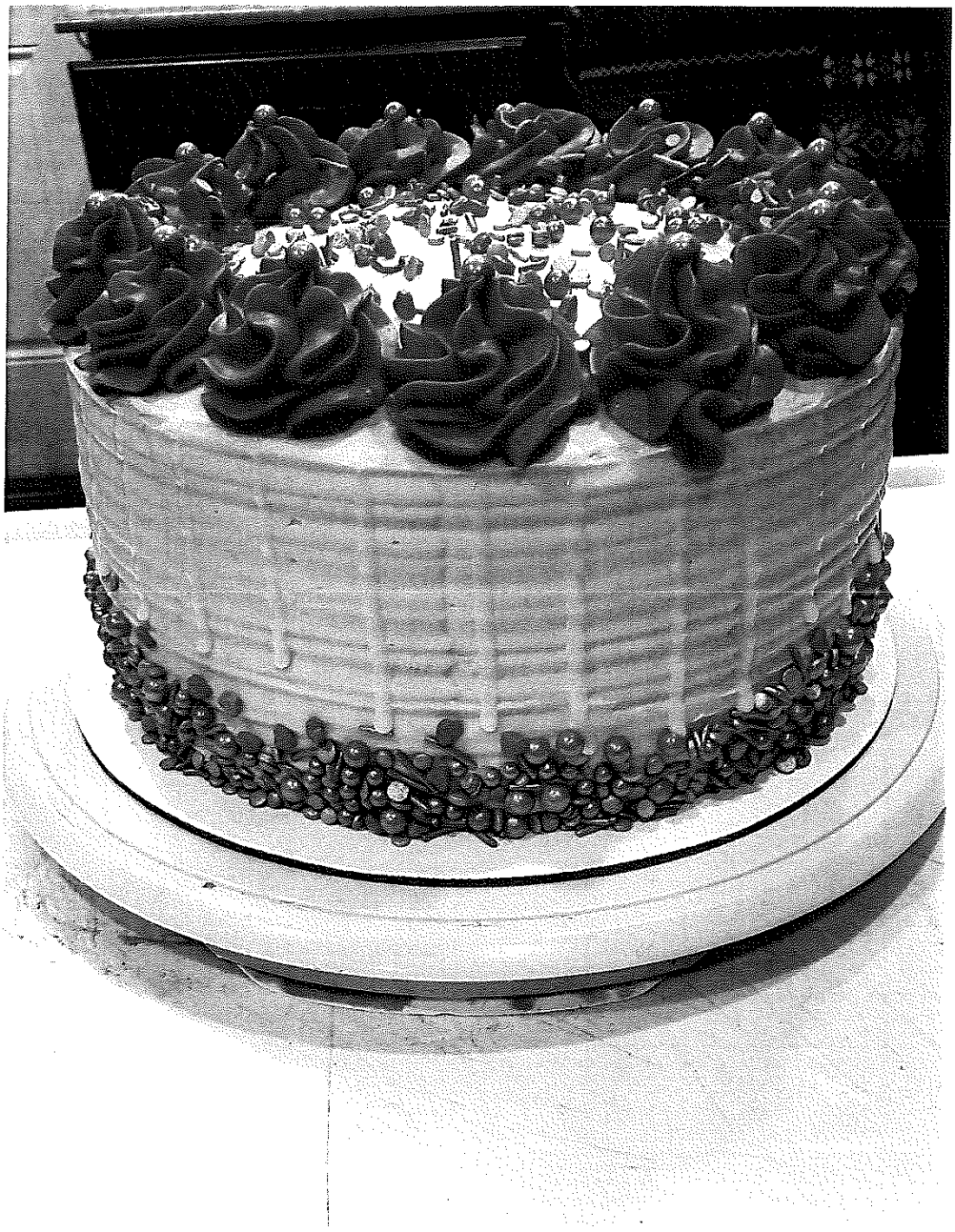
BATTERIES
SHERWOOD


5 DELLAROSE 5

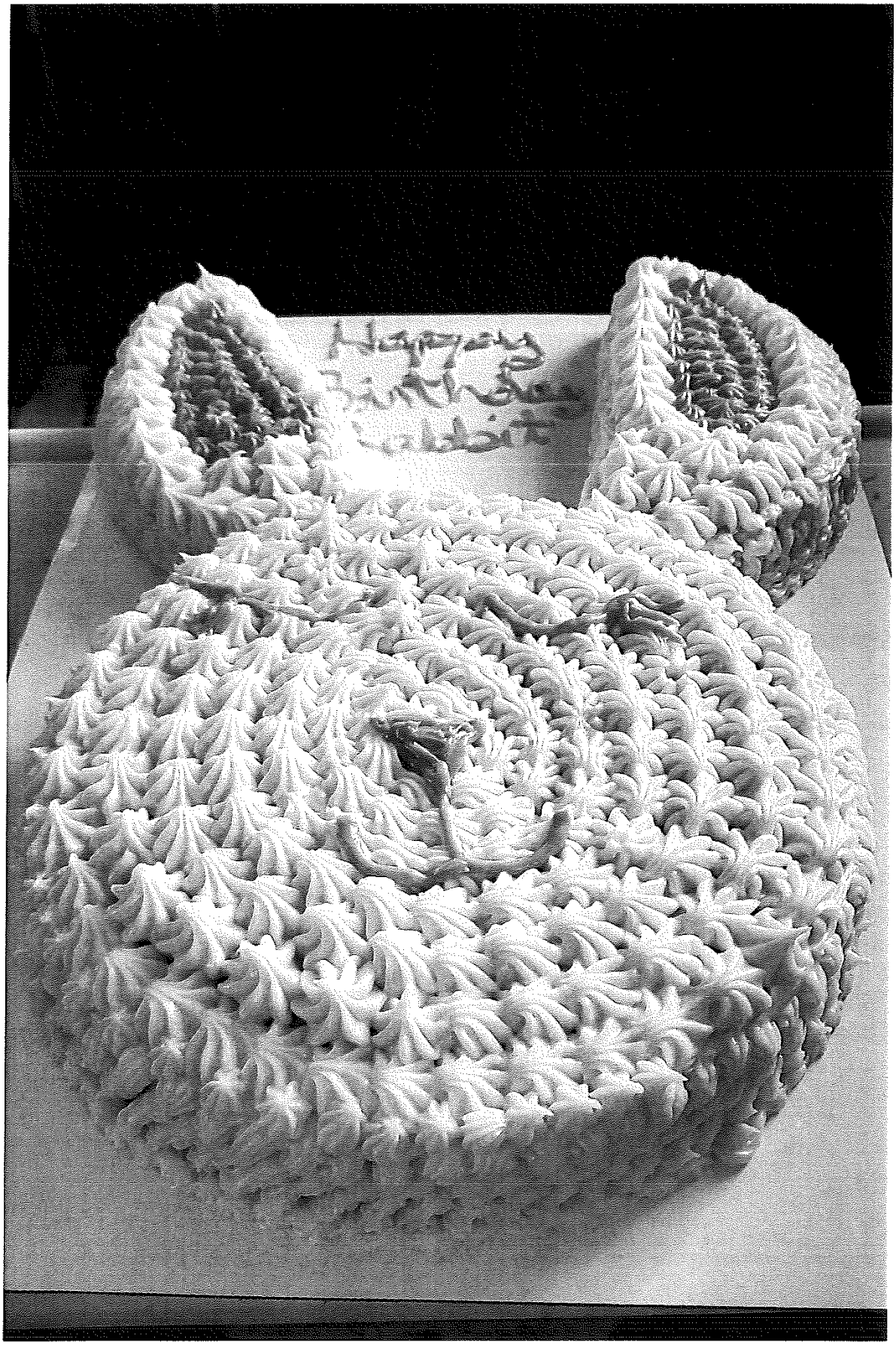


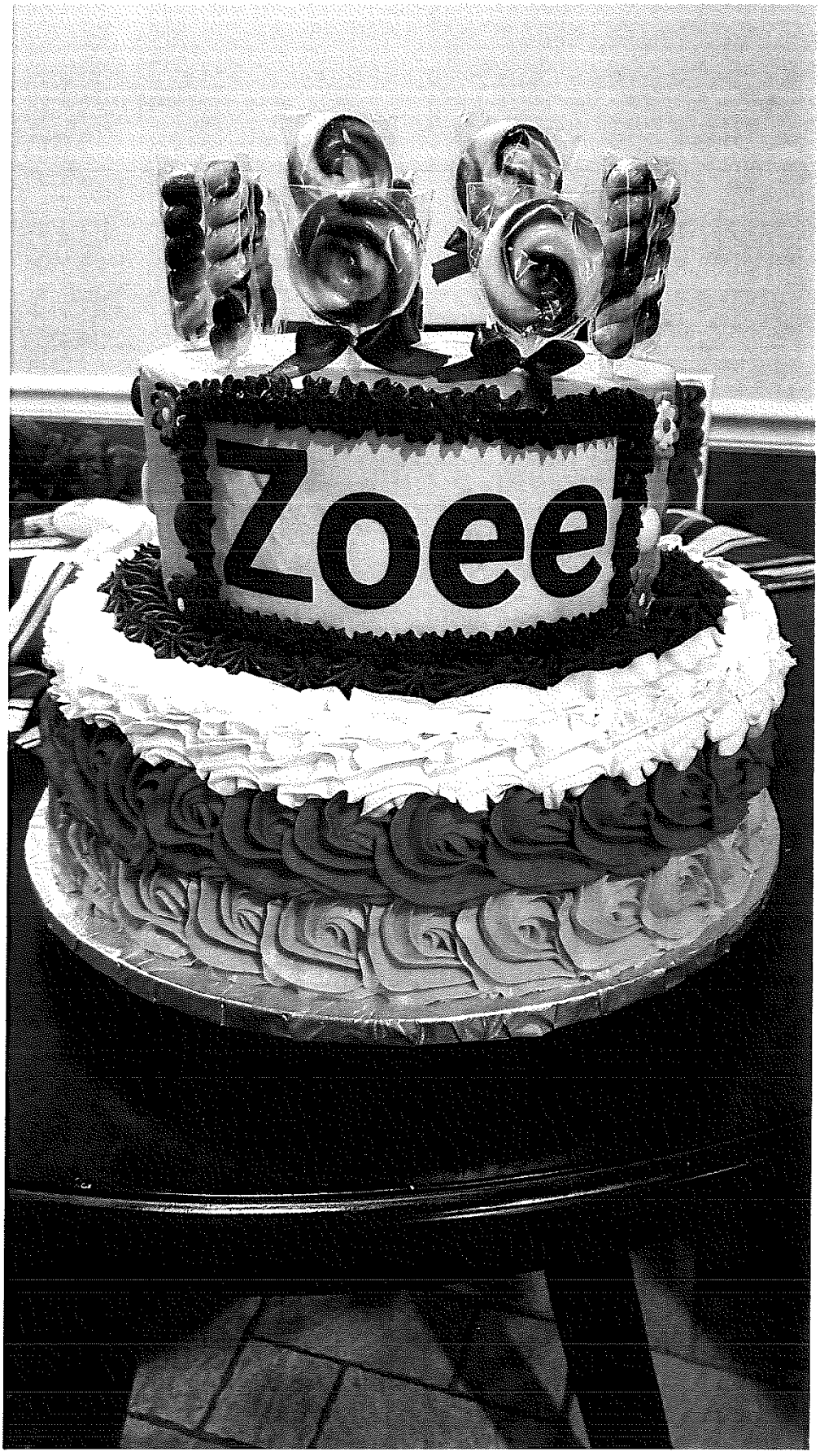

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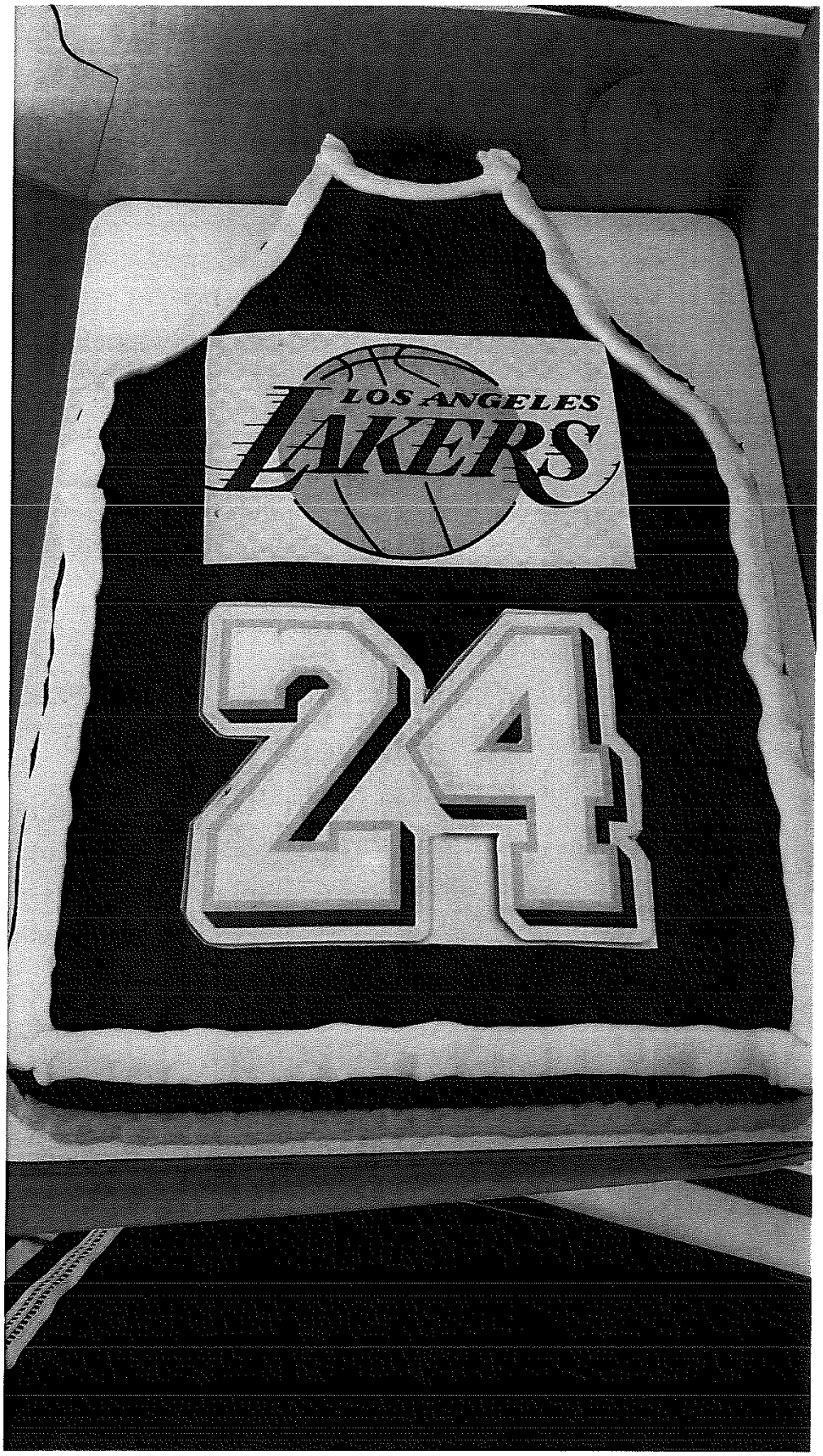




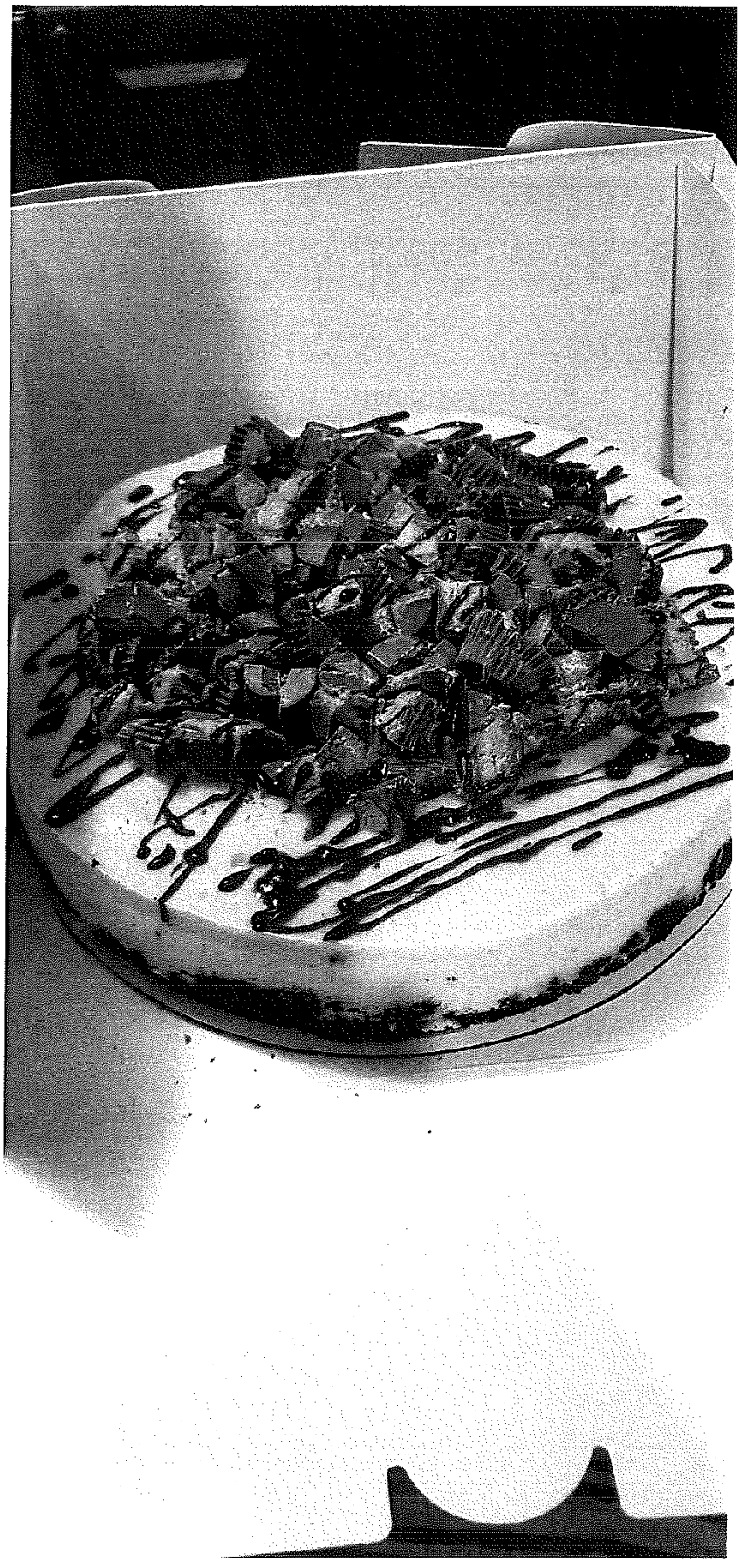





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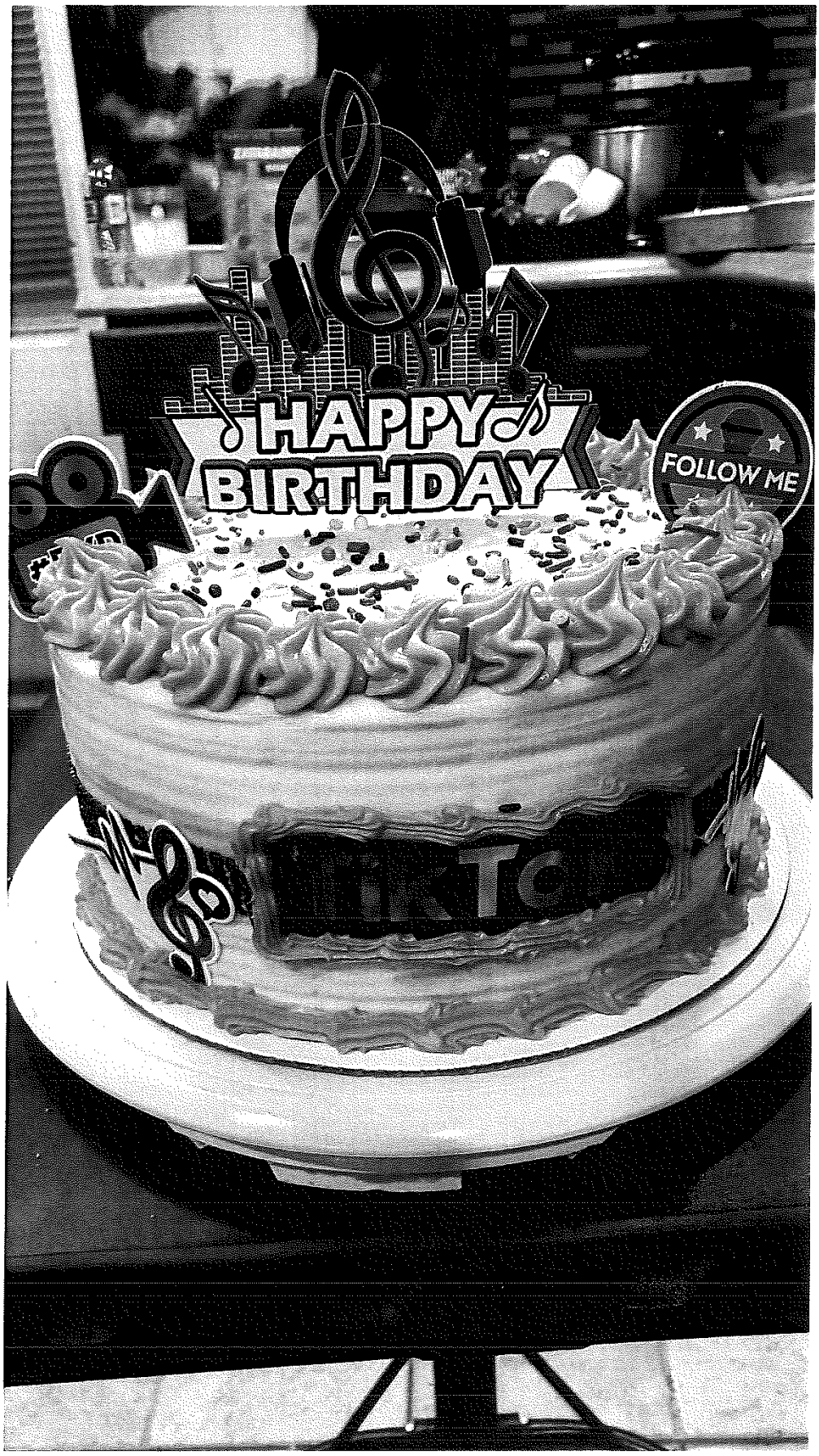

LOS ANGELES
LAKERS
24

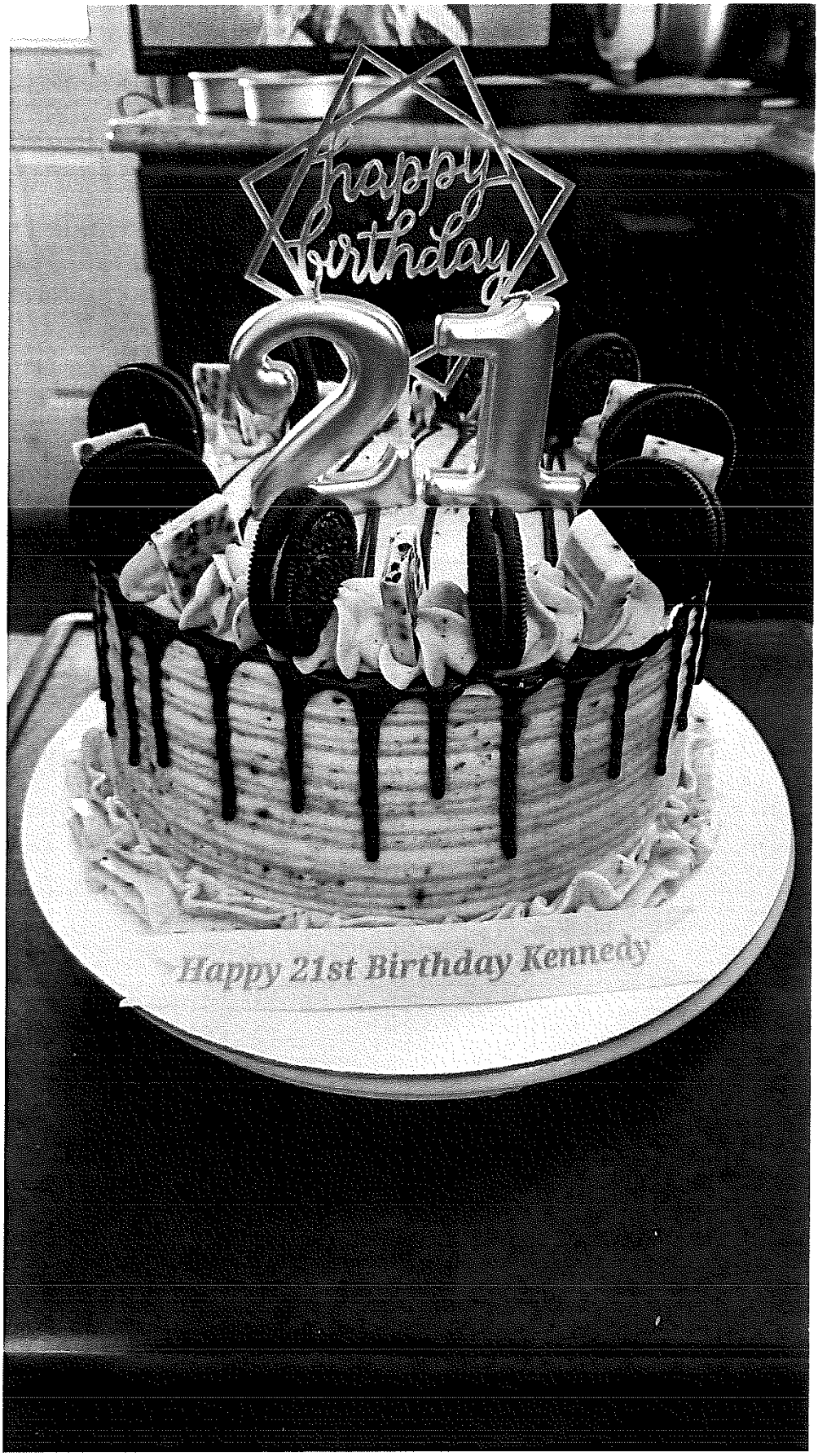

Happy
Birthday
Sweetie







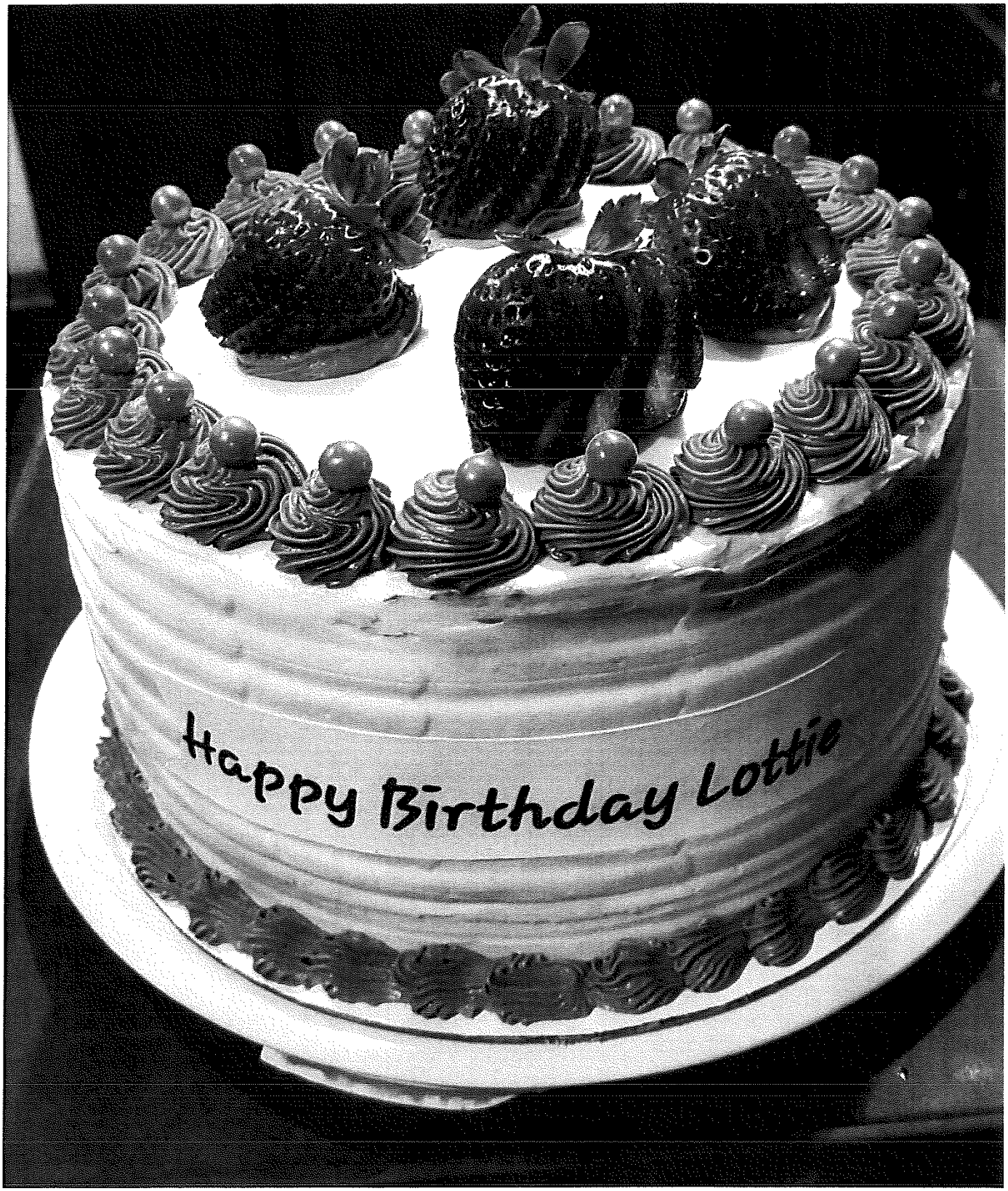

HAPPY
BIRTHDAY
FOLLOW ME
TikTok


Happy Birthday
21
Happy 21st Birthday Kennedy

CLEMSON
Happy 13th Birthday PJ

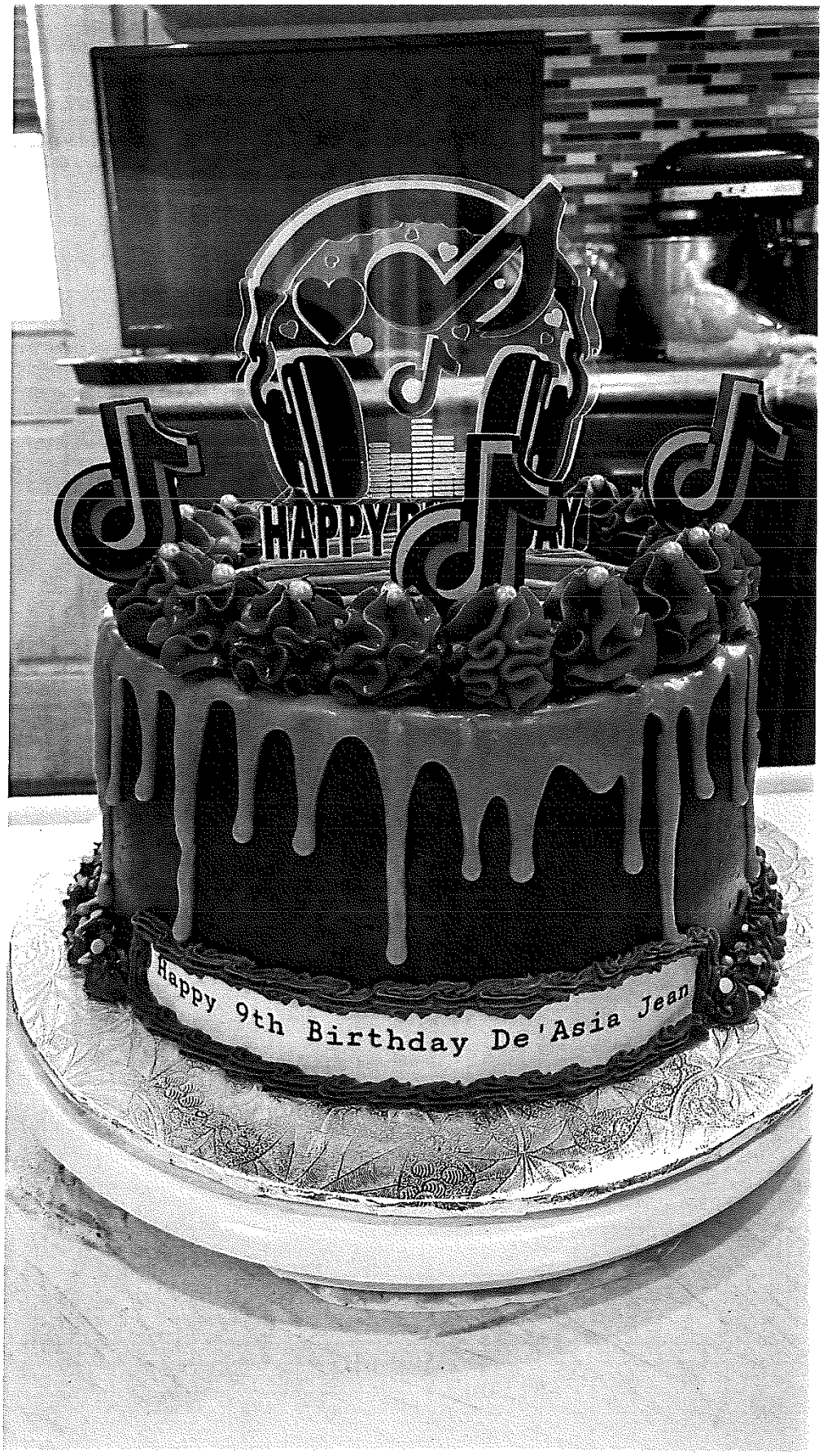
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CHAMPIONSHIP
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CHAMPIONSHIP

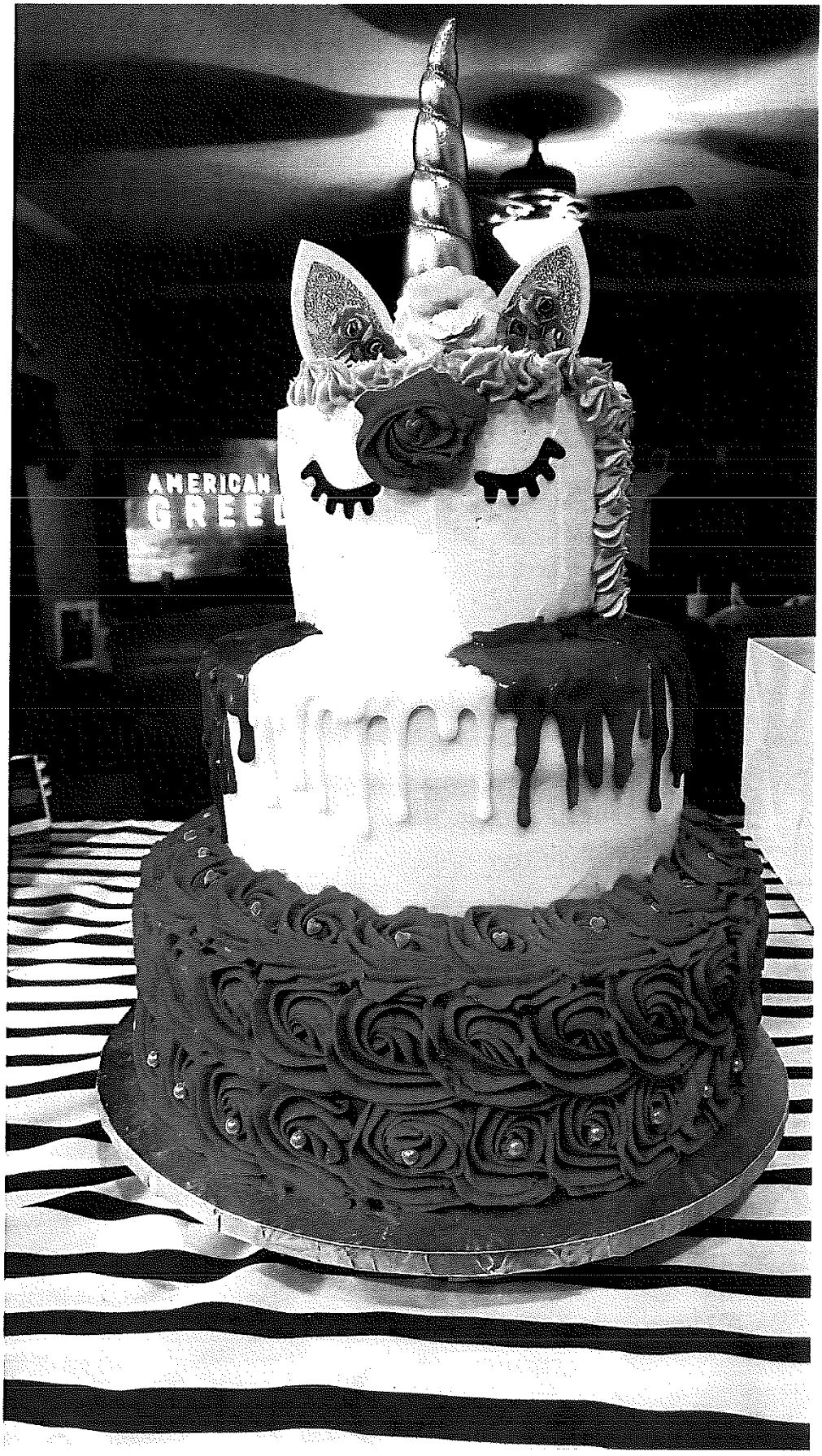
Happy Birthday Carter
PAW PATROL


Happy Birthday Lottie

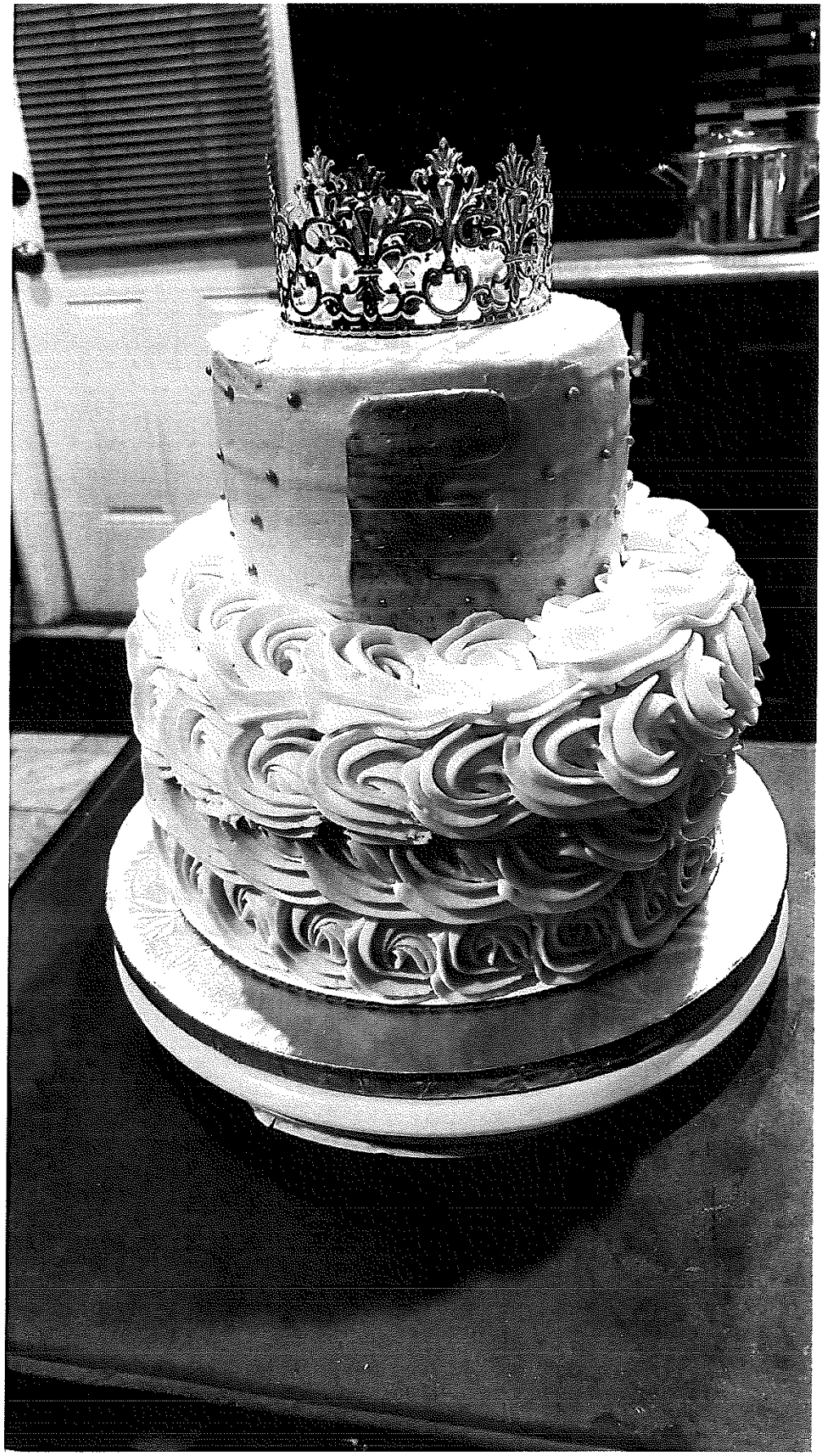

Sweet 16
Sweet 16

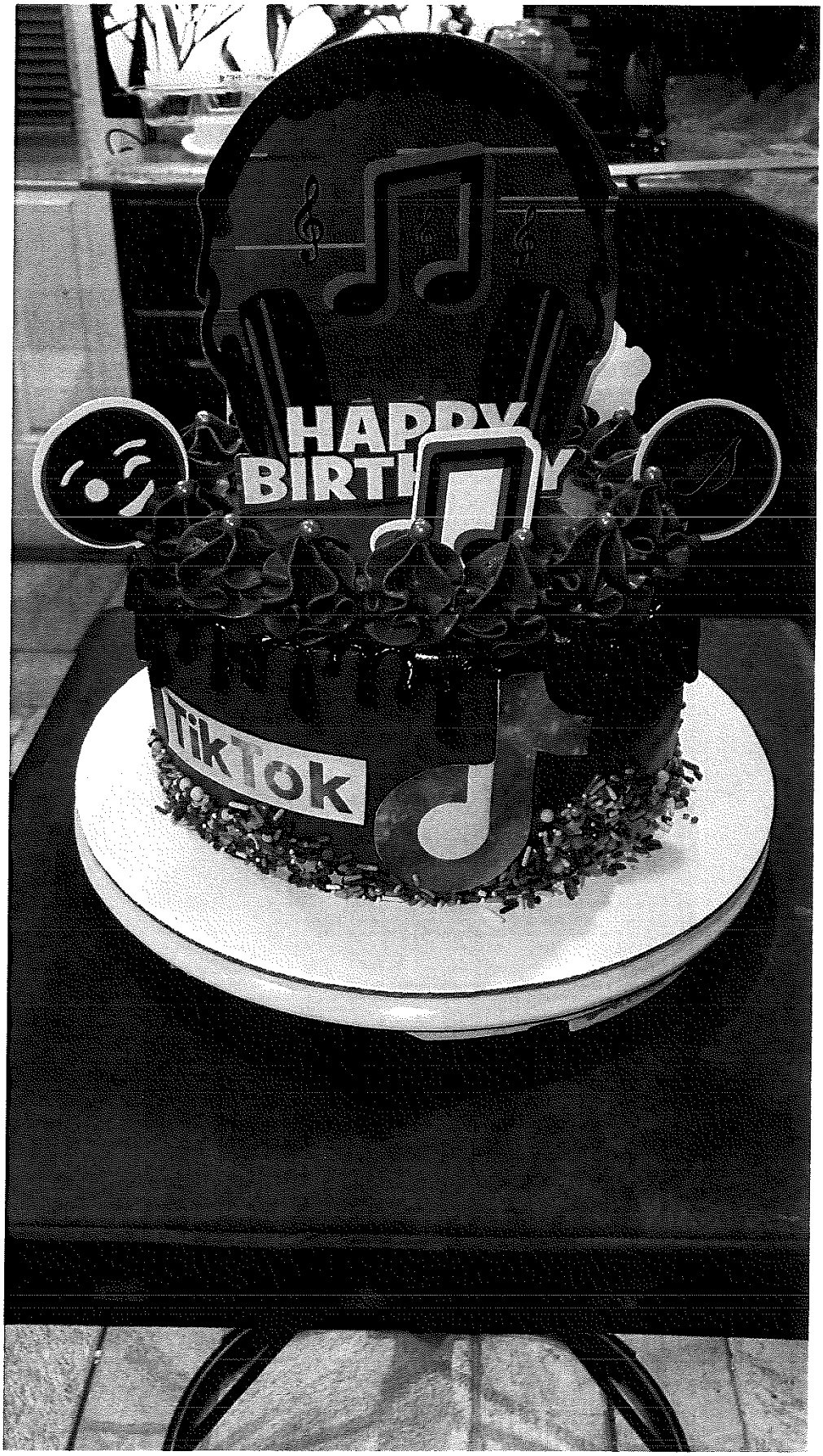

Happy Birthday Kaiden

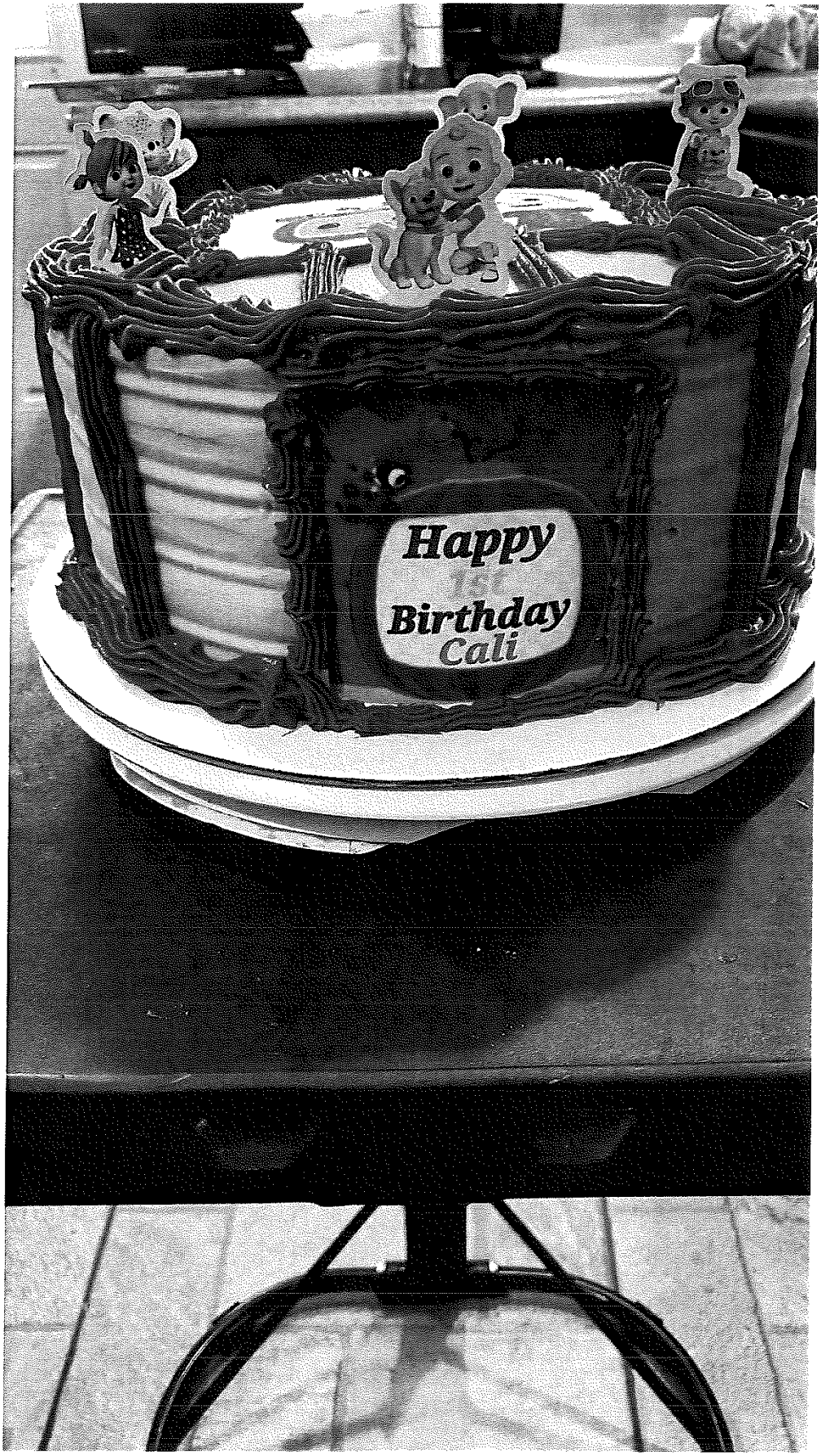

Happy 9th Birthday De'Asia Jean

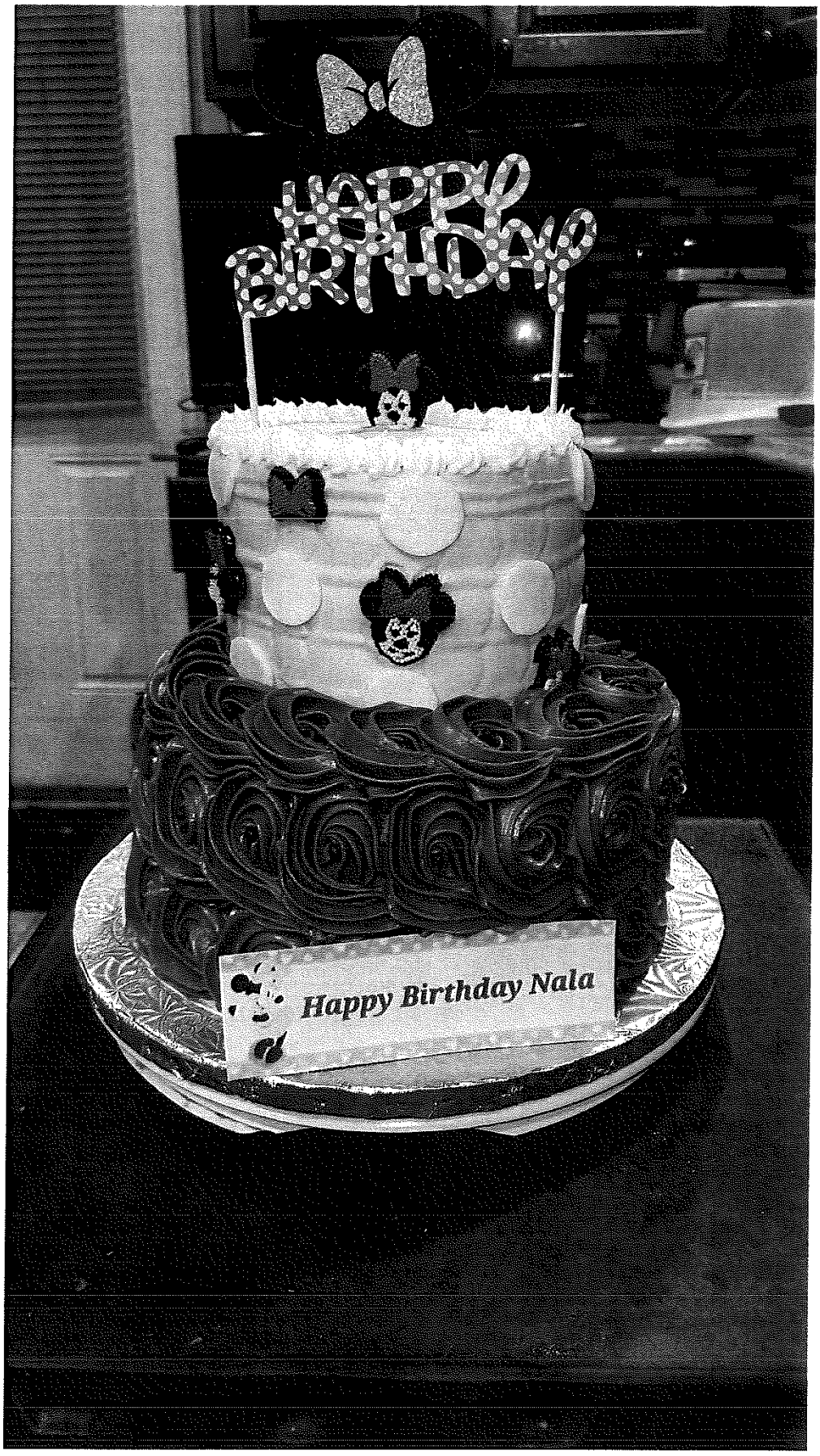

AMERICAN


SpongeBob
HAPPY B HDAY



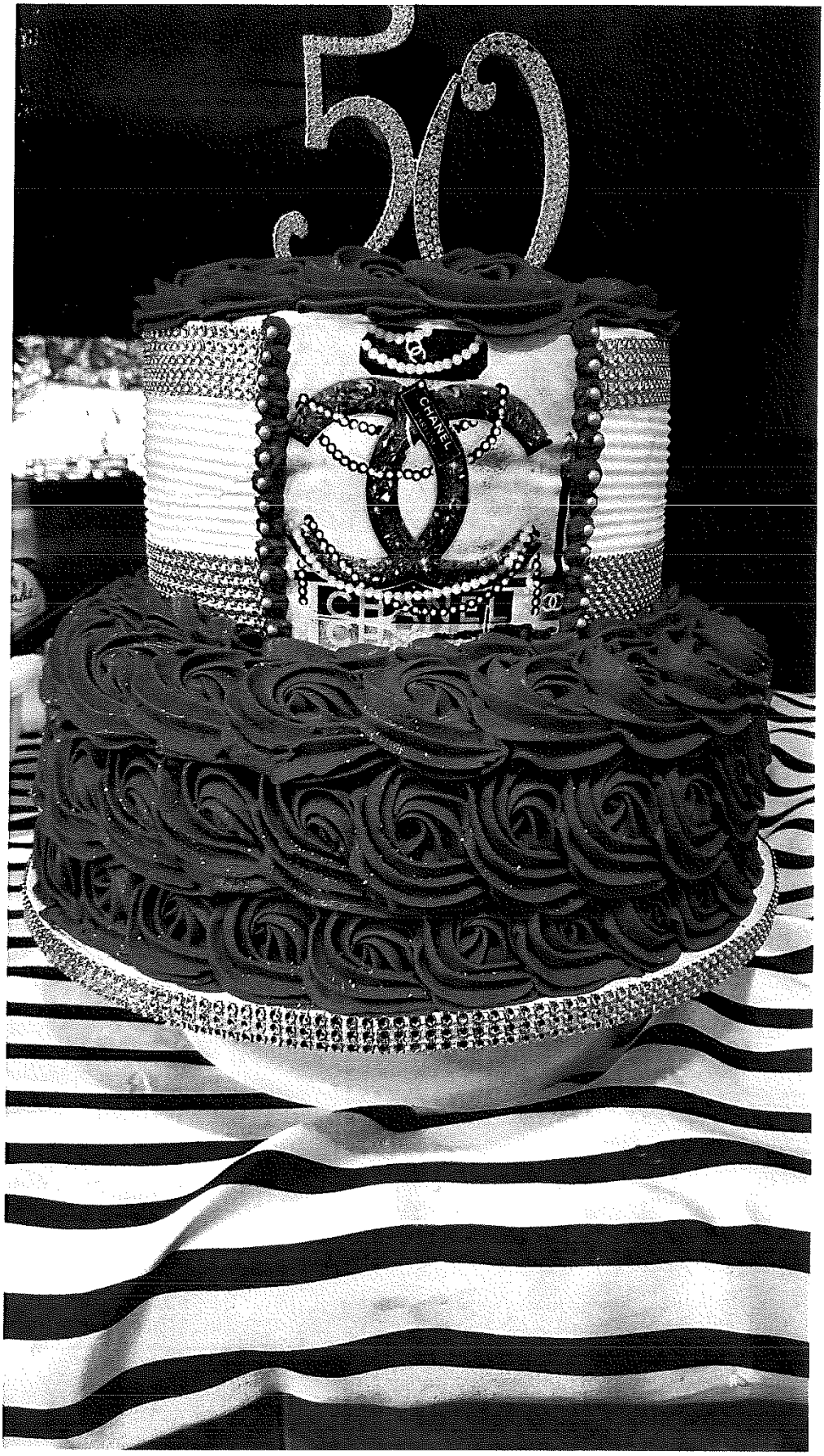

HAPPY
BIRTH
TikTok


Happy
Birthday
Cali


HAPPY
BIRTHDAY
Happy Birthday Nala



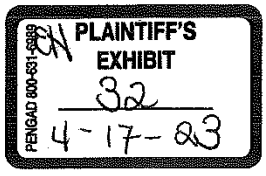



50
CHANEL

Crystal Goodwin

Past Medical Expenses

PROVIDER	AMOUNT
Columbia Rehabilitation Clinic	$64,030.00
W Dean Lorenz MD	$386.00
Providence Family Medicine	$749.00
Weight Management	$278.00
Prisma Health - Richland	$2,296.00
ABC Home Medical Supply	$74,101.44
Palmetto Health USC	$349.00
National Seating and Mobility	$8,807.40
Reliant Medical Products	$159.00
Palmetto Health Neurology	$236.00
Palmetto Health USC - Surgical 1850	$2,529.00
United Seating and Mobility	$126.99
Certified Pedorthic Orthotics	$3,180.00
Avalon Client Services	$199.00
Midlands Orthopaedics	$14,371.84
Carolina Anesthesiology Associates	$7,142.00
Professional Pathology Services	$315.00
Palmetto Health - Columbia	$4,002.00
Walmart Pharmacy	$1,525.74
Healthsouth Rehabilitation Clinic	$55,765.44
Specialty Care	$5,745.00
Fast Trac Ambulance Services	$425.60
Palmetto Health - Baptist	$125,839.00
Palmetto Primary Care Physicians	$3,326.39
Prisma Health Orthopaedics	$13,868.00
Total Past Medical Expenses	**$389,752.84**



* Auth (Verified) *

JUL/22/2016/FRI 10:45 AM FAX No. 001/006

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536 HOLBROOK, THOMAS J JR
03/02/1978 38Y F

DELBRIDGE GOODWIN, CRYSTAL 03/02/78 #2176506
07/18/2016 - - MOPA_PNE

* 6967584w7388 ClinDoc

Surgery Order

07/18/2016

From Provider	To Provider
THOMAS J. HOLBROOK, JR., MD ARCIS HEALTHCARE 1910 Blanding Street COLUMBIA, SC 29201-3620 Phone: (803) 256-4107 Fax: (803) 933-6100	PALMETTO HEALTH BAPTIST (POSTING) TAYLOR MARION ST COLUMBIA, SC 29201 Phone: (803) 296-5555 Fax: (803) 296-2623

Orders included: 1

Spinal stenosis of thoracic region
ICD-10: M48.04: Spinal stenosis, thoracic region
- LAMINECTOMY, THORACIC
  Send To: PALMETTO HEALTH BAPTIST (POSTING)
  Note to Provider:
  Posterior thoracic laminectomy for decompression from T8-T12
  23 HR OBS On 7/28/16 @ 7:30 am
  NEEDS: midas rex, mccullough retractor , FLOURO
  spinal monitoring - REP Teresa Adkins- Specialty Care
  labs: CBC, BMP, ANY OTHER LABS PER ANESTHESIA
  ALLERGIES: NKDA
  PRE-OP Meds in holding: 1 GM ANCEF IV
  SCD'S

LF ≈ 29

Date: 07/28/2016
Time: 7:30 am
Name of Instrument Rep/Company: Teresa Adkins - Specialty Care Monitoring

Patient	NAME: DELBRIDGE GOODWIN, CRYSTAL J ** PATIENT ID: 2176506 ** PATIENT SSN: 251492070 Gender: F ** DOB: 03/02/1978 ** AGE: 38yo
Address	503 GREENLAWN DR, COLUMBIA, SC 29209
Phone	H: (803) 743-9407 M: (803) 477-5465

Electronically Signed by: THOMAS J. HOLBROOK, JR., MD

PLAINTIFF'S EXHIBIT 33 4-18-23

Department	MOPA_PNE
Description	LAMINECTOMY, THORACIC (SURG)
Diagnosis	Spinal stenosis of thoracic region
ICD-10	M48.04 Spinal stenosis, thoracic region
Decline	
Clinical Provider	Prisma Health Baptist (Posting): Taylor Marion St, Columbia SC 29201, Ph (803) 296-5565, Fax (803) 296-2623
Performing Provider	Thomas Holbrook
From Order Group	THOMAS J. HOLBROOK, JR., MD, 07/18/2016
Summary of Care Record	✓ Send with order Summary of Care Record #7247797

Created by	LAMINECTOMY, THORACIC (SURG) #7247796
To	

PRISMA HEALTH BAPTIST (POSTING): TAYLOR MARION ST, COLUMBIA, SC 29201, Ph (803) 296-5565, Fax (803) 296-2623

To view the content for this document, you must re-open it.

Re-opening it, creates the document with the date it is re-opened.

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

MIDLANDS orthopaedics &NEUROSURGERY
Arcis Healthcare, LLC
114 Gateway Corporate Blvd Suite 110
COLUMBIA, SC 29204-2026
Phone: (803)256-4107, Fax: (803)933-6100

Date: 04/02/2021

RE: Crystal Delbridge Goodwin, DOB: 03/02/1978, PT ID #2176596

Dear Prisma Health Baptist (Posting),

The following is a summary of the care this patient has received at our practice. If you have questions, please contact our office.

Sincerely,

Electronically Signed by: THOMAS J. HOLBROOK, JR., MD



Summary of Care Record for Crystal J Delbridge Goodwin

Most Recent Encounter

07/18/2016 Thomas J Holbrook: 114 Gateway Corporate Blvd, Suite 110, Columbia, SC 29204-2026, Ph. tel:+1-803-2564107

Table of Contents

Reason for Referral
Problems
Allergies
Current Medications
Vaccine List
Vitals
Tobacco Smoking Status
Functional Status
Past Encounters
Procedures
Medical Equipment
Results
Mental Status
Assessment
Plan of Care
Goals
Health Concerns
Demographics

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Reason for Referral

Laminectomy, Thoracic (SURG) for Spinal stenosis of thoracic region

Note to Provider: Posterior thoracic laminectomy for decompression from T9-T12 23 HR OBS 0n 7/28/16 @ 7:30 am NEEDS: midas rex, mccullough retractor , FLOURO spinal monitoring - REP Teresa Adkins- Specialty Care labs: CBC, BMP, ANY OTHER LABS PER ANESTHESIA ALLERGIES: NKDA PRE-OP Meds in holding: 1 GM ANCEF IV SCD'S

Additional Information: confirm # 927513 Specialty Care

Referring Physician: Thomas J Holbrook, Jr., MD, Neurosurgery, Ph. (803)256-4107

Problems

Name	Status	Onset Date	Source
Ischemic Disorder of Spinal Cord	Active		Encounter
Spinal Stenosis of Thoracic Region	Active		Encounter
Spinal Stenosis of Lumbar Region	Active		Encounter

Allergies

Code	Code System	Name	Reaction	Severity	Onset
NKDA - No Known Drug Allergy					

Current Medications

Name	Start Date
baclofen 10 mg tablet 1 tablet every 6 hours	
carisoprodol 350 mg tablet Take 1 tablet every 8 hours by oral route as needed.	
diazepam 5 mg tablet Take 1 tablet every 6 hours by oral route as needed for muscle spasms.	
metformin 1,000 mg tablet	
nitrofurantoin monohydrate/macrocrystals 100 mg capsule	
tramadol 50 mg tablet Take 1 tablet every 6 hours by oral route.	

Vaccine List

None recorded.

Vitals

None recorded.

Tobacco Smoking Status

Tobacco Smoking Status	Never Smoker

Functional Status

Unknown.

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Past Encounters

08/29/2016
Spinal Stenosis of Lumbar Region
Thomas J Holbrook, Jr., MD: 114 Gateway Corporate Blvd, Suite 110, Columbia, SC 29204-2026, Ph. (803)256-4107

07/28/2016
Thomas J Holbrook, Jr., MD: 1330 Taylor At Marion Street, Columbia, SC 29220-0001, Ph. (803) 296-5010

07/18/2016
Spinal Stenosis of Lumbar Region
Thomas J Holbrook, Jr., MD: 114 Gateway Corporate Blvd, Suite 110, Columbia, SC 29204-2026, Ph. (803)256-4107

06/20/2016
Thomas J Holbrook, Jr., MD: 114 Gateway Corporate Blvd, Suite 110, Columbia, SC 29204-2026, Ph. (803)256-4107

Procedures

Date	Name	Performed by
07/28/2016	Laminectomy, Thoracic (Surg)	Information not available
06/20/2016	MRI, Thoracic Spine, W/wo Contrast	Palmetto Imaging Imagecare 710 Rabon Rd Ste 100 Columbia, SC 29203 (803) 256-7646 (Work Place)
06/20/2016	MRI, Lumbar Spine, W/o Contrast	Palmetto Imaging Imagecare 710 Rabon Rd Ste 100 Columbia, SC 29203 (803) 256-7646 (Work Place)

Medical Equipment

None recorded.

Results

Lab Results

None recorded.

Mental Status

Unknown.

Assessment

None recorded.

DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Plan of Care

Reminders			Provider
Appointments	None recorded.		
Lab	None recorded.		
Referral	None recorded.		
Procedures	None recorded.		
Surgeries	Laminectomy, Thoracic (SURG)	07/28/2016	Prisma Health Baptist (Posting)
Imaging	None recorded.		

Goals

Health Concerns

Demographics

Sex:	Female	Ethnicity:	Not Hispanic or Latino
DOB:	03/02/1978	Race:	Black or African American
Preferred language:	en	Marital status:	Information not available

Contact: 903 Greenlawn Dr, Columbia, SC 29209, Ph. tel:+1-803-7439407

Palmetto Health Baptist

GOODWIN, CRYSTAL JAQUAY
MR#275536 DOS: 07/28/2016
MR-16-0022850 SEX: F Age: 38 Y
DOB: 03/02/1978 PACS ID: 14235595

PT LOC: B Recovery Room/904/01
EXAM: MR THORACIC SPINE W/O CONTRAST

Ordering Phys: Holbrook MD, Thomas J

Accession ID: 14235595

GOODWIN, CRYSTAL JAQUAY

DOB: 03/02/1978 Age: 38 Y SEX: F
MR#: 275536 Corporate MRN#: 000605489
PRIORITY: Routine

Arrival Time: 12:54
Check-in Order Date: 07/28/16 Check-in Order Time: 12:55

Exam Start Date: 07/28/2016
Exam Start Time: 12:54:00

NOTED ALLERGIES: NKA

PLAINTIFF'S EXHIBIT 34 4-8-23
PENGAD 800-631-6989

Palmetto Health Baptist

GOODWIN, CRYSTAL JAQUAY
MR#275536 DOS: 07/28/2016
MR-16-0022850 SEX: F Age: 38 Y
DOB: 03/02/1978 PACS ID: 14235595

PT LOC: B Recovery Room/904/01
EXAM: MR THORACIC SPINE W/O CONTR

Sent for

PACS ID: 14235595

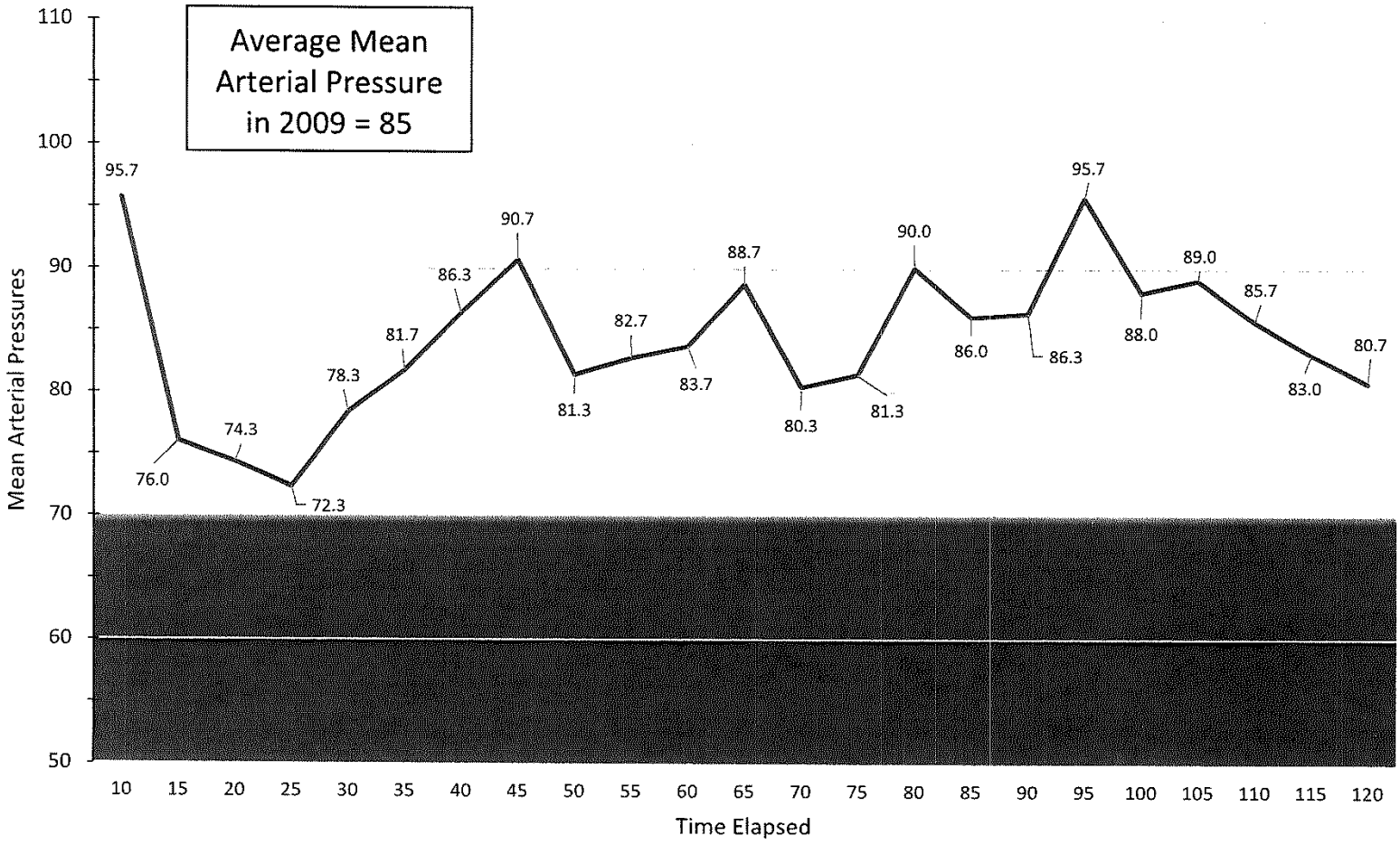
PT LOC: B Recovery Room/904/0

1275536

ACCESSION#
MR-16-0022850

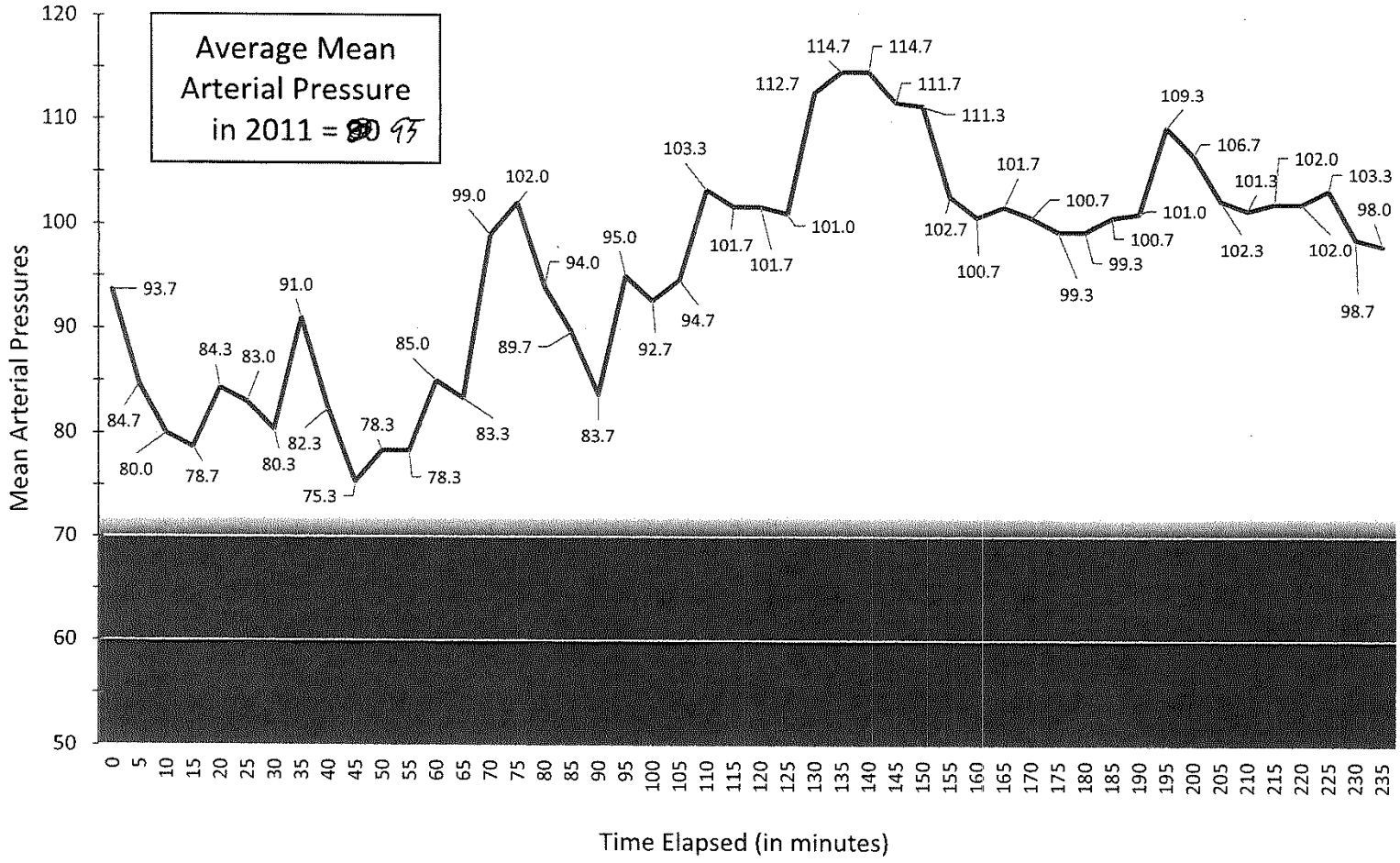
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Crystal Goodwin's
Mean Arterial Pressures in 2009 Surgery

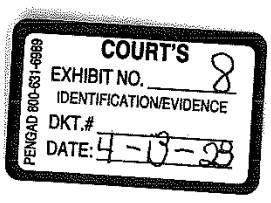


PENGAD 800-631-6989
PLAINTIFF'S EXHIBIT
84
35
4-19-23

Crystal Goodwin's
Mean Arterial Pressures in 2011 Surgery



PENGAD 800-631-6989
PLAINTIFF'S EXHIBIT
84
36
4-19-23


COURT'S
EXHIBIT NO. 8
IDENTIFICATION/EVIDENCE
DKT.#
DATE: 4-10-23
PENGAD 800-631-6989

STATE OF SOUTH CAROLINA)	IN THE COURT OF COMMON PLEAS
)	
COUNTY OF RICHLAND)	C.A. NO. 2019-CP-40-4185
CRYSTAL GOODWIN AND JAMES GOODWIN,)	
PLAINTIFFS,)	VIDEOTAPED 30(b)(6) DEPOSITION
)	OF
VS.)	
)	MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, P.A. (THOMAS J. HOLBROOK, M.D.)
MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, THOMAS J. HOLBROOK, JR., M.D., CAROLINA ANETHESIOLOGY ASSOCIATES, P.A., JENNIFER R. ROOT, M.D., AND PRISMA HEALTH, F/K/A PALMETTO HEALTH,)	
DEFENDANTS.)	

THE VIDEOTAPED 30(b)(6) DEPOSITION OF MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, P.A. (THOMAS J. HOLBROOK, M.D.), TAKEN BEFORE JILL BISHOP EDWARDS, CVR-CM, CERTIFIED VERBATIM REPORTER AND NOTARY PUBLIC IN AND FOR THE STATE OF SOUTH CAROLINA, COMMENCING AT THE HOUR OF 10:12 A.M., TUESDAY, THE 23RD DAY OF MARCH, 2021, LOCATED AT MAG MUTUAL, 2000 CENTER POINT ROAD, SUITE 2275, COLUMBIA, SOUTH CAROLINA.

ORIGINAL

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*DIGITALLY RECORDED AUDIO RETAINED FOR TWELVE (12) MONTHS FROM DATE OF CERTIFICATION.

STIPULATIONS

IT IS STIPULATED BY AND BETWEEN COUNSEL FOR THE RESPECTIVE PARTIES THAT ALL OBJECTIONS ARE RESERVED UNTIL THE TIME OF TRIAL, EXCEPT AS TO THE FORM OF THE QUESTION.

THIS DEPOSITION IS BEING TAKEN PURSUANT TO THE SOUTH CAROLINA RULES OF CIVIL PROCEDURE.

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THE READING AND SIGNING OF THIS DEPOSITION IS WAIVED BY THE DEPONENT AND COUNSEL FOR THE RESPECTIVE PARTIES.

WHEREUPON, THOMAS J. HOLBROOK M.D., BEING DULY SWORN AND CAUTIONED TO SPEAK THE TRUTH, THE WHOLE TRUTH, AND NOTHING BUT THE TRUTH, TESTIFIED AND DEPOSED AS FOLLOWS:

EXAMINATION

BY MR. GOINGS:

Q Doctor, are you familiar with the deposition process?

A Somewhat.

Q Have you given a deposition before?

A Yes.

Q How many times have you given a deposition?

A Several.

Q And that's including in your career as a -- as a neurosurgeon?

A Yes.
Q If any point in time you don't understand my question or need me to rephrase or explain my question, please direct those requests to me and not the other attorneys in the room. Okay?
A Okay.
Q If you answer my question, I'm going to assume that you understood my question; is that fair?
A Yes.
Q Okay. Is there any reason why you would not be able to testify truly -- truthfully and accurately here today?
A No.
Q During the course of this deposition, if I were to say or refer to you, please understand that I'm referring to you as a witness that's been designated on behalf of Midlands Orthopaedics in this case; is that fair?
A Okay.
Q Do you understand that you are testifying here today on behalf of Midlands Orthopaedics and Neurosurgery?
A Yes.
THE VIDEOGRAPHER: Pardon the interruption. Sorry, Doctor. We can barely hear you, even on the mic. You're going to need to speak up, sir.
THE WITNESS: Yes, ma'am.
THE VIDEOGRAPHER: Thank you.

MR. GOINGS: Would it be helpful if he moved his mic up some?

THE VIDEOGRAPHER: It's all the way up. I just think he's talking really low.

MR. GOINGS: Okay.

(MARKED FOR IDENTIFICATION, PLAINTIFF'S EXHIBIT NUMBER 1, NOTICE OF DEPOSITION, ATTACHED.)

BY MR. GOINGS:

Q Dr. Holbrook, we've marked as Exhibit 1 the deposition notice for today's deposition. And your attorney and I have circled the topics that I understand that you're here today designated to speak about. Have you seen this deposition notice marked as Exhibit 1 before?

A Yes.

Q And are you here today to testify on behalf of Midlands Orthopaedics?

A Yes.

MR. GOINGS: Are you able to hear the witness on the record?

THE VIDEOGRAPHER: On the mic. Yes.

MR. GOINGS: Okay.

BY MR. GOINGS:

Q Doctor, what documents did you review in preparation for today's deposition?

A My deposition and an outline from Mr. Davis.

Q An outline?
A Yes.
Q What kind of outline?
A An outline of the case.
Q Okay. Do you have the outline with you that we can look at?
MR. GOINGS: Anything privileged on it that we need to know about?
MR. DAVIS: It's all privileged, but if you want to see it, that's what it is. I prepared that. I prepared that.
MR. GOINGS: Okay.
MR. ROBINSON: Then why are you sharing it?
MR. DAVIS: You wanted to see it. There it is. I don't want it marked as an exhibit.
MR. GOINGS: You don't want it marked as an exhibit?
MR. DAVIS: No. I think it's privileged. You asked --
MR. GOINGS: All right. So you're claiming privilege to it?
MR. DAVIS: Yes, sir.
MR. GOINGS: Okay.
MR. DAVIS: Attorney work product.
BY MR. GOINGS:

Q Okay. You reviewed an outline for today's deposition?
A Yes.
Q Okay.
MR. GOINGS: So I take it that any questions I may ask him about the outline, you would object on the grounds of privilege?
MR. DAVIS: Could I make a statement, just to clarify what this is. I mean, I can tell you what it is.
MR. GOINGS: Sure.
MR. DAVIS: It's just an outline I prepared to help him get ready for his 30(b)(6) deposition. It's mainly my going over each item number that he was going to answer that I've already designated to you that he would be responding, in addition to number 25. And just citing, as best I could, depositions, his deposition testimony and page numbers that I believe, in my opinion, related to those topics, just to kind of help him focus in reviewing his deposition. That's basically it.
MR. GOINGS: Okay.
MR. DAVIS: It's pretty bland.
MR. GOINGS: Okay. To the extent that we may challenge the work project or privilege designation, we'll discuss that in advance after the deposition.

MR. DAVIS: Fine.
MR. GOINGS: And then take that up at a later date, if necessary.
MR. DAVIS: That's fine.
MR. GOINGS: So just kind of -- don't lose that.
MR. DAVIS: I'm not going to lose it.
MR. GOINGS: Okay.
MR. DAVIS: I'm not going to lose it.
MR. GOINGS: Okay.
MR. DAVIS: It's not very interesting.
MR. GOINGS: I bet. I bet. And I'm not trying to create an issue that's not an issue. Okay?
MR. DAVIS: Yes, sir.

BY MR. GOINGS:

Q Okay. So you reviewed your deposition and you reviewed an outline. Is that correct?
A Yes.
Q Anything else?
A Nothing lately.
Q Have you looked at any documents or reviewed any documents related to this case?
A Well, the other depositions and information that I was given related to those.
Q And what other depositions have you -- have you personally reviewed?

A All of them.
Q So it's your testimony that you have reviewed all the depositions in its entirety that have been taken in this case up to this present date?
A Maybe not every word and not lately.
Q Okay. What depositions of physicians have you reviewed?
A I guess, Dr. Root and Dr. Jones and Dr. Lustgarten.
Q Any other doctor depositions?
A I don't think there were any others that I remember right offhand.
Q Have you reviewed any depositions of other medical professionals that may not be medical physicians?
A Yes.
Q And who were those depositions?
A I think Mr. Starnes and Maurio Riley were the two that I recall right offhand.
Q In reviewing these depositions, did you learn something new about the case or the facts of the case that you previously did not know?
MR. DAVIS: I'm going to have to impose an objection. I don't think it's been clear, with all due respect. He did not review these depositions in preparation for the 30(b)(6). He just -- as a part of being a defendant in the case, he's reviewed those

depositions as they've been supplied and sent by my office.

MR. GOINGS: Okay.

MR. DAVIS: Just to be fair with you.

MR. GOINGS: I understand.

MR. DAVIS: Yes, sir.

BY MR. GOINGS:

Q And I think my question was what depositions have you reviewed related to this case. And I understand that maybe you didn't review them in preparation for today's deposition, but for purposes of this case, you have, in fact, reviewed the depositions that you've previously stated on the record?

A Yes.

Q Have you ever spoken with another doctor, such as a neurosurgeon, orthopedist, or anesthesiologist, or any physician, about the care and treatment of Crystal Goodwin?

A Not other than at the time when she was in the hospital when I would have been treating her in the hospital and other physicians would be taking part of her care when they were on call and that sort of thing.

Q Okay. Since this case has been filed, you've not spoken with any physician, neurosurgeon, orthopedist, anesthesiologist related to any issue concerning the

standard of care?
A No.
Q Have you -- have you been interviewed or discussed, formally or informally, your care and treatment of Crystal Goodwin with any -- with any physician?
A No.
Q Have you spoken at all with Dr. Root about Ms. Goodwin or this case?
A Not other than at the time of surgery and I saw her in the hall one time after this had been filed and she mentioned that had been given a lawsuit for this.
Q What was that discussion in the hallway?
A That she had been served, I guess, with a court case or a subpoena or something.
Q Anything else about that discussion?
A I told her that I had gotten one similar, but I hadn't looked at it yet and I didn't know what it was about.
Q Is that the extent of the conversation?
A Pretty much.
Q Does Midlands Orthopaedics take any responsibility, whatsoever, for Crystal Goodwin being paralyzed today?
A Crystal Goodwin is not paralyzed today.
Q How would you describe Crystal Goodwin's physical condition today?
MR. DAVIS: Excuse me. What topic number are you

referring to now in this line of questions?

MR. GOINGS: It includes two, three, five, six, seven, eight, nine.

MR. DAVIS: Is that it? I'm sorry.

MR. GOINGS: 11.

MR. DAVIS: Okay. Thank you. Could you ask the question again? I interrupted you.

BY MR. GOINGS:

Q How would you describe Crystal Goodwin's physical state?

A As far as her neurologic state?

Q Yes, sir.

A I'd say she has significant weakness and numbness in her legs.

Q Okay. So you disagree that she's paralyzed?

A Correct.

Q Do you agree that she has paralysis?

A She is not paralyzed.

Q Can someone have paralysis and not be totally paralyzed?

A Paralyzed means, to me, no function. So you're either paralyzed or you're not.

Q All right. So, if you're -- if you have some function in your legs, you're not paralyzed?

A That would be correct.

Q Do you -- do you understand why Crystal Goodwin believes she's paralyzed today?
A Did you tell her that?
MR. DAVIS: Objection to the form of the question.
BY MR. GOINGS:
Q Do you understand why she believes she's paralyzed today?
A Did you tell her that she was?
Q So, maybe I should have made this clear at the beginning of the deposition. It's my job to ask questions to you and it's your job to answer those questions. And I'm asking you, do you understand why Crystal Goodwin believes she's paralyzed?
MR. DAVIS: Objection to the form of the question. I don't mean to be repetitive, but same objection.
THE WITNESS: It might be best to ask her that question.
BY MR. GOINGS:
Q Okay. Does Midlands Orthopaedics take any responsibility, whatsoever, for Crystal Goodwin suffering from severe neurological deficits to her lower extremities?
MR. DAVIS: Object to form of the question.
THE WITNESS: Is that in here somewhere in the deposition? So, what's your question? I don't

understand.
BY MR. GOINGS:
Q Does Midlands Orthopaedics take any responsibility, whatsoever, for Crystal Goodwin suffering severe neurological deficits to her lower extremities?
A You mean did Midlands Orthopaedics cause this through malpractice? Is that what you're saying? No, they did not.
Q Okay. Does Midlands Orthopaedics take any responsibility, whatsoever, for Crystal Goodwin having significant weakness and numbness in her legs today?
A Midlands Orthopaedics is not responsible for any malpractice. There was none committed.
Q Do you know anyone who was responsible?
A For?
Q For the malpractice that you referenced.
A There was no malpractice.
Q And everything was done correct in the surgery room?
A Everything that was done was reasonable and done in order to get her the best possible result.
Q Did Crystal Goodwin suffer from chronic hypertension or high blood pressure?
A What page is that on?
Q So, for purposes of the deposition, you can't ask your lawyer to assist you or reference any page or page

number. You have to answer the question based on your personal knowledge or knowledge in your capacity as the representative of Midlands Orthopaedics.

A Okay. I believe, as I stated in my deposition, that I was aware that she had hypertension.

Q So, at the time of this surgery, and in the weeks and months and years leading up to the surgery, you would agree with me that Crystal Goodwin did, in fact, suffer from chronic hypertension?

A She had hypertension when I saw her. I'm not sure exactly how long she had it.

Q How did you know that she had hypertension or high blood pressure?

A She said she did.

Q So she told you she had hypertension?

A Yes.

Q Did your office, Midlands Orthopaedics, perform any tests or studies to determine if she had hypertension?

A We took her blood pressure.

Q Did the blood pressure readings reveal or show that Crystal Goodwin had hypertension?

A I believe one of the readings did and one of them did not.

Q How many readings, blood pressure readings, did Midlands Orthopaedics take, to your knowledge?

A I recall at least two.
Q In taking blood pressure readings, is it possible to have some outliers in the results of the blood pressure test using a cuff?
A Yes.
Q If a cuff is not situated correctly on the arm, would you agree with me that the blood pressure readings could be off?
A Maybe.
Q In your deposition, you testified that Ms. Goodwin suffered, quote, injury to the spinal cord, end quote, during this surgery.

MR. DAVIS: Would you cite the --

MR. GOINGS: Page 49.

MR. DAVIS: Thank you, sir. Page 49? Okay. What line, please?

MR. GOINGS: I don't have the deposition in front of me. I just know it's page 49.

MR. DAVIS: Well, I've got a copy. I'm happy to share it with you.

BY MR. GOINGS:
Q Line 3. You don't need to look far down the page. It says, "It was an injury to the spinal cord." Do you see that?
A Yes.

Q On behalf of Midlands Orthopaedics, does Midlands Orthopaedics also contend that Crystal Goodwin sustained an injury to the spinal cord during the surgery?
A Yes.
Q Do you agree that the injury to the spinal cord was most likely the result of an ischemic event?
A Yes.
Q What does ischemia mean?
A It means that there is a vascular event, a stroke in the spinal cord, or any stroke is ultimately related to a vascular event.
Q Does ischemia, in layman's terms, mean tissue death?
A Not necessarily.
Q Can ischemia cause tissue death?
A It can.
Q Is tissue death often the result of ischemia?
A Sometimes it is.
Q Prolonged ischemia can lead to tissue death; correct?
A Not necessarily.
Q But you would agree that tissue death is a known result of ischemia; right?
A It can be but not necessarily.
Q It's not always; right?
A Correct.

Q But it's a foreseeable outcome of ischemia for the tissue to suffer what's been known as tissue death; right?
A That's a possibility.
Q A known possibility?
A Yes.
Q A known result?
A Yes.
Q Ischemia is the restriction in the blood supply to tissue. Is that a correct statement?
A That sounds reasonable.
Q When blood supply of the tissue is restricted, this can result in a shortage of oxygen needed to keep the tissue healthy and alive; right?
A Yes.
Q And when the tissue is deprived of oxygen and sufficient blood flow, the tissue can become damaged, isn't that true?
A It can.
Q And that is a known result; right?
A Yes.
Q The purpose of proper perfusion is to ensure that the tissue receives a sufficient amount of blood flow and oxygen; is that right?
A Correct.

Q An ischemic event, including tissue death, can be the result of improper perfusion levels; is that fair?
A It's possible, but not in this case.
Q But improper perfusion levels can lead to an ischemic event?
A Crystal had adequate perfusion levels.
Q We're going to get to Crystal in a minute. I want to know just general medicine at this point in time. You would agree that improper perfusion levels can lead to an ischemic event resulting in tissue death?

MR. DAVIS: I'm going to object to this whole line of questions as not being relevant to any of the topics that he is designated to testify about as a designated 30(b)(6) witness, specifically, on the numbers you cited to me earlier.

MR. GOINGS: All right.

MR. DAVIS: Let me finish. I'm making my objection. You talk about the treatment and care of Crystal Goodwin, deviations from the standard of care by Dr. Holbrook, the causes of her neurologic deficits. You're asking general questions about medicine which have nothing to do with the topics that are listed on the 30(b)(6). And I believe the rules state that you're limited to ask questions about those topics.

MR. ROBINSON: Same objection.

MR. GOINGS: I respectfully disagree to your objections. Your objections are noted, and I'll give you a running objection, as well.

MR. DAVIS: Thank you.

MR. GOINGS: I'll continue to ask the questions and then, if it comes up at a later date, we can do that.

MR. DAVIS: Thank you very much. I appreciate you doing that.

MR. GOINGS: All right, Doctor.

THE WITNESS: So, should I answer his question or not?

MR. DAVIS: Yeah. You should try to answer any questions he asks unless I instruct you not to.

THE WITNESS: Okay.

BY MR. GOINGS:

Q Doctor, improper perfusion levels can lead to an ischemic event resulting in tissue damage or death; correct?

A Crystal always had a proper perfusion level. That doesn't apply in this case.

Q I'm asking you a question about --

A A hypothetical case?

Q I'm asking you this question, and I need you to answer the question.

A Well, is it a hypothetical case or is it something specific to Crystal?
Q We'll start with a hypothetical case.
A Okay.
Q Do I need to ask the question again?
A Yes.
Q Okay. You would agree that improper perfusion levels can lead to an ischemic event that could result in tissue damage or tissue death?

MR. DAVIS: Same previous objection. Do I need to keep saying that?

MR. GOINGS: I gave you a running objection.

MR. ROBINSON: So this would be a running objection on all of the hypotheticals not relating to Crystal Goodwin?

MR. GOINGS: You can have all the running objections you wish. I'm just trying to get through the deposition.

MR. DAVIS: Okay. Thank you.

MR. GOINGS: With as few interruptions as possible.

MR. DAVIS: Yes, sir. I understand.

THE WITNESS: So what's your question?

MR. GOINGS: Do you want me to ask it again?

THE WITNESS: Please.

BY MR. GOINGS:

Q Do you agree that improper perfusion levels can lead to an ischemic event resulting in tissue death or tissue damage?

A In a hypothetical case, that's possible.

Q Well, you're also taught that in your training as a physician, in particular, a neurosurgeon; right?

A Yes.

Q Okay. And you're taught in med school and through your fellowship and through your training that, if a patient's perfusion levels are not kept at the adequate levels, that an ischemic event may occur, resulting in tissue damage and tissue death; right?

A Not necessarily.

Q Well, that's not always the case, but that is a known result or a foreseeable outcome to improper perfusion levels, isn't it?

A Could it ever happen? Yes.

Q Is it true that low perfusion or low blood flow can result in an ischemic injury similar to a stroke to the spinal cord?

A This is a hypothetical case again?

Q If you want to consider it hypothetical.

A Well, I mean, is it hypothetical or does it apply to Crystal?

Q When you go through med school, are you taught hypotheticals?
A Sometimes we do look at hypothetical situations.
Q All right. Are you trained on hypothetical situations?
A Sometimes we will talk about cases that are hypothetical cases.
Q And in your training as a medical physician, you're taught that low blood flow or lack of perfusion can result in an ischemic injury; isn't that true?
A That's a possibility in this hypothetical case you're talking about.
Q Okay. Can perfusion levels be altered during a surgery?
A Yes.
Q How can perfusion levels be altered during a surgery?
A Well, they can be made to go up or down as needed.
Q How is one's perfusion level increased during surgery?
A Well, you can give medicine or you could give fluid, would be two ways.
Q And whose role is it to give medicine or give fluids to increase perfusion levels?
A Well, in this particular case, there was no indication to give medicine or fluids, and I would say that the risk of doing that outweighed the potential benefits.
Q How -- whose role or responsibility is it, though, to

increase perfusion levels during surgery?
A To actually do that? Anesthesia.
Q Okay. Do you -- as the neurosurgeon, do you make that recommendation to anesthesia?
A Yes.
Q Okay. And how is perfusion levels decreased during surgery?
A Drugs, usually.
Q And you, as the neurosurgeon in the room, can make that recommendation to anesthesia?
A Yes. I have done that in cases from time to time.
Q Did anyone with Midlands Orthopaedics discuss Ms. Goodwin's blood pressure to Dr. Root or anyone with the anesthesiology team prior to starting the procedure?
A I don't recall right offhand.
Q Did anyone from Midlands Orthopaedics discuss Ms. Goodwin's hypertension or high blood pressure with Dr. Root or anyone with anesthesiology, prior to starting this procedure?
MR. ROBINSON: Object to form.
MR. GOINGS: You can answer.
THE WITNESS: That information would have been conveyed to him, to the anesthesia, that she did have hypertension in looking at our office notes.
BY MR. GOINGS:

Q Is anesthesiology provided with Midlands Orthopaedics office notes?
A I'd have to ask them if they got those or not.
Q And who is "them"?
A Anesthesia.
Q All right. That's a question for anesthesia?
A If they had them and reviewed them, they would be the ones that would know that better. I don't recall right offhand.
Q That would not be a question that you would be able to answer?
A Not right now.
Q You said that Midlands Orthopaedics would have -- or I understood you said that anesthesiology would have been able to look at Midlands Orthopaedics' notes. Did you say that?
A I'll usually send a copy of my office notes to the hospital for a particular patient.
Q And is it sent in paper copy or electronic copy?
A I don't know.
Q Who is in charge of sending those office notes to the hospital?
A Somebody in our office would do that. It might be a different person for a particular case.
Q For your cases, when you were the surgeon, who in the

office at Midlands Orthopaedics would send records to the hospital for a patient prior to surgery?

A Who would actually send them?

Q Yes, sir.

A I'm not sure if it would've been the nurse or if it would have been another clerical person.

Q Would they be sent electronically via email?

A I don't know.

Q Would it be sent through a patient electronic portal?

A I don't know.

Q Would it be mailed to the hospital?

A I don't know.

Q Would it be hand delivered to the hospital?

A It could be. I don't know.

Q Do you have, on behalf of Midlands Orthopaedics, any evidence of the documents that anesthesiology would've been provided from Midlands Orthopaedics for Crystal Goodwin's surgery in July of 2016?

A I couldn't tell you right offhand, but you might ask them. They might know.

Q Did you see any testimony that you previously read before today's deposition that would indicate such?

A Well, I read their depositions. It's been probably a few months ago and I don't specifically recall a discussion of what office notes they might have gotten

or reviewed.
Q Are you able to -- you, as a surgeon at the hospital, let's say you're at Baptist. Are you able to access the Midlands Orthopaedic chart for a patient while you're at Baptist Hospital?
A Yes.
Q How do you do that?
A Computer.
Q Which computer?
A Hospital computer.
Q So you can log on to the hospital computer at Baptist and see the Midlands Orthopaedic records of your patient?
A Yes.
Q Midlands charting and treatment notes are able to be viewed and accessed by a hospital computer at Baptist?
A Yes.
Q Is there a certain portal you go to or you went to for that?
A There is.
Q What is that called?
A It's Midlands -- it's something with Midlands and you have to have a password and that sort of thing.
Q So, in order to access the treatment notes that you would have accessed, you would have to have a password

to go on to the Midlands portal, or Midlands site?
A Well, I'm not sure exactly how it works, but more or less, that's the general idea.
Q I mean, you did this for patients; right?
A Right.
Q And you did this often? Every time you did a surgery; right?
A No.
Q Did you often access Midlands Orthopaedic records while you were at Baptist Hospital?
A No.
Q The times that you did, how did you do it?
A On the computer.
Q And how did you do that on the computer? What steps did you take to access the records?
A I logged into the website.
Q Which website?
A Midlands.
Q All right. You would have to log into Midlands Orthopaedics?
A Yes.
Q Okay. This would not be kept on the patient record portal for a patient that was actually admitted into the hospital, would it?
A I don't understand that.

Q You said you had to go to the Midlands website to see the records. Is that what I'm hearing?
A Correct.
Q Would that be a different website than you would use to access general patient records for a patient who was admitted into the hospital at Midlands -- at Baptist?
A Well, I wouldn't access the Baptist records by looking at the Midland website.
Q Okay. So there are two different portals or two different websites that you would go to?
A Well, if you're already in the hospital, you just log onto the hospital computer. It has the hospital records that are for a patient that's currently there.
Q And that's how you get the hospital's records for a patient?
A That's how you review those records for somebody who's already in the hospital.
Q How do you review your records for a patient that's in the hospital that has treatment notes and records with Midlands?
A If it's on the Midlands server, then you go to the Midlands website.
Q Okay. So it's a separate website you would go to, to access the records for a patient at Midlands?
A For the office records for Midlands; yes.

Q Okay.
A Unless they had already been sent to the hospital and they were part of that record. And they may -- some of those may be, from time to time.
Q And how would those records be sent to the hospital?
A I don't know how they did it. Probably by the computer.
Q If Midlands records were sent to the hospital, you would anticipate that those Midlands records that were sent to the hospital would be made part of the hospital file, wouldn't you?
A If they had them, probably so.
Q Okay. Is -- are anesthesiologists provided access to Midlands Orthopaedic and Neurosurgery records on a patient?
A Not routinely, but if they need the records, they can request them if they didn't already get them.
Q Okay. And Carolina Anesthesiology, do they have access to patient records on this Midlands Orthopaedics website?
A I don't think so, but they can call and ask for whatever they need.
Q Is the hospital, and in particular, I'm going to speak about Baptist Hospital, Prisma Baptist. Is the hospital given access to medical records and medical

charting of Midlands Orthopaedics when a procedure is performed at that hospital by one of the Midlands physicians?

A You mean the hospital itself? It wouldn't be the hospital. It would be somebody has to request the record.

Q It has to be specifically someone --

A Some person.

Q They had to specifically request those records from Midlands; right?

A Well, it depends on what it's for.

Q Anesthesiology. If the anesthesiology team needed to access the records from Midlands Orthopaedics, how would they go about doing it?

A They would call the office and ask for them.

Q Okay. And that would be also put into the records of Midlands that they were requested from another practice or another facility; right?

A I don't know how that works.

Q Are you the physician that recommended that Crystal Goodwin undergo a spinal surgery in July of 2016?

A Yes.

Q Did she have any preexisting conditions, comorbidities, underlying medical conditions that would have prevented her from having that surgery?

A No.
Q And the recommendation for that surgery was made by you; correct?
A Yes.
Q You wouldn't have recommended the surgery if you thought the surgery was dangerous or unsafe for her, would you?
MR. DAVIS: Objection to the form of the question.
THE WITNESS: I felt that the benefits outweighed the risks.
BY MR. GOINGS:
Q And what would've been the benefits of the surgery?
A Improving her condition and preventing it from getting worse.
Q Did Crystal Goodwin need to undergo the spinal surgery that you performed in July of 2016?
A Yes.
Q Do you know how to calculate mean arterial pressure?
A Yes.
Q How do you calculate mean arterial pressure?
A The systolic plus twice the diastolic divided by three.
Q Is that generally known by physicians at Midlands Orthopaedics?
A Probably.
Q What was Crystal Goodwin's blood pressure readings when

checked at Midlands Orthopaedics?
A I'd have to look at the record.
Q Do you have the records?
A No.
MR. DAVIS: I can pull them up. Do you want me to do that?
MR. GOINGS: Yeah. If you want to.
MR. DAVIS: Okay. I've just got a hard copy.
MR. GOINGS: Sure. Yeah.
MR. DAVIS: The one I'm looking at is an organized index of medical records and tab, page 1 and 2. It would be all through tab one, I believe, are copies of notes that were obtained.
THE WITNESS: Now this is from 2012.
MR. DAVIS: Do you want a particular focus?
BY MR. GOINGS:
Q Well, my question is you've seen and reviewed Crystal Goodwin's treatment records and notes at Midlands Orthopaedics, haven't you?
A Yes.
Q In these treatment notes that you've reviewed, how many times was Crystal Goodwin's blood pressure checked?
A I can recall two right offhand, but other than that, I'm not sure.
Q Okay. Based on your recollection of the two that you

recall right offhand, do you know the date of those blood pressure readings and what the result was?

A One was about a week before surgery and I'm not sure when the other -- it was sometime prior to that.

Q All right. What was the one a week before surgery?

A Here is one. Let's see. Here's one on 6/20/16. That's 152/112.

Q And what does that equate to be as the mean arterial pressure?

A I don't have a calculator.

MR. DAVIS: He can use mine on my phone. Would that be okay?

MR. GOINGS: That would be just fine.

MR. DAVIS: Okay.

THE WITNESS: 125 is what I'm getting.

BY MR. GOINGS:

Q Okay. You said there was a blood pressure reading a week before surgery?

A About.

Q Okay. The date that I have for that would be 7/22/16. It looks like this is the preoperative assessment.

MR. ROBINSON: Could you repeat the last answer? 125 --

MR. GOINGS: It was 152/112, and he said it equates to a mean arterial pressure of 125.

THE WITNESS: Here's one on 7/18/20, which is 129/81.

BY MR. GOINGS:

Q Okay. And what does that equate as the mean arterial pressure?

A Your thing went off.

MR. DAVIS: Oh, I'm sorry.

THE WITNESS: That's 97.

BY MR. GOINGS:

Q All right. And then do you have the blood pressure reading on her preop assessment the week before surgery? I think that's the one you were mentioning.

A These are the office records. I don't think it would be in the office record. It would be in the hospital record. Is that the one you're looking for?

Q This is the preop notes. Anesthesiology would be able to access the preop assessment of a patient before surgery; correct?

A The one that they did. Yes.

Q Okay.

A They did it.

Q To speed it up, I can hand you --

MR. DAVIS: Sure, yeah. That works.

BY MR. GOINGS:

Q It was made as Exhibit 5 in your previous deposition.

What I'm handing you is a copy of the five exhibits, six exhibits, to your previous deposition. What does it show as of 7/22/2016 as the blood pressure readings with corresponding mean arterial pressure?

A Let's see. 156/92. It doesn't give a mean.

Q What would be the mean arterial pressure?

A You'll have to turn that back on.

MR. DAVIS: Yes, sir.

THE WITNESS: 113.

BY MR. GOINGS:

Q Okay. And then is it your understanding that Ms. Goodwin's blood pressure was checked at the hospital by anesthesia prior to beginning the procedure?

A Yes.

Q Okay. What was her blood pressure when she got to the hospital before the procedure began?

A I don't remember.

Q I'm going to hand you what has been marked as Exhibit 3 to your previous deposition. This is the page I want to ask you about. What does it show that her blood pressure readings were before surgery on 7/28/2016?

A What's that word above it? I can't make that out. I see the blood pressure reading, but it says -- it's got some description of it above it. I can't tell what that is.

Q It's not my record. I don't know.
A It's not my record.
Q Would it be pre-induction VS, vital signs?
A It doesn't look like induction.
MR. ROBINSON: Do you have an extra copy of that exhibit?
MR. GOINGS: All right. I blew it up here for you. Does it say preinduction VS?
THE WITNESS: Yes. It does.
BY MR. GOINGS:
Q What does preinduction VS mean?
A I think preinduction vital sign.
Q What does that mean to you as a physician?
MR. ROBINSON: May we see what you're looking at on the document, please?
MR. DAVIS: The preprinted.
MR. ROBINSON: Gotcha.
MR. GOINGS: Above the handwritten 60/99, it says preinduction VS.
MR. DAVIS: Oh, okay. Thank you.
MR. ROBINSON: Thank you.
MR DAVIS: The printed part on the --
MR. GOINGS: Yes.
MR. DAVIS: Thank you, sir.
MR. GOINGS: Are you able to see them?

MR. ROBINSON: Yeah.

MR. DAVIS: Yeah. Yeah. I gotcha.

BY MR. GOINGS:

Q Can we agree that what appears to be somewhat illegible in the document you're looking at says preinduction VS?

A Yes.

Q What does preinduction VS stand for?

A Preinduction vital signs, is what I would take that to mean.

Q And when are pre-induction vital signs performed?

A Before induction.

Q When was induction on this procedure?

A Do you see a time on there somewhere you want me to look at?

Q I don't, actually. But let me ask you this. When is -- what event occurs for induction to begin?

A When they start the preparation to put the patient to sleep.

Q Okay. So does it -- does this anesthesia record -- oh, wait. It says the continuous anesthesia start time is at 0732. At the top of the page, 0723. Doctor, would the preinduction vital sign, based on this document, reflect that blood pressure for Crystal Goodwin was 160/99?

A It says the preinduction blood pressure is 160/99.

Q Do you have any reason to believe that that is not correct?
A I believe that, when they took that blood pressure, that is correct at that time.
Q What would be the mean arterial pressure with a blood pressure of 160/99?
A Can you turn it back on for me?
MR. DAVIS: Yes, sir.
THE WITNESS: 119.
BY MR. GOINGS:
Q Do you know what the -- her average mean arterial pressure would've been, based on these four blood pressure readings that we've looked at?
A No.
Q Are you aware of any other blood pressure readings in the medical file that you would have had access to, prior to the surgery, other than the four that I've showed you?
A Not right offhand.
Q Where would additional blood pressure readings perhaps be in your charting and medical file of Crystal Goodwin?
A Well, if we had them, they would be in the chart.
Q Okay. Is 160/99 a normal blood pressure?
A That's hypertensive.

Q You would agree that that reflects hypertension?
A Yes.
MR. ROBINSON: Object to the form.
BY MR. GOINGS:
Q Is 152/112 a normal blood pressure?
A I'd say that was hypertensive.
Q Is 156/92 a normal blood pressure?
A I would say that was hypertensive.
Q So, of the four blood pressure readings, at least three reflect a hypertensive state?
A If those were -- if those were accurate.
Q Do you have any reason to believe that they would be inaccurate?
A Yes.
Q What reasons would you have to think that the blood pressure readings, the four that we have shown, would be inaccurate?
A Well, we have reason to believe that they may be artificially high.
Q Why do you believe that they are artificially high?
A Well, one thing, if she has pain, that can cause them to be artificially high. There's the white coat syndrome, which can cause them to be artificially high. And on the preinduction anesthetic, she was taking two blood pressure medicines at home and she said that she

ran out of one so she was only taking half of her blood pressure medicine. So that would definitely make it run high.

Q Any other evidence or reason why you believe these four blood pressure readings are artificially high?

A Those are three good reasons, right there.

Q What is her baseline blood pressure then?

A That was not determined.

Q Not determined by who?

A Anyone.

Q Why wasn't it determined?

A It's not necessary.

Q Why wasn't it necessary?

A Why are you saying it was?

Q Well, in your previous deposition you said that everybody knows what the baseline blood pressure was.

MR. DAVIS: Where in the deposition does it say that?

THE WITNESS: Where do you see that? What line is that?

MR. GOINGS: Lines 6 through 8.

MR. ROBINSON: Object to the form of the last question.

THE WITNESS: That's not what that says.

BY MR. GOINGS:

Q All right. Let's go back to page 28. I'm going to read it out loud. I'm going to read the question and you can read your answer. Let's go to line 15 on page 28. Question -- without objections being read. Question: "Do you agree that, when determining where to keep a patient's blood pressure during anesthesia, the patient's historical baseline blood pressure should be considered?" And your answer?

A That should be, could be considered.

Q That's not what you said. It says -- read what you said.

A "It is considered." Okay. That's what I said.

MR. ROBINSON: Object to the form.

BY MR. GOINGS:

Q Next question. "And it should be considered?" What's your answer?

A I said, "It is considered. I mean, that's just a normal part of the process. Every patient's baseline blood pressure is observed before surgery."

Q Next question: "How far would one go back to look at baseline blood pressure?" What's your answer?

A I don't know.

Q Question: "Whose job is that?" What's your answer?

A "Is it to look at the blood pressure?"

Q "To determine baseline blood pressure." What is your

answer?
A "To determine baseline blood pressure, I think that's something that everybody knows, what the baseline blood pressure is."
Q All right. So --
MR. DAVIS: With all due respect, I know it's a continuing objection but --
MR. GOINGS: Absolutely.
MR. DAVIS: I object to that as not being responsive to any topic that's listed in Rule 30(b)(6).
MR. GOINGS: I respectfully disagree, but I thank you for your objection.
MR. DAVIS: Thank you.
MR. ROBINSON: Same objection.
BY MR. GOINGS:
Q Doctor, what was Crystal Goodwin's baseline blood pressure?
A We don't have one.
Q The blood pressure readings in your medical records and on the date of the surgery do not indicate a range of her baseline blood pressure?
A I think in order to get an accurate baseline blood pressure, you would need several blood pressures over a period of time to formulate what an accurate blood pressure would be. I think just taking three or four

blood pressures, some of which are known to be artificially high, is not an accurate baseline blood pressure.

Q How many months of blood pressure history would you need to obtain the baseline blood pressure?

A That's something that usually her blood pressure -- her primary care doctor, whoever was treating her blood pressure, would determine.

Q Before doing a surgery, an operation, a spinal procedure, you agree that determining a patient's baseline blood pressure should be -- should be obtained; right?

A A baseline blood pressure? As far as an accurate baseline blood pressure to use to treat her blood pressure and that sort of thing, that would be up to her primary care doctor. I think that we had all the information that we needed to safely perform this surgery, as far as blood pressure parameters are concerned.

Q You would agree that all the blood pressure readings you had showed hypertension?

A No.

Q Okay. Which one or ones did not show hypertension?

A This one.

Q So one out of four showed no hypertension?

A Correct.
Q Three out of four did show hypertension?
A They had reasons to be artificially elevated.
Q Are you suggesting that a physician, a competent physician, a physician that looks into patient health first, should disregard three blood pressure readings showing hypertension and regard only one that shows no hypertension?
A I think we take those things under consideration.
Q Did you ask Crystal Goodwin what her blood pressure ran consistently?
A I don't recall.
Q Did you ask Crystal Goodwin what she believed her baseline blood pressure to be?
A No.
Q Did you ask Crystal Goodwin if she believed that she was a person who suffered from high blood pressure or hypertension?
A She said she had hypertension.
Q Did you have any reason to believe that Crystal Goodwin was lying when she said that she was someone who had high blood pressure?
MR. DAVIS: Object to the form of the question.
THE WITNESS: No.
BY MR. GOINGS:

Q Do you -- when I say "you", I mean Midlands Orthopaedics. Does Midlands Orthopaedics or you, individually as a physician, doubt and dispute that Crystal Goodwin's baseline blood pressure was in the level of a patient who suffers from hypertension?
A What?
Q Do you dispute or doubt that Crystal Goodwin's baseline blood pressure is in the level of someone who suffers from high blood pressure or hypertension?
A I think she has hypertension.
Q Okay. If she has hypertension, do you agree that her blood pressure should be kept during a surgery or an operation at a level that's consistent with her baseline hypertensive state?
A I don't believe we've determined an accurate baseline blood pressure.
Q What do you need to determine an accurate baseline blood pressure?
A A series of blood pressures over a period of time.
Q And you have a series of blood pressures over time, don't you?
A We have four.
Q Which -- what do you need to determine baseline blood pressure, if these four are not enough?
A I can't tell you exactly how many. That would depend

on her blood pressure treating physician, I think, to determine what they thought they needed for that.

Q Well, you're the one that is testifying that her blood pressure readings were inadequate to determine a baseline blood pressure?

A For depending on what purpose you are -- you're using.

Q You said that you can't determine what her baseline blood pressure is?

A I believe that her blood pressures that we have here were adequate and satisfactory and safe to proceed with this surgery.

Q Okay. And that's the evidence that you did have. Those are the blood pressure readings that you did have; correct?

A Correct.

Q Based on the blood pressure readings that you did have, what would be her baseline blood pressure?

A You can't determine it.

Q What would you need to determine her baseline blood pressure with the four baseline -- the four blood pressure readings that you had prior to the surgery?

A I don't think you can do it, get an accurate reading with just those four.

Q But you agree that determining baseline blood pressure is important before starting any surgery?

A Knowing what the blood pressure is at the start is important. I wouldn't consider that a normal baseline blood pressure over a period of time.
Q Should a reasonable and prudent physician attempt to determine one's baseline blood pressure before putting them under anesthesia?
A What was that, now?
Q Should a reasonable and prudent physician determine a patient's baseline blood pressure before putting them under anesthesia?
A I don't think that's necessary. I don't think that's standard of care. I think you can determine what it is at the time, but as far as a long-term accurate baseline blood pressure, I don't believe it's the standard of care to do that.
Q In your deposition, you said, quote, everybody knows what the baseline blood pressure is, end quote. My question to you is what was Crystal Goodwin's baseline blood pressure?
A So what's your question?
Q What was Crystal Goodwin's baseline blood pressure?
A I don't have the accurate baseline blood pressure.
Q You said in your deposition under oath that everybody knows what the baseline blood pressure is and, if everybody knows what the baseline blood pressure is,

I'm asking you, as the surgeon who performed this procedure, what was Crystal Goodwin's baseline blood pressure?

MR. ROBINSON: Object to the form.

MR. DAVIS: Object to the form of the question. This is way beyond 30(b(6).

THE WITNESS: I think the meaning of that is that everybody knows how to determine what a baseline blood pressure is.

BY MR. GOINGS:

Q Okay. So, if everybody knows how to determine what a baseline blood pressure is, what did you do to determine or attempt to determine Crystal Goodwin's baseline blood pressure?

MR. ROBINSON: Object to the form.

MR. DAVIS: Same objection.

THE WITNESS: It was not necessary for this surgery to determine her long-term baseline blood pressure. I believe we had enough information with what we had to proceed with the surgery. I don't think that we needed any further information and neither did your expert witness.

BY MR. GOINGS:

Q So you didn't need any further information?

A On blood pressure.

Q On blood pressure because you had four different readings. Did you consider those four different readings in determining what her baseline blood pressure was?
A I didn't determine a baseline blood pressure.
Q Was there someone in the surgery suite, somewhere, someone in the hospital that day whose job that it was to determine Crystal Goodwin's baseline blood pressure?
A I don't think anybody was specifically tasked with that job.
Q But determining baseline blood pressure is something that is to be considered prior to surgery; right?
A It could be. Not necessarily.
Q If someone has a history of hypertension, is it more important to determine that patient's baseline blood pressure than someone who does not suffer from hypertension?
A I don't think it's necessary to determine a long-term ongoing baseline of her blood pressure for this surgery, and neither did your expert witness.
Q What expert witness said that?
A Jones.
Q So you read his deposition?
A Yes.
Q What do you disagree with related to his opinions?

MR. DAVIS: Object to the form of a question. That's way beyond 30(b)(6).

MR. GOINGS: It's not. It's not.

MR. DAVIS: There's no topic here listed that has anything to do with Dr. Jones' opinions.

MR. GOINGS: He's relying on it in his testimony.

MR. DAVIS: Go ahead, subject to my objection.

THE WITNESS: What's your question?

BY MR. GOINGS:

Q Do you disagree with Dr. Jones' opinions?

A On what?

Q His opinions in this case?

MR. ROBINSON: Object to the form.

MR. DAVIS: Same objection.

THE WITNESS: It's been a while since I read them.

BY MR. GOINGS:

Q Well, in answering my previous question, you said, well, Dr. Jones agrees with you on that point.

A I specifically remember what he said about that specific blood pressure and the preinduction blood pressure.

Q Did you see what he said about the fact that the perfusion levels were not kept at the right state during the procedure?

A I saw what he said when he said Dr. Holbrook did not

commit malpractice.
Q You understand that he's not a neurosurgeon?
A He's -- he's counseling you on all of these blood pressure issues.
Q Did you see what Dr. Lustgarten said?
A About what?
Q About you committing malpractice.
A Could you give me a specific example?
Q You read his deposition?
A Yes.
Q Okay. Do you agree or disagree with his opinions?
MR. DAVIS: Objection to the form of the question. This is not a 30(b)(6) question.
THE WITNESS: Which one?
BY MR. GOINGS:
Q How many opinions did you read that he had?
A I read his deposition. I don't remember how many opinions he had.
Q What would be considered Crystal Goodwin's reasonable range for a baseline blood pressure, based on the four readings that you had of Ms. Goodwin?
A I wouldn't base a baseline blood pressure on just four readings.
Q So, sitting here today, you don't know what Crystal Goodwin's baseline blood pressure was?

A A baseline blood pressure, I think, would be determined over a longer length of time, maybe weeks or longer, and we don't have that information. That was not necessary. The doctor who treats her blood pressure didn't think that it was necessary. He thought it was well-controlled enough that he did not need to do that, evidently.

Q Sitting here today, on behalf of Midlands Orthopaedics, Midlands Orthopaedics does not have an opinion or a conclusion as to what Crystal Goodwin's baseline blood pressure was. Is that what I understand?

A I think the blood pressure readings that we had before surgery were adequate to go ahead and proceed with a safe surgery regarding her blood pressure.

Q Before surgery, did you tell anyone what Ms. Goodwin's baseline blood pressure was?

A We had not established a baseline blood pressure.

Q Before surgery, did anyone tell you what Ms. Goodwin's baseline blood pressure was?

A To my knowledge, no baseline blood pressure was established.

Q Were there any problems during the procedure with excess bleeding?

A No.

Q Were there any problems with the wound site at all?

A Like what, specifically?
Q Did you notice any problems during the surgery with the wound site?
A No.
Q Did Ms. Goodwin become hypotensive during the surgery?
A No.
Q What does hypotensive mean?
A Low blood pressure.
Q And what does it mean to become hypotensive during surgery?
A It means that you had hypotension during surgery.
Q So low blood pressure during surgery?
A Yes.
Q Why do you believe she was not hypotensive?
A I looked at the readings. They're all within normal limits.
Q What are the normal limits?
A I believe that all of those pressures are within normal or reasonable blood pressures.
Q What are the normal reasonable blood pressures?
A I can't give you a specific number for a patient. I think that it varies depending on the patient.
Q Is there a particular range?
A I mean, there's maybe a general range. I can't give you a specific number.

Q What's the general range?
A I can't give you a specific number. It's individual for each patient.
Q So blood pressure should be kept individual for each patient.
A I think you should individualize a blood pressure treatment to that patient.
Q And what do you individualize it to?
A What you think is reasonable.
Q And what do you think's reasonable, some of the information you use is what is a patient's past blood pressure?
A You could.
Q What else is used during a surgery to determine the reasonable acceptable range of one's blood pressure?
A What the blood pressure reading is.
Q In order to conclude that Ms. Goodwin was not hypotensive during surgery, you would have to find out and determine what her baseline blood pressure really was; right?
A No.
Q So, if someone runs around a 155/90 or 155/95, what would be the acceptable blood pressure range during a procedure?
MR. ROBINSON: Object to form.

THE WITNESS: I don't have a specific number.
BY MR. GOINGS:
Q If she ran on average of maybe a 145/95, what is the acceptable range to keep one's blood pressure --
A I don't have --
Q -- during surgery?
A I don't have a specific number for you.
Q You said that there is a general range that they should be kept. What is that general range?
A I think for whatever you felt was reasonable for what you were doing in that patient at the time. I can't give you a specific number.
Q What factors do you, as a physician, rely upon in determining a reasonable range?
A How the patient is doing during the surgery.
Q Is it safe to keep a patient who has chronic hypertension in blood pressure ranges that are in the range for a normal person without hypertension?
A It can be.
Q In what situations?
A Well, I don't understand what you're asking.
Q You said it can be. In what situations can that be correct to do?
A I don't understand your question.
Q All right. If a person has hypertension, chronic

hypertension, what scenarios would it be proper, reasonable, customary to keep one's blood pressure at a level above a patient that does not have hypertension during a surgery?

MR. ROBINSON: Object to form.

THE WITNESS: That doesn't make sense to me. Maybe you should ask it another way.

BY MR. GOINGS:

Q If a patient has hypertension, should their blood pressure during surgery be kept at a rate that is within their normal blood pressure readings for that patient?

MR. ROBINSON: Object to the form.

MR. DAVIS: Same objection.

THE WITNESS: You mean should you artificially make them hypertensive if they're hypertensive to start with? Is that what you're asking?

MR. GOINGS: Yes.

THE WITNESS: Not necessarily.

BY MR. GOINGS:

Q Is it reasonable and proper to use normal -- a normal range of one's blood pressure, someone who is not hypertensive, for surgery on a patient who is hypertensive?

MR. ROBINSON: Object to the form.

THE WITNESS: What?
BY MR. GOINGS:
Q What's the -- what's the range, the acceptable range, for blood pressure of a patient who does not have hypertension?
MR. DAVIS: Object to the form.
THE WITNESS: Probably 120/80 has been considered a normal blood pressure.
BY MR. GOINGS:
Q What is the mean arterial pressure for someone who has blood pressure of 120/80?
MR. ROBINSON: Robert, I know you've got a question and I want him to answer it. So can I have just have a running objection on hypotheticals. I just want to reassert them, but I'll just keep it running, rather than say at each question --
MR. GOINGS: I don't think that's hypothetical, but, yes. I'm happy to give you a running objection.
MR. DAVIS: And I'll just --
MR. GOINGS: Same thing.
MR. DAVIS: -- join. Thank you.
THE WITNESS: 93.
BY MR. GOINGS:
Q 93. So, if a patient had hypertension, is it reasonable and acceptable to keep a patient's blood

pressure during surgery at or around a 120/80, which would equate to a 93 for a mean arterial pressure?
A What, now?
Q What doesn't make sense about that question?
A Ask it again.
Q If the patient has hypertension, is it reasonable, acceptable, and proper to keep their blood pressure during surgery in the range of 120/80, which would reflect a mean arterial pressure of 93?
A Could that be satisfactory? Yes.
Q Is it, for patient safety, better to keep a hypertensive patient in the range of their baseline blood pressure during the procedure?
A What are you saying the base -- are you saying keep them at a hypertensive baseline?
Q Yes, sir.
A No. Not necessarily.
Q Why no, not necessarily?
A I don't think that's necessary.
Q Why do you believe that's not necessary?
A Why do you believe it is?
Q I'm not saying it is. I'm asking you. Why do you believe it's not necessary?
A Based on my experience.
Q Do you have any medical literature that supports that

opinion?
A Supports what?
Q Your opinion that a hypertensive patient can and should and is proper to have their blood pressure during surgery in the range of someone who's not hypertensive?
A Well, I think the normal range, I think, in some of the recent articles I've read was like keep a mean arterial pressure of 80 to 90. And I believe one of them said that normal above potentials were consistent with a mean pressure of 60.
Q What articles are you referring to?
A The ones that you gave to your expert witness.
Q Which ones are those?
A The ones on intraoperative monitoring and anesthesia.
Q Where are they published from?
A I don't know. You have them.
Q Did you read those reports and studies?
A I read the articles.
Q Okay. Are those articles published in a medical journal?
A You have them.
Q Are they published in a medical journal?
A I believe so.
Q And do they represent a published article on the subject of medicine?

A They're published.
Q Okay. Are they published in an acceptable and reliable authority?
MR. DAVIS: Objection to the form of the question.
THE WITNESS: You gave them to me. You must have thought they were okay or you wouldn't have given them to me.
BY MR. GOINGS:
Q I'm asking you. Not me.
MR. DAVIS: Hold on just right now, right now, Robert.
MR. GOINGS: What?
MR. DAVIS: Your tone --
MR. GOINGS: My tone -- there's nothing wrong with my tone.
MR. DAVIS: Yeah, it is. It's getting loud and argumentative.
MR. GOINGS: No, it's not.
MR. DAVIS: Yes, it is.
MR. GOINGS: Actually, it's not.
MR. DAVIS: This is on video, so we know it is.
MR. GOINGS: Your tone is getting loud and argumentative with me.
MR. DAVIS: You don't need and you cannot --
MR. GOINGS: And you're pointing at me. You don't

have to do all that. I'm asking him ---

MR. DAVIS: You cannot talk to this witness, my client, or any witness at a deposition, 30(b)(6) or otherwise, in an argumentative tone, and I object to that.

MR. GOINGS: Thankfully -- thankfully, it's on video.

MR. DAVIS: That's exactly right. My whole point.

BY MR. GOINGS:

Q All right, Doctor. The question --

MR. ROBINSON: I'd just like to make an objection to badgering witness, as well.

MR. GOINGS: Thank you.

BY MR. GOINGS:

Q The question is, to you, Doctor, is the articles that you read -- are they from a medical journal that is deemed to be an acceptable or reliable authority?

MR. ROBINSON: Object to the form.

MR. DAVIS: Objection.

THE WITNESS: Would you like to take a break and try and compose yourself?

BY MR. GOINGS:

Q I'm going to ask you the question again.

A I take that as a no.

Q Is the articles that you reviewed, are they published

in a medical journal that is considered acceptable or reliable authority?

A Well, evidently you thought they were because they're your articles.

Q Now, I didn't author those articles, did I?

A No. I don't think so.

Q Physicians authored those articles; right?

A Probably.

Q My question, again, and let me see if you can answer this, is the articles that you read that were in the medical journals, are they written in a journal or a published article that is of acceptable or reliable authority?

A I think they're acceptable or you wouldn't have given them to your witness, would you?

Q You, though, as a physician, do you consider the articles that you read, that were provided to experts in this case, to be acceptable or reliable authority?

A You thought they were.

MR. ROBINSON: Object to the form.

BY MR. GOINGS:

Q So I've asked you this question multiple times. I understand that you're refusing to answer the question.

A No.

Q And I want you to -- listen --

A I have not authenticated the articles.
Q I want you to answer the question, not ask a question back to me. I've asked it now 10 times, almost. I need an answer. I'm not going to ask it again. If I have to ask it again, I'm going to ask the court to compel you to answer it. I'm going to ask the question again and I would like an answer from you. Doctor, do you agree that the medical journals that you have read and reviewed in this case that were provided to the experts, do you believe that those medical journals and published articles are of acceptable or reliable authority?
MR. ROBINSON: Object to the form.
THE WITNESS: I have not researched the reliability of those articles, myself.
BY MR. GOINGS:
Q Okay. Do you disagree with the articles as being published in peer-reviewed scholarly literature about medicine?
A I don't know if they were peer-reviewed or not.
Q You've testified that Ms. Goodwin was not hypotensive; correct?
A Correct.
Q All right. In order to determine if a patient is hypotensive, is the -- do you have to determine what

the baseline blood pressure is of that patient, in order to determine if someone is actually hypotensive or not?

A No.

Q And why is that?

A I don't think it's necessary.

Q By definition, hypotensive means what?

A Low blood pressure.

Q Okay. And if someone has hypertension, the range of someone with hypertension that becomes hypotensive is different from the range of a normal non-hypertensive person that becomes hypotensive; correct?

A No. Not necessarily.

Q In what range does hypotensive begin?

A That would be an individual thing. I can't give you a specific number.

Q Why would it be individualized?

A Depends on how it affects each individual patient.

Q Is baseline blood pressure one of the factors in consideration to determine hypotensiveness?

A Well, I think you would use other methods to determine hypotensive, the effects of hypotension in the operating room.

Q What methods would you determine or use?

A To determine, I would look at the monitor and see what

the blood pressure was if I needed to do that.
Q What else?
A That would probably be the best way to find out what the blood pressure is.
Q So, to determine if someone is hypotensive, you would look at the monitor, the blood pressure monitor, itself.
A If I wanted to know what their blood pressure was, I would look at the monitor.
Q Well, what are the signs and symptoms of one becoming hypotensive?
A Low blood pressure.
Q If a patient becomes hypotensive during surgery, what is done to correct low blood pressure?
A It depends on the cause of the low blood pressure.
Q What can be done to correct hypotensive state of a patient during surgery?
A Medicines, fluids, blood.
Q You agree with me that there are things that a physician can do during surgery to change a patient's hypotensive state?
A There are things that you can do to make the blood pressure go up or down in surgery as necessary.
Q Medicines, fluid, and blood, those are the three things that can correct a patient who becomes hypotensive

during surgery?
A Those are three things that could affect the blood pressure.
Q Would those three things, one, or a combination of those three things, increase one's blood pressure out of the hypotensive state?
A They could. Or you could use drugs to make it more hypotensive.
Q Ischemia is a known result of prolonged hypotensive -- hypotension; correct? During surgery?
A What?
Q Is ischemia a known result of prolonged hypotensive -- of a prolonged hypotensive state during surgery?
MR. ROBINSON: Object to the form.
THE WITNESS: Not necessarily.
BY MR. GOINGS:
Q Can ischemia be a result of a prolonged hypotensive state during surgery?
MR. ROBINSON: Object to form.
THE WITNESS: If it was low enough and for a long enough period of time, it could.
BY MR. GOINGS:
Q How long and low does it need to be for hypotension -- for a hypotensive state to result in ischemia?
A That would be an individual thing. I can't give you a

number.
Q In Ms. Goodwin's case, how low and how long would her hypotensive state need to exist to result in ischemia?
A I can't give you an exact number.
Q Can you give me a range?
A No.
Q Can anyone give a range?
MR. DAVIS: Object to the form of the question.
THE WITNESS: I think it would be individualized.
BY MR. GOINGS:
Q Okay. And as it relates to the individual of Crystal Goodwin, how low and how long does the blood pressure need to be to result in ischemic changes to the spinal cord or spinal column?
A There's no way to calculate that.
Q What does hypoperfusion mean?
A Low perfusion.
Q Does that result in impaired flow of oxygen-rich blood to the spinal cord?
A Not necessarily.
Q Can hypoperfusion lead to the impairment of oxygen-rich blood to the spinal cord?
A Is it possible in a given situation? Yes.
Q And that is, in fact, a known result of hypoperfusion, isn't it?

A Not necessarily. It could be.
Q When you say not necessarily, explain your answer.
A You could have low blood pressure that had no adverse effect.
Q And you can have low blood pressure and have an adverse effect?
A Yes.
MR. DAVIS: We've been going for over an hour.
MR. GOINGS: Okay.
MR. DAVIS: Can we take a short break?
MR. GOINGS: Sure.
MR. DAVIS: Thank you very much.
(OFF THE RECORD 11:37 A.M. - 11:49 A.M.)
BY MR. GOINGS:
Q Doctor, does Midlands recognize that what might be an adequate and an appropriate blood pressure for one patient may be inadequate and inappropriate for another patient for the same exact procedure?
A I think blood pressures vary depending on the patient.
Q If a patient has a blood pressure of 152/112 and 129/81, 156/92, 160/99, where should the blood pressure for that patient be kept while under anesthesia for a surgery?
A Well, it would -- some of that would depend on whether or not you thought that those were accurate blood

pressures and should you use those solely to base your decisions on.

Q In the medical records that you've reviewed from Midlands Orthopaedics or Prisma Baptist, formerly Palmetto Health Baptist, is there any notations, any reference that the blood pressure readings were inadequate or, excuse me, were not correct or inaccurate?

A I believe all the blood pressures that were recorded during surgery were within normal limits.

Q Right. But the pre-intubation blood pressures from the day of the surgery back weeks and several months, based on those, does Midlands contend that any of those blood pressure results were not accurate?

A I think those were the blood pressures that were taken at that time, but there's reason to believe that several of those were artificially high.

Q Is there any notation on the day of surgery that either you or anyone from the anesthesiology team considered that those blood pressures were artificially high and could not be or should not be considered?

A The pre-operative blood pressure that was high was considered and was felt to be satisfactory and safe to proceed with the surgery.

Q But you never had any communications with Dr. Root or

anyone on the anesthesia staff about what the blood pressure should be set at during this procedure; is that fair?

A That was not necessary.

Q Okay. So you didn't have any of those communications with anesthesiology?

MR. ROBINSON: Object to the form.

THE WITNESS: That was not necessary in this case.

BY MR. GOINGS:

Q Well, why was that not necessary?

A I think this was a standard -- this case was managed in a standard manner.

Q Was Crystal Goodwin a standard patient for this type of procedure?

A I think she was a type of patient that typically has this type of surgery.

Q Does Midlands Orthopaedics agree that the proper way to maintain blood pressure during surgery is to keep it as close as possible to that particular patient's baseline blood pressure?

A I think that's an individual thing.

Q And what individual factors or characteristics should be reviewed to determine proper blood pressure during surgery?

A I think some of it is some of the parameters that they

look at during the surgery.
Q Is some of the parameters to look at before surgery is the patient's history of blood pressure?
A That's considered.
Q What else is considered?
A For high blood pressure?
Q Yes, sir.
A Her blood pressure would be the main thing to consider for hypertension.
Q Anything else considered, other than prior blood pressure readings, in determining what to keep a patient's baseline blood pressure at during a surgery?
A Like what?
Q You said there were factors to consider. Then you said that prior blood pressure was one of those factors. What other factors?
A On how to manage her blood pressure during surgery?
Q Where to keep the blood pressure during surgery.
A I think it should be kept at an adequate level, and I think that was done.
Q What is an adequate level for Crystal Goodwin?
A I can't give you a specific number.
Q Is that important, though, to determine before beginning a surgery like this?
A There's no way to determine a specific number before

surgery.
Q Is it important to maintain blood pressure during surgery as close as possible to that particular patient's baseline blood pressure?
A Not necessarily.
Q Why would that not necessarily be true?
A Well, you might want to make it lower for certain reasons.
Q For this surgery that Crystal had, why would it not be important to maintain the blood pressure in a range during surgery that would be as close as possible to that particular patient's baseline blood pressure?
A I think it should be kept at a reasonable level and it was done.
Q What is a reasonable level, though?
A What her level was was reasonable.
Q And what was that level kept at?
A These levels. These that you see during her -- that are recorded during her surgery. I think those are all reasonable blood pressures.
Q Okay. I understand that you believe that the blood pressure readings during surgery were kept at a reasonable level. My question, though, is, is it important to maintain blood pressure during surgery as close as possible to a particular patient's baseline

blood pressure if that patient has hypertension?
A Not necessarily.
Q Why would that not be true?
A I think that it should still be kept at a reasonable level. I don't think you necessarily need to keep her at a hypertensive level.
Q Does that level that it needs to be kept at, should that level be higher than a person without hypertension?
A Not necessarily.
Q So is it -- is it reasonable and standard to keep a hypertensive patient with a history of hypertension and high blood pressure, at a blood pressure rate that would be standard for someone who does not have hypertension?
A I think it should be kept at a number which is felt to be reasonable for that patient at that particular time.
Q And what did Midlands Orthopaedics and the hospital do to determine what the reasonable blood pressure levels should have been for Crystal Goodwin during the surgery?
A I think the blood pressure readings that we had were adequate to proceed with a safe surgery.
Q What did you do, Doctor, on behalf of Midlands Orthopaedics, to determine a safe intraoperative blood

pressure for Crystal Goodwin during this surgery?
A I looked at the blood pressures that she had preoperatively and I felt that those were satisfactory to proceed safely with the surgery.
Q And you did that when?
A Before the surgery.
Q The day of the surgery?
A I would have seen the others when she was in the hospital. I mean, when she was in the office preoperatively.
Q But you didn't go to Dr. Root and say, "Dr. Root, this patient's got a history of hypertension and the blood pressure readings are in her chart. And it looks like she had a 160/99 here, before we -- before we start. You need to keep the blood pressure higher than you would normally keep it for someone who does not have hypertension"?
A I didn't think she needed to keep it higher than normal.
Q Okay. So you didn't tell Dr. Root she needed to either, did you?
A I didn't think she needed to keep it higher.
Q Okay. But you didn't tell Dr. Root she needed to keep it higher?
MR. ROBINSON: Object to the form.

THE WITNESS: That wasn't necessary.
BY MR. GOINGS:
Q On the date of the surgery, the morning of the surgery, did you tell Dr. Root that she needed to keep the blood pressure higher than where it's normally kept for someone without hypertension?
A So you're asking me should I tell Dr. Root to make a patient hypertensive during the surgery? No. Who would do that?
Q Now, you say I wouldn't tell the doctor to keep someone hypertensive during surgery. Is that the same as keeping someone at their -- at their baseline, even if their baseline is at a hypertensive state?
A It depends on what you felt was best for that particular patient at that time in that situation. And I think the right thing was done for Crystal during this surgery as regarding her blood pressure management.
Q Okay. And before the surgery, you didn't tell Dr. Root, did you, keep the blood pressure higher than it would normally be kept at because she has chronic hypertension?
A I didn't think she needed to be kept higher.
Q I know you didn't -- you don't and didn't think that she needed to be kept higher. But you didn't convey

that information to Dr. Root, did you?
A You're saying that I should convey something to Dr. Root that I didn't want her to do, to tell her to do something that I didn't want her to do?
Q You didn't convey to Dr. Root your thoughts or your impressions as to where to keep blood pressure during this procedure?
A There was no reason to do that.
Q Okay. And because there was no reason to do that, you didn't do that; right?
A She is perfectly capable of managing blood pressure.
Q If mean arterial pressure is not kept at a safe level during surgery, can a patient become permanently injured?
A Crystal's was kept at a safe level throughout her surgery.
Q Okay. But if it wasn't kept at a safe level during surgery, the patient can be permanently injured; correct?
MR. ROBINSON: Object to the form.
MR. DAVIS: Same objection.
MR. BRADLEY: Same objection.
THE WITNESS: It's possible.
BY MR. GOINGS:
Q It's possible?

A Possible.
Q And isn't it true that medical literature and your training and education as a neurosurgeon is consistent with the fact that failing to keep mean arterial pressure at a safe level during surgery for a period of time can result in permanent injury to a patient?
MR. ROBINSON: Object to form.
THE WITNESS: Crystal's was kept at a safe level.
BY MR. GOINGS:
Q I understand you believe Crystal's was, but in a situation when mean arterial pressure is not kept at a safe level during surgery, a patient can be permanently injured; correct?
A If it was not kept at a safe level, it could cause an injury; yes.
Q Okay. And when the mean arterial pressure is kept too low, that can result in a lack of perfusion; right?
A Not necessarily.
Q But it can result in a lack of perfusion, can't it?
A It could.
MR. ROBINSON: Object to the form.
BY MR. GOINGS:
Q If the mean arterial pressure is kept too low, what else could occur as it relates to blood flow, other than a lack of perfusion?

A Well, if it were kept low enough for a long enough period of time, it could have adverse effects.
Q Like what?
A Like it could affect -- it could affect cell function in various body systems.
Q And effect on cell function can result in cell deterioration and death; right?
A If it was bad enough, it could.
Q And tissue death, particularly at the spinal cord, can result in permanent injury, including total paralysis or what some consider to be partial paralysis; right?
A It's possible.
Q When Midlands Orthopaedics has a neurosurgeon in the surgery suite in the room, is that person the most knowledgeable as to neuroscience?
A For that particular patient at that particular time, yes.
Q You testified earlier that you would have had records sent to the hospital before surgery. Do you recall that?
A May have.
Q May have.
A We oftentimes do.
Q In this particular situation with this particular surgery, can you state with certainty that Crystal

Goodwin's records from Midlands Orthopaedics was sent to the hospital before surgery?

A Well, you could look at the hospital records and see if they're there, but I don't have an independent recollection whether they're there or not. I don't remember looking at them.

Q And if they're not in the medical records at the hospital, it's fair to say that they were not sent; right?

MR. DAVIS: Objection to the form of the question.

THE WITNESS: Maybe.

BY MR. GOINGS:

Q Who gives instructions about what to send to the hospital from Midlands Orthopaedics?

A Usually they request -- have a request sheet of what they -- what they want.

Q What is on the request sheet for this type of surgery?

A It would be what they would request, what they would need.

Q So you would only send the records that would be requested?

A Sometimes we send them anyway. I can't remember if they requested them or if we sent some or whether or not they got the office records for this case. I'm not sure.

Q The request sheet, is that a document from the hospital?
A I don't know if they have a specific request sheet or not.
Q Does Midlands just send the records that are requested or does Midlands send the entire chart, the entire record of a patient before surgery?
A Well, they might send what's requested or they might send what they thought was pertinent.
Q Do you really know the answer to the question or are you just speculating?
A For this particular case as to what was actually sent, I don't remember exactly what was sent for this. I mean, you could look in the hospital chart and see.
Q So the best answer as to what was sent in this particular case, you would direct me to the hospital's medical chart?
A It would be easy to determine if it was in their chart or not.
Q Okay. Who decides, though, what gets sent to the hospital? Is that you as a physician that decides that or is that someone else at Midlands Orthopaedics?
A I think, probably the basic information that is sent is probably standard.
Q And what is the basic information that's sent?

A Well, whatever would pertain to whatever particular surgery was being done, most likely. I can't -- I don't remember exactly what was sent in this case.
Q Would a surgery referral form be sent to the hospital from Midlands Orthopaedics?
A What do you mean?
Q A surgery order, a surgery referral form, would that be sent?
A The surgery would be scheduled with the hospital.
Q How does Midlands Orthopaedics go about scheduling surgery at the hospital?
A The hospital has a scheduler.
Q And Midlands would contact that scheduler?
A Probably.
Q And when Midlands Orthopaedics schedules surgery, they have a form known as a surgery order that is sent from Midlands Orthopaedics to the hospital; correct?
A I think that's something like that.
Q Other than a surgery order form, what else is sent by Midlands Orthopaedics to the hospital?
A I'm not sure exactly what all is sent.
Q Who would be the best person from Midlands Orthopaedics to answer those questions?
A Maybe Ann Margret.
Q Okay. How was Ms. Goodwin positioned on the surgery

table?
A Prone.
Q What does that mean?
A She was lying face down.
Q Is this your preferred position for a patient for this type of procedure?
A This is standard for this type of procedure.
Q Is there any particular type of surgery table that was used?
A Regular surgery table.
Q Does a regular surgery table that's used at the hospital for Ms. Goodwin's case, in particular, does it have a name or does it go by anything?
A I don't know of a particular name.
Q It's just a surgery table?
A I mean, I don't have a particular name for its.
Q What was the angle of the table?
A What do you mean, angle?
Q Did the table have an angle to it?
A Well, you can angle it and move it any -- most any kind of direction that you want to.
Q During this procedure, from start to finish, did you angle the table?
A I believe it was flat during this case.
Q Okay. Where would the positioning of the legs be for

Ms. Goodwin?
A Towards the end of the table.
Q What side of the table? The right or the left side, with you looking at the patient?
A It would be on my right side.
Q Okay. And the head, of course, then would be on the left side.
A Most likely, yeah.
Q Okay. Where would her hands be placed during this procedure?
A They would be placed about the head level.
Q About the head level?
A Uh-huh.
Q So straight up or would they be bent in any way?
A Elbows would be bent.
Q In what degree?
A I don't think there's a particular degree, but probably maybe -- well, I can't really give you a degree.
Q 45-degree angle? 90-degree angle?
A I've never really measured it. Maybe something between 45 and 90.
Q Would the arms be at all times actually on the table or positioned partially off the table?
A They would be supported on armrests.
Q And the armrests -- would the armrests be lower in

elevation from the table? Higher in elevation from the table? Or at the same elevation of the table?

A About the same.

Q A little lower or a little higher?

A About the same.

Q Okay. Would she have had a blood pressure monitor on during this procedure?

A Yes.

Q Where would that blood pressure monitor be on her body?

A It's usually on the arm.

Q Right arm or left arm?

A I don't know in this case.

Q Okay. Does it matter which arm?

A I don't think so. Not in this case, that I'm aware of.

Q What part of the arm?

A Usually the upper arm.

Q In between the shoulder and the elbow?

A Shoulder and the elbow. Yes.

Q Okay.

A Although I'm not sure in this particular case, but that's usually where it is.

Q The elbow rests or the armrests, would they come out in a 45 -- I mean, a 90-degree angle so the hands are at or near the same location as the head, or would the hands be away from the head, if that makes any sense?

A They're roughly at the same level of the head, but they're not touching the head. They're out to the sides.
Q But at the same level as the head?
A As far as distance from the floor? Yes. About.
Q You wouldn't know if the position would be -- of the hands would be at a 45-degree angle -- excuse me, of the arms would be at a 45-degree angle or a 90-degree angle, would you?
A Well, I never really measured it. They probably would be something like that (indicating), whatever that angle is.
Q Okay. Do you have a preference card at the hospital?
A Yes.
Q Did you have a preference card at Prisma Baptist?
A Probably.
Q Okay. What was on your preference card for this type of procedure?
A I don't look at the preference card.
Q Well, what are your preferences that you would anticipate to be on your preference card with these types of procedures?
A Well, for what, and I'll tell you.
Q Instrumentation to perform the procedure?
A That's in a standard -- a standard tray that we use for

this particular type of surgery and they pull a tray particular to what type of surgery is going to be done.

Q. Okay. What about the type of sutures to use?

A. Those would be pulled, as well.

Q. Okay. What is your preference for the type of sutures to use, let's say just to close fascia?

A. We use different types. Vicryl oftentimes for fascia.

Q. Okay?

Q. Can you spell that? What'd you say it was?

A. V-i-c-r-y-l, I think.

Q. And that is your preference to close fascia?

A. That's what we usually use.

Q. Okay. Does that dissolve or not dissolve?

A. It dissolves.

Q. All right. What's the purpose of neuromonitoring during a spinal surgery?

A. To monitor the nervous system.

Q. Is neuromonitoring important?

A. It can be.

Q. Why can neuromonitoring be important?

A. Why what?

Q. Why can neuromonitoring be important during a spinal surgery?

A. To assess the status of the nervous system.

Q. Is neuromonitoring designed to promote patient safety

and limit bad outcomes in spinal procedures?
A We use it to try to improve the safety of the surgery.
Q And you would agree that one of the primary objectives of neuromonitoring is to promote patient safety and to limit poor outcomes or unintended outcomes in spinal procedures?
A We use it in order to help try and achieve a good outcome.
Q Okay. Is the purpose of neuromonitoring to detect and limit possible injury to a patient's nervous system during a surgery?
A We do use it for that.
Q And intraoperative neuromonitoring can provide valuable information to you as a surgeon who performs complex spinal procedures; is that correct?
A It can.
Q And the information that you obtain through the intraoperative neuromonitoring is used to prevent and to lessen the degree of injury to a patient during this type of procedure?
A It can be used for that.
Q Okay. What else can it be used for?
A Just general monitoring of the nervous system.
Q And why would the nervous system need to be monitored during a procedure like the one that Crystal Goodwin

had?
A We're operating near the nervous system.
Q Is the purpose of intraoperative neuromonitoring to promote safety for a patient?
A Yes.
Q Has the use of intraoperative neuromonitoring been noted to avert neurological complications involving motor and sensory defects following the spinal surgery?
A Can it do what?
Q Does the use of intraoperative neuromonitoring assist physicians, such as yourself, in averting neurological complications, motor and sensory defects that may arise as a result of spinal surgery?
A It can.
Q And neuromonitoring technology allows the intraoperative assessment of spinal cord function through real-time feedback from sensory tracts, motor tracts, and individual nerve roots; is that right?
A It can.
Q Can it not?
A All depends on what you're using it for.
Q What would intraoperative neuromonitoring be used for in the type of procedure that Crystal Goodwin had?
A We use it primarily to monitor function of the spinal cord.

Q Is it important to monitor the function of the spinal cord during this procedure?
A I don't think it's required, but it's something I chose to do.
Q And why did you choose to use intraoperative neuromonitoring?
A I thought it was an additional level of safety.
Q And it's an additional level of safety that the patient pays for; right?
A The patient pays for the neuromonitoring? I don't know who got billed for that. That's a separate company from the hospital.
Q Okay. Neuromonitoring is not free, though, is it?
A No.
Q And neuromonitoring is not used in all spinal cases, is it?
A No.
Q With you, as a neurosurgeon, how often did you use neuromonitoring in discectomies or laminectomies?
A Discectomies, usually not.
Q What about laminectomies?
A Usually not.
Q Why did you choose to use neuromonitoring for Crystal Goodwin's surgery?
A It was in the thoracic level.

Q For thoracic related surgeries, is neuromonitoring used?
A It is used to sometimes.
Q For you, as a neurosurgeon, how often do you use neuromonitoring for thoracic level surgeries?
A It depends on what kind of surgery I'm doing.
Q Okay. The surgery that Crystal Goodwin -- that you performed on Crystal Goodwin was called what?
A A laminectomy.
Q For thoracic laminectomies, how often do you use or did you use intraoperative neuromonitoring technology?
A I usually did.
Q And why was that?
A An additional level of safety.
Q Is there a reason why you would use that for the thoracic spine, in particular?
A I don't understand that.
Q Does the surgery on the thoracic spine lend itself to the use of neuromonitoring that perhaps other parts of the spine do not?
A You can use neuromonitoring on any part of the spine you want.
Q Why did you choose -- generally use neuromonitoring for thoracic laminectomies?
A An additional level of safety.

Q And why is that?
A To monitor the function of the spinal cord.
Q Is the thoracic level susceptible to injury of the spinal cord when you perform this type of procedure?
A Could it be injured? That's possible.
Q Okay. Can you explain to me why neuromonitoring was particularly used for Crystal Goodwin's thoracic laminectomy?
A I thought it would give an additional level of safety.
Q Safety from what?
A Injury.
Q Okay. What does MEP stand for?
A Motor-evoked potential.
Q What does that mean?
A That means testing the motor-evoked potentials.
Q What does SSEP stand for?
A Somatosensory-evoked potentials.
Q And what does that test for?
A Sensory function.
Q Of what?
A Of whatever you're testing.
Q Does SSEPs monitor the integrity of sensory pathways?
A Some of them; yes.
Q Do you agree that MEPs are substantially more important than SSEPs for monitoring intraoperative spinal cord

function?
A No.
Q Okay. Why is that?
A Because it's not.
Q Okay. Is there any latency with MEPs or SSEPs, or are they both real-time?
A Motor-evoked potentials would be more real-time when they're being run. Somatosensory may have some delay. It has been generally my experience that there's not much of a delay.
Q When you say not much of a delay, how much are we talking about?
A A lot of the cases that I have used it in, is they seem to be almost instantaneous without a delay within a few seconds, has been my general experience, but it may take, depending -- it may take a few minutes.
Q Is there a reason why there would be a latency or delay for SSEPs?
A I think certain drugs and that sort of thing and different conditions of the patient can influence it.
Q And give me an example of that.
A Which one?
Q Drugs or situations related to a patient that could affect it?
A Drugs could affect it. Temperature could affect it.

Q Was there any issues with Crystal Goodwin's temperature during this procedure?
A No.
Q Was there any issues related to Crystal Goodwin's urine output during this procedure?
A I believe Mr. Starnes testified that she had good urine output.
Q Did you see any records that showed that she did not have good urine output?
A I relied on his -- on his opinion.
Q Did you read in the records as it relates to Crystal Goodwin's urine output?
A Which records?
Q The operative records. The records from the hospital related to her urine output during the surgery?
A I didn't monitor the urine output.
Q Okay. Have you since seen any urine output records related to Crystal Goodwin during the surgery?
A Just the operative record.
Q Okay. What does the operative record show as it relates to her urine output?
A Where is that?
Q You've seen it on the operative record?
A I thought it was on there somewhere. I haven't looked at it lately.

Q Would it be on the anesthesia record? Is anesthesia the -- the team that monitors urine output?
A Anesthesia would monitor urine output.
Q Do you see any urine output notations on the anesthesia records that's in front of you that's been previously marked as Exhibit 3 to your prior deposition?
A Can you show me where they are? I don't -- I'm looking all over.
Q At the bottom, it says urine dash interval slash total. Do you see that?
A Yes.
Q Can you read what's listed on these pages? And for the record, it would be Prisma Baptist -- Prisma Health Baptist 756 through Prisma Health Baptist 757. Have you had the opportunity to review the urine levels as reflected on the --
A I see that line.
Q Okay. And what is it?
A Where are you looking?
Q On the urine line.
A Well, there's slashes, and then it looks like there's a 40.
Q Okay.
A Maybe it has a slash in it. I can't tell.
Q What does a slash mean?

A I don't know.
Q Have you seen records before like this that have slashes?
A I've seen records with slashes.
Q What do they mean to you, as a clinician?
A In this particular thing, I'm not sure exactly what that means with the slash. I'd have to ask them.
Q Does it show that the total urine output was 80?
A Let's see. Urine interval total. The last number I see is 80.
Q Okay. Do you see any other number higher than 80 under the urine output level?
A No.
Q Is there a rule of thumb as to how much urine output is expected per kilogram per hour?
A That's sort of out of my area of expertise.
Q Would you expect a patient to have a greater urine output for the length of the surgery than what's listed as 80?
A I would expect them to have an adequate output of urine and Mr. Starnes said she had a good output of urine.
Q And what would -- how long was the surgery?
A It looks like from about 7:30 to -- well, I think the surgery was over at 11 and anesthesia was over at, maybe, 11:30.

Q During this period of time, what would you expect to be a reasonable urine output?
A The specific amount of urine output for that surgery for that length of time is sort of out of my area of expertise.
Q Okay.
A I'll rely on Mr. Starnes and he said that it was -- that it was a good urine output.
Q Did he tell you that during the procedure?
A Yeah. I think that was in his deposition.
Q So he told you during the procedure that the urine output was good?
A I think I read that in his deposition. As best as I can recall, I think so.
Q Okay. So, in this case, he testified that he believed that the urine output was good?
A I think I saw that in his deposition.
Q Okay. But he didn't tell you during the actual procedure in 2016, when you were operating on Crystal Goodwin, that the urine output was good, did he?
A He wouldn't need to do that.
Q Okay. And so you or anyone on behalf of Midlands Orthopaedics, you don't have an opinion as to proper urine output. Is that what I'm hearing you say?
A I think urine output needs to be adequate. I can't

give you an exact number as to what that is. He says it was good and I've worked with him for years and I trust him. I trust him.

Q So you don't know what good urine output would be for this procedure?

A I can't give you an exact -- what we do you want, an exact amount?

Q Do you have range that would be good?

A No.

Q So you don't have a range and you don't have an amount?

A Correct.

Q Okay. What is Rocuronium? And I don't know if I am pronouncing that correct. Did I?

A That's a drug, a muscle relaxer.

Q What type of drug is it? I know you said muscle relaxer, but can you be more specific from a pharmacological standpoint?

A It relaxes the muscles.

Q Okay.

A It's commonly given in anesthesia procedures.

Q And is it commonly given in this type of procedure?

A In a laminectomy?

Q Yes, sir.

A Many laminectomies are probably given that. I don't know. I can't tell you exactly. They might use

different drugs for different cases. That's sort of up to anesthesia. I don't tell them what drugs to use in most cases.

Q How long does Rocuronium generally last in a patient?

A I don't know.

Q Is it considered to be a long-acting drug or more of a short-acting paralytic?

A It's probably medium to long, but I'm not sure exactly how you would characterize that. Anesthesia would be better to answer that.

Q Did you know that they were giving Crystal Goodwin a drug called Rocuronium?

A Later on in the case I knew that they were going to give her a muscle relaxer.

Q For what purpose?

A To relax her muscles.

Q Is there a reason why or an event that occurred that y'all needed to relax her muscles?

A Yeah. She was having trouble with the endotracheal tube and they felt that it would be safer in order to give her that drug to relax those muscles so that it didn't obstruct her airway.

Q Do you know the spelling of rocuronium?

A No.

Q Am I pronouncing it right, though?

A Close.
Q How would you pronounce it?
A Well, vecuronium. Is this the one that starts with a V? Vecuronium.
Q Okay. I thought it started with an R, but --
A Well, maybe it does. There are several different ones and they're very close.
Q If you would have known that they were giving this Rocuronium drug, would you have requested a more shorter-acting agent or drug?

MR. ROBINSON: Object to the form.

MR. DAVIS: Same objection.

THE WITNESS: I did know that they were giving her a muscle relaxer. They asked me was it okay. I thought it was safe and in her best interest to give her that at this time and so I told them it was okay.

BY MR. GOINGS:
Q Did the muscle relaxant that was provided to her affect the neuromonitoring that was being performed?
A It affected the motor-evoked potentials.
Q Okay. So it only affected one portion of the neuromonitoring?
A Correct.
Q When that drug was being provided, Rocuronium, did you know that that would take out MEP monitoring?

A Yes.
Q Okay. And Rocuronium, or however we spell it or say it, you knew when they were giving it to them that that would limit the ability to perform neuromonitoring, specifically as it related to MEPs?
A Yes.
Q Okay. Was any drug or agent given to Ms. Goodwin during the procedure that would have affected SSEPs?
A No. Not that I'm aware of.
Q Did any event happen during the surgery procedure that would have affected SSEPs?
A What do you mean?
Q Did any event occur, incident, or anything occur during the procedure that would have affected SSEP readings?
A Yes. We lost the SSEP readings at about 10:03.
Q Okay. Is there anything that would have caused that to be lost that you know of?
A Yes.
Q What was that?
A Stroke in the spinal cord.
Q Okay. Ischemia?
A Yes.
Q Okay. And can you tell us all of the potential causes of a stroke in the spinal cord?
A Well, there are a number of different things that could

cause a stroke.
Q What are those?
A It could be bleeding, infection, inflammation, a vascular reason. Those are some of the things that might cause it.
Q So I'm going to write these down. Bleeding is one cause; correct?
A That could cause it.
Q Infection?
A Could.
Q Vascular, what did you say?
A A vascular etiology. Yes.
Q And a vascular etiology, that would be an ischemic event?
A Circulation. Yes, an ischemic -- could cause an ischemic event. All those things could cause an ischemic event.
Q When you say circulation, are you also including perfusion?
A It could be.
Q Okay. So we have bleeding, infection, a vascular event?
A Right.
Q What else?
A Pressure on the spinal cord could cause that.

Q What else?
A Those are the main ones I can think off right offhand.
Q Was there an issue with bleeding during this procedure?
A No.
Q Was there an issue with infection during this procedure?
A No.
Q Was there an issue with inadequate pressure on the spinal cord during the procedure?
A No.
Q Any other causes of the SSEPs going out that you correspond to an ischemic event? And you used the word stroke. Any other potential causes of this type of event?
A Of a stroke?
Q In the spinal cord. You said bleeding --
A I said stroke in the --
Q -- infection, vascular etiology or vascular event, and pressure on the spinal cord?
A I think those are the main ones.
Q Okay. Of these main ones, which does Midlands Orthopaedic believe to be the most probable cause of Crystal Goodwin's condition?
MR. DAVIS: Object to the form of the question. Go ahead and answer.

THE WITNESS: No definite cause was ever determined.

BY MR. GOINGS:

Q Was an investigation by Midlands ever performed to determine a definite cause?

A I performed an investigation.

Q And what did you do in your investigation as an employee of Midlands Orthopaedics?

A The main investigation involved getting MRI scanning.

Q MRI scanning. And what did the MRI scan reveal to you as a neurosurgeon?

A It showed an area in the spinal cord which was consistent with ischemia or a stroke.

Q And what was that area of the spinal cord?

A About T9 level.

Q T9 level. What vascular components are found in the T9 level?

A Blood vessels that supply the spinal cord.

Q And do those blood vessels have any particular name to them?

A Most of them don't. There's one that comes in at that level called Adamkiewicz is one that sometimes comes in at that level. Most of them are not named.

Q All right. The one that comes in at that level is called what?

A Adamkiewicz, sometimes.
Q Can you spell that for the court reporter.
A No. It starts with an A.
Q I think I can get you the spelling. Would it be spelled A-d-a-m-k-e-i-w-i-c-z (as spelled)?
A Sounds about right.
Q And it's called the artery of the Adamkiewicz. Is that right?
A That's pretty close.
Q Okay. And that's a major supplier of blood to the lower spinal cord?
A Could be.
Q Is there any greater supply of the blood to the lower spinal cord, other than the Artery of Adamkiewicz?
A Well, it might not be that one. There might be another dominant artery in that area.
Q What would that artery be?
A A radicular artery.
Q You mentioned there was some type of stroke in the spinal cord at this area of, in particular, the T9; correct?
A Yes.
Q Was that -- and you believe that was an ischemic event?
A Yes.
Q Okay. What are the causes of ischemic events in that

area?
A I think I just went over all of those.
Q Could lack of blood supply through that area cause the ischemic event?
A It could.
Q You can't rule that out?
A No. Any one of those things that I named could cause that.
Q And you have no opinion as to which of those four that you named could be the most probable cause?
MR. DAVIS: Object to the form of the question.
THE WITNESS: In the end, all strokes are vascular in nature, but I can't tell you exactly what the cause of this was. No cause was ever demonstrated. Even on the very sensitive MRI scan did not demonstrate a cause for why this stroke occurred.
BY MR. GOINGS:
Q Would you expect the MRI to demonstrate a cause?
A If there was one demonstratable, I would.
Q Wouldn't the MRI just show you the result of an ischemic event, rather than the cause of an ischemic event?
A Oftentimes it will show the cause.
Q This MRI didn't show a clot or a thrombus, did it?
A No.

Q And if a clot or a thrombus caused it, you would expect a clot or a thrombus to -- or evidence of one, to be shown on the MRI, wouldn't you?
A I would expect that.
Q Okay. If --
A But not necessarily.
Q -- the tissue just deteriorated and got damaged --
MR. DAVIS: Excuse me just a minute. He was still talking when you started talking.
MR. GOINGS: I'm sorry.
MR. DAVIS: I just wanted to be sure the court reporter heard the end of his answer.
THE WITNESS: I said --
MR. GOINGS: Thank you. I'm sorry for that.
THE WITNESS: I said it could -- I said it could show those things but not necessarily would show all of those.
BY MR. GOINGS:
Q Okay. So not necessarily would this sensitive MRI that was performed show the cause?
A Correct.
Q Okay. And if the tissue became damaged, just due to lack of perfusion, you would expect that to be shown on the MRI, that it was caused by tissue damage due to lack of perfusion, wouldn't you?

MR. ROBINSON: Object to the form.
THE WITNESS: It did -- it did show tissue damage.
BY MR. GOINGS:
Q Okay. So tissue damage was shown?
A On the MRI scan. It would show the stroke. That's what was shown.
Q But a clot, or evidence there of a clot or thrombus, was not shown?
A Correct.
Q Okay. Would a stroke look differently? Would a stroke look different on an MRI than a perfusion injury? Would a stroke look different on an MRI than just a simple perfusion injury? Would it look different on it?
A Well, even though the MRI showed changes that were consistent with a stroke, it did not demonstrate a specific cause for that stroke.
Q Okay. If it was caused due to perfusion, a perfusion related injury, would that be revealed on the MRI that it was based on a perfusion injury?
A It could.
Q What would show? What would it look like?
A It depends on what was the cause of the lack of perfusion.
Q If the lack of perfusion was a lack of blood supply or

blood flow through that area.
A It depends on what caused the lack of blood flow.
Q Okay. Lack of blood supply, lack of blood moving through that area.
A Well, it would depend on if there was a demonstratable cause for why it was not flowing through that area.
Q The MRI -- let's see here. So you said the MRI did not show a cause?
A Correct.
Q Would you expect the MRI to always show a cause?
A No.
Q Is it more likely than not that MRI is not going to always show a cause; it will instead show the effect?
MR. ROBINSON: Object to form.
THE WITNESS: Sometimes it shows just the effect. Sometimes it shows the cause and effect. That's one reason to do the study, is to find out if it does show a cause.
BY MR. GOINGS:
Q What were you looking for on the MRI study that would have shown you a cause of the ischemia to the T9 level?
A I was looking for a reason that she would have had ischemia.
Q Okay. And what were you looking for?
A Such as a blood clot. Such as pressure.

Q And you didn't see any of those on the MRI?
A We did not see a cause for this stroke on the MRI scan.
Q Okay. And even though the cause is not shown on the MRI, an injury based on lack of perfusion cannot be ruled out based on the MRI?
A The MRI did not demonstrate a cause. So you can't say that, you know, whatever was the cause of this was not demonstrated on MRI scanning.
Q But the MRI scanning did reveal that there was no pressure, thrombus, or clot?
A We didn't see anything like that on the MRI scan.
Q And if it was caused by pressure, thrombus, or clot, you would have expected to see that on the MRI?
A Not necessarily, but usually.
MR. GOINGS: Counsel, I said I would give -- take a break about an hour into once we start, and I think we're there. Do you want to take a break now, keep going? Do you want to have lunch? Tell me what y'all want to do. We can go off the record.
(OFF THE RECORD 12:42 P.M. - 1:36 P.M.)
(MARKED FOR IDENTIFICATION, PLAINTIFF'S EXHIBIT NUMBER 2, MISCELLANEOUS DOCUMENTS, ATTACHED.)
BY MR. GOINGS:
Q Dr. Holbrook, we've marked as Exhibit 2 to your deposition the packet of exhibits that were used in

your previous deposition in May of 2020. We'll mark that as Exhibit 2, and you actually have a copy of that right in front of you. Okay?

A Okay.

Q Do you recall when I was asking you questions about the position of Ms. Goodwin during the procedure?

A Yes.

Q And during our break, I was able to find a picture on the internet. And I can show counsel and then maybe we can print it off and make it an exhibit if we need to. I'm going to show you this picture after I show it to your counsel, and just ask you, is this the type of position that Ms. Goodwin would've been in. If it's not, you can tell me what's wrong or what needs to be corrected.

MR. GOINGS: Do you see that?

MR. DAVIS: Yeah.

MR. ROBINSON: Did you produce that picture in discovery?

MR. GOINGS: We'll produce it to you right now.

MR. ROBINSON: Just note my objection.

MR. GOINGS: Okay. Is there a way that we can -- I can email it to someone here and we can print it off and just have an exhibit?

MR. DAVIS: She left at 11. Otherwise, yeah.

MR. GOINGS: Okay. We can go off the record

(OFF THE RECORD 1:37 P.M. - 1:37 P.M.)

(MARKED FOR IDENTIFICATION, PLAINTIFF'S EXHIBIT NUMBER 3, PHOTOGRAPH, ATTACHED.)

BY MR. GOINGS:

Q All right. Back on the record. I'm going to show you what is going to be marked as Exhibit 3, which is a photograph of a patient appearing to be on an operating table. My question is would this be the position that Ms. Goodwin was in during the surgery that you performed on her in July of 2016?

A Similar.

Q Similar?

A Uh-huh.

Q Is that a yes?

A Similar. Yes.

Q Okay. What, in Exhibit 3, would be different from the position that Ms. Goodwin would have been in at the time of the surgery?

A I think some of the positioning with the legs may not have been quite like that. The arms probably would've been -- the hands would've been a little higher.

Q All right. Would the padding under the torso area, chest area of the patient, would that be there?

A I can't tell if that's solid all the way through or

not. She did have chest rolls, but I can't -- I don't know what that -- I can only see that from the side, so I don't know what the rest of it looks like.

Q Would the chest rolls that Ms. Goodwin have been on top of, would they have been solid or would they have an indention in them?

A They would just be a roll. One -- one on one side and one on the other side, which would allow the chest and abdomen to hang free.

Q Would it have elevated the chest and the abdomen as shown in this photograph?

A It would have raised it off the table.

Q Okay. You said that the legs may be in a different position. What position would you --

A Well, it might not have been -- probably would have been a little more padding under the knees and maybe not -- the feet may not have been quite that high.

Q Okay. What about the arms?

A The arms look like they would've been a little bit higher. The hands would probably have been a little higher than those.

Q The hands, themselves, would be higher?

A Well, the hands and the arms.

Q Okay. In what manner would they be higher?

A Closer towards the ceiling than the floor.

Q Would there be any padding that Ms. Goodwin's face would be cradled in?
A She would have padding.
Q And what type of padding would that have been?
A Probably foam.
Q Would it -- would the padding have raised her head off of the table?
A Yes.
Q How thick is the chest roll padding and the facial padding?
A I don't know.
Q Greater than six inches or less than six inches?
A Well, I don't know. I'd have to guess. I haven't really measured it.
Q Okay. Doctor, I'm going to hand you what is going to be marked as Exhibits 4 and 5 to the deposition.

(MARKED FOR IDENTIFICATION, PLAINTIFF'S EXHIBIT NUMBER 4, ARTICLE, ATTACHED; AND PLAINTIFF'S EXHIBIT NUMBER 5, ARTICLE, ATTACHED.)

BY MR. GOINGS:
Q Exhibit 4 is a document appearing from the Seminars in Spine Surgery entitled Management of Intraoperative Neuromonitoring Signal Loss. Have you seen this document before?
A I don't know.

MR. DAVIS: Let me just -- since we took a break, I just need to have my continuing objection noted to this line of questioning as being outside of the topics designated for this witness.

MR. GOINGS: And I disagree with your objection.

MR. DAVIS: I assume you're going to disagree with all of my objections, but I understand. Thank you for letting me continue.

MR. GOINGS: Which basically --

MR. DAVIS: And respectfully submitted.

MR. ROBINSON: I anticipate an objection to both Exhibit 4 and the next exhibit, but I'll just put them on the record at the same time.

MR. GOINGS: Okay. Cool. I'm going to mark and hand it to the witness.

BY MR. GOINGS:

Q The document marked as Exhibit 5, appearing from Contemporary Spinal Surgery, Volume 13, Number 8, August 2012, entitled Intraoperative Neuromonitoring in Spine Surgery.

MR. ROBINSON: Has Exhibit 4 and 5 been produced in discovery?

MR. GOINGS: It has.

MR. DAVIS: Is that 4 and 5?

MR. GOINGS: Yeah.

MR. DAVIS: 4 and 5?
MR. GOINGS: Yes, sir.
MR. DAVIS: Okay.
BY MR. GOINGS:
Q Have you had the opportunity to review Exhibit 4, entitled Management of Intraoperative Neuromonitoring Signal Loss?
A Not all of it. Some of it.
Q Is this the first day you've ever seen this document?
A Is this one of the ones that you gave to your expert witness?
Q Do you believe that I gave a document to the expert witness entitled Management of Intraoperative Neuromonitoring Signal Loss?
A I think he said that you all gave him some of the articles that were in there. I don't know if you gave all of them to him or some of them. I can't remember.
Q Have you seen this document before today?
A If it's one that you gave your expert that he provided to us, then, yes.
Q Do you recall reading this document at any time before today?
A I think -- I think this is one of them.
Q Okay. Are you familiar with this journal? Seminars in Spine Surgery?

A I don't believe I've seen that particular one.
Q Does Midlands Orthopaedics subscribe to medical journals or an online database of medical journals?
A I think that's more an individual thing.
Q So Midlands Orthopaedics does not have a subscription for its neurosurgeons on spinal medicine?
A I did -- not for me, they didn't. I subscribed to the things that I wanted to get.
Q What did you subscribe to?
A Well, I'm a member of the American Association of Neurological Surgeons and the Congress. And they put out reviewed journals, you know, scientific journals every month.
Q What are the names of those reviewed or scientific journals that they put out each month?
A I think Neurosurgery and Journal of Neurosurgery.
Q So, there's two?
A Those are two. I mean, there's others, but those are the two that I get.
Q Any others?
A I think those are the only journals that I get right now.
Q Have you ever seen the medical journal that's in front of you, in particular, entitled Seminars in Spinal Surgery?

A I think this is one of the articles that you gave your expert and I looked at it, you know, when we got it.
Q Okay. And did you have any thoughts or impressions upon reading this article when you first looked at it?
A I just read it.
Q Okay. Would you agree that this is a published article on the subject of spinal medicine?
A It looks like it.
Q Would you agree that this is a published article on the topic of spine surgery?
A It looks like it's on the topic of management of intraoperative neuromonitoring signal loss.
Q Are you familiar with any online databases that publish peer-reviewed scholarly literature about medicine?
A Like what?
Q Are you familiar with any databases? Online databases?
A I think our association has websites that have information on them.
Q Okay. And what are those websites?
A Well, there's the American Association of Neurological Surgeons and the Congress of Neurosurgery.
Q Is it the position of Midlands Orthopaedics that this article published in Seminars of Spine Surgery is not a reliable authority in this subject matter?
MR. DAVIS: I'm going to object to this whole line

of questions. I'm going to instruct him not to answer any more questions about medical articles that's not covered anywhere, unless you can persuade me which topic that he's designated to testify about that this relates to.

MR. GOINGS: It relates to multiple topics.

MR. DAVIS: Well, tell me about it.

MR. GOINGS: Okay. Do you have the notice in front of you?

MR. DAVIS: Yes, sir.

MR. GOINGS: It relates to number three. It relates to number five. It relates to number six, seven, eight. It relates to number nine. It relates to number ten.

MR. DAVIS: How?

MR. GOINGS: Well, for example, number 10 says, "The purpose of neuromonitoring and the standard of care known to Midlands Orthopaedics related to neuromonitoring for Crystal Goodwin during the surgery on July 28, 2016." That's one. There's also number nine about the standard of care for performing a decompressive thoracic laminectomy. I would -- I would --

MR. DAVIS: Okay.

MR. GOINGS: -- offer this to allow me to ask the

question subject to your objections.

MR. DAVIS: Sure, I understand that. But the reason I'm objecting is --

MR. GOINGS: I understand your objection is it's outside the scope. I disagree.

MR. DAVIS: Yeah, it's -- okay. Well, there's nothing here that says anything that you're going to ask this 30(b)(6) witness about medical articles.

MR. GOINGS: Okay. I disagree, but we'll continue.

MR. DAVIS: Well, where does it say anything about medical articles? because I missed that.

MR. GOINGS: I'm not going to get into a disagreement with you on this.

MR. DAVIS: Okay. We'll agree to disagree.

MR. GOINGS: All right, Doctor. Madam Court Reporter, would you read back the question I asked before the objection was interposed?

THE COURT REPORTER: Is it the position that Midlands Orthopaedics that this article published in Seminars of Spine Surgery is not a reliable authority in this subject matter?

MR. DAVIS: I'll withdraw my instruction because, obviously, we're going to be having to take this up or whatever.

MR. GOINGS: Okay. I understand.
MR. DAVIS: How to save time, maybe, in the future I'll allow him to answer my question subject to my objection.
MR. GOINGS: Fair enough.
MR. DAVIS: Thank you.
MR. ROBINSON: Same objection.
THE WITNESS: So, answer or not?
MR. GOINGS: Yes, sir.
THE WITNESS: So what's your question?
MR. GOINGS: Would you read the question back to the witness, please.
THE COURT REPORTER: Is it the position of Midlands Orthopaedics that this article published in Seminar of Spine surgery is not a reliable authority for the subject matter?
MR. GOINGS: Did you understand and hear the question?
THE WITNESS: Yes. I haven't independently verified this article.
BY MR. GOINGS:
Q Has anyone from Midlands Orthopaedics verified this article?
A Not that I know of.
Q What do you or Midlands Orthopaedics need to do to

verify this article?
A I don't know how to do that.
Q Well, you said you haven't independently verified it. My question is what do you need to do to satisfy yourself that it's independently verified?
A I don't know how to -- to verify a scientific article. I've never done that.
Q Have you had an opportunity to read this article?
A A little bit of it. I mean, you just gave it to me.
Q Well, you had it before today's deposition.
A Well, that was in the past. I haven't read it lately.
Q Well, I'm going to give you time to read the article. It's, essentially, two and a half pages, three pages, depending on how you look at it. And then I'll just have questions for you related to this article.
A Do you want me to go ahead and read the article now?
Q Yes, sir.
A Okay. So what's your question?
Q Doctor, have you had the opportunity to read this article in its entirety?
A I read it.
Q Does this article discuss the management of intraoperative neuromonitoring signal loss during spinal surgery?
A Yes.

Q Ms. Goodwin's surgery dealt with intraoperative neuromonitoring signal loss; correct?
A Yes.
Q Do you disagree with the conclusions reached in this article?
A Let me see what the conclusion was.
MR. ROBINSON: Object to form.
THE WITNESS: Well, let's see. It says, "Intraoperative neuromonitoring is a vital component in providing safe and effective care to patients undergoing spine surgery." Yes. "Appropriately addressing neuromonitoring signal changes in a systemic and timely manner can help avert potentially devastating outcomes. The five-step algorithm described herein can be used for troubleshooting neuromonitoring signal changes in adults and children undergoing surgery." It says it can be used. It doesn't say it must be. Okay. What's your question?
BY MR. GOINGS:
Q Do you disagree with the conclusions --
MR. ROBINSON: Object to form.
BY MR. GOINGS:
Q -- reached in this article?
A I think the conclusions are okay, but I probably would not do exactly what they have outlined.

Q Okay. Are the conclusions, the three sentences in the conclusion section, is there anything, to your knowledge, incorrect or wrong?
A Well, I think those are mainly as a guideline, a suggestion of things that you may do. I don't think that you can apply that to every patient.
Q So this says, "The five-step algorithm described herein can be used." And you commented that it doesn't say it must be used. Do you see that?
A I see that.
Q Are you aware of any other process, step, algorithm, or guidance, on what to do related to the management of intraoperative neuromonitoring signal loss for spine surgery?
A Well, I go by my experience and what I think is best for that particular patient in that situation at that time.
Q Okay. The first -- so I understand that you don't believe, and correct me if I'm wrong, that the five steps outlined in this article should be followed.
A I think they're a guideline, and I think that each patient's care should be individualized. I don't think you have to rigidly go by this stepwise algorithm here.
Q Okay. Does this article suggest that you must go rigidly by this stepwise algorithm?

A No. It says that you can use it.
Q Okay. Are you aware of any articles, treatises, opinions, peer review articles of any nature that deal with what to do during a surgery when neuromonitoring signal loss occurs?
A Well, when there's an issue with surgery, I rely on my judgment and experience as to what I think is best for that individual patient.
Q The introduction to this article, will you read it, sir?
A "Intraoperative neuromonitoring is an important tool for providing safe and effective care to patients undergoing spine surgery. Combined neuromonitoring modes including transcranial motor-evoked potentials and somatosensory-evoked potentials are frequently used. Loss of neuromonitoring signals can be associated with potentially devastating consequences. This review discusses management of intraoperative neuromonitoring signal loss during spine surgery. The authors describe a stepwise algorithm for troubleshooting signal loss."

MR. ROBINSON: Object to the form of the last question.

BY MR. GOINGS:
Q That was the abstract you read.

A That was the abstract.
Q All right. Read under number one, introduction?
MR. ROBINSON: Object to form.
MR. DAVIS: Really? I'm going to object. You had him read the whole article. He's read it. We're just going to read the whole thing into the record? I mean, I'm just -- where is this going? What has this got to do with the 30(b)(6)?
MR. GOINGS: Well, you can object to the form of the question, but the speaking objections, respectfully, I believe, are improper. He read the --
MR. DAVIS: Tell me why reading this article in the record advances your 30(b)(6) deposition.
MR. GOINGS: He read the wrong sentence and paragraph. And I'm directing him to the correct one. I want him to read the correct one and I want to ask him questions about it. I'm taking the deposition, and you're sitting here.
MR. DAVIS: Okay. He's already read the whole article.
MR. GOINGS: No, he didn't. I want him to read --
MR. DAVIS: He read the whole article in our break.
MR. GOINGS: I want him to read it out loud and then I have some questions to follow.

MR. ROBINSON: Object to the form.
MR. DAVIS: Object to the form.
MR. GOINGS: All right.
BY MR. GOINGS:
Q Dr. Holbrook, under introduction, not abstract, but introduction, please read that out loud, sir.
MR. ROBINSON: Object to the form.
THE WITNESS: You want me to read it?
MR. DAVIS: Yes, sir. Go ahead.
THE WITNESS: "Loss of neuromonitoring signals can be associated with potentially devastating consequences, yet it may also occur because of technical issues that result in false positive findings. The objective of this review is to discuss the management of intraoperative neuromonitoring signal loss during spine surgery."
BY MR. GOINGS:
Q Doctor, do you agree with the statement that the loss of neuromonitoring signal can be associated with potentially devastating consequences, yet may also occur because of technical issues that result in false positive findings?
MR. DAVIS: Object to the form.
MR. ROBINSON: Object to the form.
MR. DAVIS: You can go ahead and answer.

THE WITNESS: Yes.
BY MR. GOINGS:
Q Okay. This article states on page 2 that, "The criteria for determining a positive signal change that prompts a surgeon's notification are frequently institutional dependent." Do you see that?
A Yes.
Q Okay. Within Midlands Orthopaedics, what is the criteria for determining a positive signal change that should prompt a surgeon of this issue?
A I don't think Midlands has a protocol for that.
Q You, as a neurosurgeon, when do you want to be notified of a positive signal change in neuromonitoring?
A When there's a significant change from the baseline.
Q And what would be deemed to be a significant change from baseline?
A A 50 percent amplitude loss is often used for that.
Q And that's what the article says; correct?
A Uh-huh.
Q Is that a yes?
A That's a yes.
Q Is that also for you, for your purposes in being notified of a signal change, do you want to be notified when the threshold changes at least to 50 percent amplitude loss?

A Well, standard for the technicians is to notify the surgeon when there's a greater than 50 percent loss.
Q Okay. And what was the percentage of loss for Crystal Goodwin during this surgery?
A Hundred percent.
Q And is that an issue that you believe you should have been notified about?
A I was notified.
Q You were notified about the signal loss?
A Yes.
Q Were you notified that it was a hundred percent signal loss?
A Yes.
Q This article states that, quote, it is essential to develop a stepwise troubleshooting algorithm to manage problems effectively. My question is did you ever develop a stepwise troubleshooting algorithm that you used to manage signal loss effectively?
A I think troubleshooting algorithms are good guidelines, but I think every individual patient situation needs to be individualized, and that's what I do.
Q Okay. And you agree that the five steps in this article is at least a good guideline?
A They're suggestions.
Q Okay. Did Midlands Orthopaedics set forth or set up or

develop any troubleshooting guidelines for what to do when a patient lost signal?

A Not that I know of.

Q Did you, as a surgeon at Midlands Orthopaedics, develop any guides or algorithms or steps about what you thought you should have done or you should do in the event of intraoperative signal loss?

A I use my experience and judgment to formulate a plan for each particular patient for each specific incident.

Q And what was the plan that you set forth for Crystal Goodwin?

A Well, initially, we checked the surgical site and we checked the equipment. I checked with anesthesia and then we subsequently closed the wound and made the MRI scan.

Q How long did the surgery last after signal loss?

A Let's see. I think the wound was probably closed -- about an hour, I think, is about how long it took to get the wound closed.

Q Did you continue operating for over an hour after signal loss occurred?

A We didn't -- part of that was the -- a major part of that was the closing, which we had to do in order to take her to the recovery room and get the MRI scan.

Q So once -- you're telling me that once there was this

signal loss, the time spent in the operating room was -- was solely related to discontinuing the procedure and closing the wound?

MR. ROBINSON: Object to form.

THE WITNESS: We did remove some further bone down at the lower portion of the laminectomy, which I thought may have been an issue. And it was my judgment that all of that was in Crystal's best interest.

BY MR. GOINGS:

Q How long would it -- how long does it typically take you, Doctor, to close this type of surgical wound?

A I would guess with this redo, it might take 30, 45 minutes, maybe.

Q When the signal loss occurred, were you substantially complete? Had you substantially completed the decompression laminectomy?

A Most of it.

Q Percentagewise, tell us how much of the decompression laminectomy had you completed up unto the point of signal loss?

A Almost all of it.

Q And were you working in or near the T9 level of the thoracic spine?

A Not at that time.

Q Were you working at or around the T level -- T9 level

of the thoracic spine within 30 minutes of the neuromonitoring going out?

A I couldn't tell you exactly how many minutes.

Q Did you ask the neuromonitoring tech to check to see if the equipment had failed or malfunctioned?

A Yes.

Q Did you get a response?

A Yes.

Q What was the response?

A She said the equipment was good.

Q How long did it take for her to give you that response?

A Oh, I don't know. You might find that in her records. It seemed like it was very quick.

Q Did you see her check the equipment?

A Well, I was focused on the wound. I wasn't watching her check the equipment.

Q Do you have any reason to doubt that she did, in fact, check the equipment?

A No.

Q Did you do anything to assess for changes in anesthesia?

A I looked at the monitor and asked them if they had any issues.

Q Did you ask them if it was any gas issues or agent issues, such as nitrous oxide, that could alter the

signals?
A I asked them if they had any issues.
Q And you got a response?
A Yes.
Q What was the response?
A They didn't have a problem.
Q And who gave you that response?
A Mr. Starnes.
Q In the surgery suite, did you rule out equipment failure based on what you were told from the neuromonitoring tech?
A Well, they told me that they couldn't find a problem with it. That didn't -- that didn't mean that there couldn't still have been a problem with it. It made it much less likely.
Q Okay. Did you rule out any anesthetic changes as the cause of positive signal loss?
A Anesthesia told me they didn't have any problems.
Q Did you contact Dr. Root, the anesthesiologist assigned to this case?
A There was no reason to contact her.
Q Is it the position of Midlands Orthopaedics that, when a signal is lost in neuromonitoring and you're performing a spinal surgery, that is a condition that anesthesiology, in particular, the anesthesiologist,

doesn't need to be notified about?
A The nurse anesthetist knew about it.
Q The who?
A The nurse anesthetist, Mr. Starnes, he knew about it.
Q But the -- is it the position of Midlands Orthopaedics that the complete signal loss of the lower extremity was not a condition or situation that necessitated advising Dr. Root?
A Well, when I have an issue in surgery, I'm focused on what is the issue and what do we need to do to get it corrected. Okay. If we needed to call Dr. Root, I would have called Dr. Root. I saw no anesthesia issues. Mr. Starnes saw no anesthesia issues. This was not an anesthesia issue.
Q Did you ever say please call or contact Dr. Root?
A No. There was no reason to call Dr. Root.
Q Did Mr. Starnes ask you if he should call Dr. Root?
A I don't recall him asking me that.
Q Do you agree that SSEPs, the amplitude of the SSEPs decrease with ischemia?
A They can, but not necessarily.
Q Do you agree that even a minor drop in blood pressure can lead to significant SSEP changes that may reverse by increased perfusion pressure?
A Maybe, but it would more than likely be a significant

decrease instead of a small decrease unless there was some other circumstance with the surgery that already was causing a problem.

Q Did you direct anyone in the surgery room to optimize cord perfusion?

A The blood pressure was already within normal limits. There was no reason to manipulate the blood pressure. I think that the risk outweighed the benefits of raising the blood pressure.

Q You've been in situations where you've raised the blood pressure to a level higher than the blood pressure of Ms. Goodwin during the surgery, haven't you?

A In another patient higher than Ms. Goodwin's?

Q Yes, sir.

A Well, I don't really focus on whether I need to raise somebody else's blood pressure based on what her blood pressure is. That doesn't make any sense.

Q You testified that Ms. Goodwin's blood pressure was normal?

A I think it was within normal limits during the entire surgery; yes, sir.

Q Okay. Were they within normal limits for Ms. Goodwin or were they in normal limits for purposes of someone who does not have hypertension?

A I believe they were in normal limits for Ms. Goodwin.

Q Are you aware of what's referred to in medicine that the intraoperative blood pressure should be maintained within 20 percent of a patient's baseline?
A I've heard that.
Q Is that true?
A Well, your own article states 30 percent. Not this one. I think it's one of the other ones that you gave to sort of coach your other witness.
Q And it's your testimony, under oath, that I gave these articles to an expert to coach them?
A Somebody gave them to him, and they came from you. He said you gave him some of those articles. I don't know if he said every single one, but he said some of them. I assume that was all of them.
Q You realize that you can actually go to the computer and pull these off; right?
A Probably. But I think he said that he got them from your law firm.
Q And the purpose of that was to coach him?
A Well, I guess you had a certain direction you wanted him to head and you thought these articles would help head him in that direction.
Q Do you believe these articles are adverse to your position in this case?
A I think a lot of what's in them helps my position.

Q Okay. Let's look at what helps your position in this article, Exhibit 4.
A Okay.
Q Tell me what helps your position in Exhibit 4.
A Well, let's see.
MR. ROBINSON: Object to form.
MR. DAVIS: Same objection. Again, this goes way far afield of the 30(b)(6) notice or the purpose of this deposition.
THE WITNESS: Let's see here. Now, Crystal's mean arterial pressure during the whole case, what was the lowest one? Was it, like, 83 or something?
MR. GOINGS: You can't ask anybody to help you.
THE WITNESS: Well, how about you? You've got that information. I need that to answer the question.
BY MR. GOINGS:
Q Okay. So you need the information as to Crystal Goodwin's lowest mean arterial pressure during the surgery?
A Yes.
Q Have you seen any documentation that shows what her lowest mean arterial pressure was during the surgery?
A I have, but I can't remember it, so that's why I'm asking you.
Q Let me see if I can locate that. What I have, and I'll

invite opposing counsel to correct me if I'm wrong, is that at 11:20, 105/70, which I understand computes to a mean arterial pressure of 81.7?

A That's the lowest one; is that correct?

Q That's what I understand it to be, yes.

A Okay.

Q Unless you have another number?

A No. I don't. I just asked what it was. I'll trust you on that. Okay. You look at --

Q Here's another one that was 82.

A Okay. So 81 and 82 are the lowest ones.

MR. DAVIS: Can I show him the answers to the Requests for Admission that had those --

MR. GOINGS: Sure. Absolutely. And I just don't have it in front of me.

MR. DAVIS: Yeah. That's fine. I just found it and pulled it up.

THE WITNESS: Where are we looking at now?

MR. DAVIS: This is part of the discovery. I am looking at the documents called Defendant Holbrook Second Amended Answers to Plaintiff's Third Set of Request for Admissions. And number 10, and it's talking about admitting the spreadsheet below accurately represents the blood pressure readings that were recorded on the handwritten anesthesia chart

during the surgery performed on Crystal Goodwin on the morning of July 28, 2016, and correctly calculates the mean arterial pressure of those blood pressure values.

THE WITNESS: Okay.

MR. DAVIS: I believe we admitted these. Let me look. Yeah.

THE WITNESS: All right. Go back down to 10:03. Let's see what that one was.

MR. DAVIS: All right, sir.

THE WITNESS: That one was -- right before it was 110. Okay. It was 110. Okay. You ready?

BY MR. GOINGS:

Q And then, at 9:55 was 86? Do you see that?

A I see that one. And the lowest one was -- what was it? 85.

Q 81 to 82.

A So 82, 84, 81.7, so 82. Okay. So let's see. Wait a minute. So the lowest one is 82 and, at the time that she lost signal, it was 110. Okay.

Q Did you take into consideration latency?

A Latency? So how much latency you want to calculate in there?

Q Well, SSEPs, by definition, are not available in real time.

MR. ROBINSON: Object to the form.

BY MR. GOINGS:
Q And it results in latency; right?
A Okay. All right. Well --
MR. ROBINSON: Objection.
THE WITNESS: So the -- so the mean pressure never went below 80 or never went below 82. It never went below 82 in the whole case.
BY MR. GOINGS:
Q Okay. So let me ask you the question, now that you have reviewed the chart of her mean arterial pressure during the procedure. You volunteered that this article was actually helpful to your position in this case. And my question was tell me what parts of this article, entitled Seminar Spine Surgery, 2015, Management of Intraoperative Neuromonitoring Signal Loss, is helpful to your position in this case?
A All right. So we looked at the blood pressures. The mean arterial pressure never dropped below 82. All right. Here is a quote. "In the author's experience to ensure adequate cord perfusion, mean arterial pressure should be elevated to 80 to 90 milligrams -- millimeters." Hers was never below 80, so it was well within the range of safety, as stated in your article.
Q Do you know if this sentence relates to people with hypertension?

A I believe that's all comers in their case.
Q Do you believe that that sentence also includes individuals with hypertension?
A I'm sure it did.
Q And how do you know that to be true?
A Let's see. They had 176 patients who underwent spine surgery. So it doesn't say for sure, but I bet out of 176, a fair number of the population would have hypertension.
Q You agree with me, however, though, for a normal person without hypertension, that the mean arterial pressure should be elevated to 80 to 90 mmHg?
A That's not what this says.
Q But I'm asking you for a normal person without hypertension, do you agree that the mean arterial pressure should be elevated to 80-90 mmHg?
A Not necessarily.
MR. ROBINSON: Object to the form.
BY MR. GOINGS:
Q Does this article say that that relates to and applies to an individual with chronic hypertension?
A They applied that to 176 patients and, although it doesn't state it, I'll bet that a significant percentage of them have hypertension. Probably the same percentage as in the normal population.

Q What is that?
A I don't know. Probably a lot.
Q All right. So you think that sentence helps you. You've pointed out one sentence. Any other sentences that assist your position in this case or the position of Midlands Orthopaedics?
A It also talks about some of the steps and things that they do that they say are suggestions and whether or not you do them is left up to the judgment of the individual doctor, based on that particular patient's circumstances, which is what I did.
Q All right. Is there any other sentence in this three-page peer reviewed article that states a position that is favorable to you in this case?
MR. DAVIS: Object to form.
MR. ROBINSON: Same objection.
THE WITNESS: That's the two that I kind of see. If you've got some that you think don't, then I'll be glad for you to bring those up and we'll discuss them.
BY MR. GOINGS:
Q Okay. To be fair, you did nothing as a surgeon to optimize cord perfusion, did you?
A Her blood pressures were good. She had good cord perfusion.
Q Did you do anything, though, to change her cord

perfusion when the signals went out?
A Anything you do has risks and benefits, and there was nothing else that I thought should have been done that would have been a benefit without offsetting risks.
Q Did you put in your operative report that you considered all these risks and benefits that you're telling us about today when you did the surgery?
A The operative report is just a summary. It's not a detailed every last thought you had in your head during the surgery.
Q And an operative report should be complete, shouldn't it?
A It's a summary. It's not a complete document about everything that was done. It's a summary.
Q In fact, the operative report doesn't even state the words "signal loss", does it, or the phrase "signal loss"? Do you need to see the operative report? It's Exhibit 2 in this deposition.
A It's in here?
Q I believe so.
A I don't see it in there. Oh, here it is. Here it is. Never mind.

MR. TRAYWICK: Can we go off the record real quick?

(OFF THE RECORD 2:36 P.M. - 2:43 P.M.)

BY MR. GOINGS:

Q Doctor, in your operative report, do you state that the neuromonitoring signal loss went out?
A What were you asking about?
Q In your operative note, do you state that the intraoperative neuromonitoring signals to Ms. Goodwin's lower extremity went out?
A I see where it says they abruptly stopped.
Q What does it say, abruptly stopped?
A What?
Q What does it say, abruptly stopped?
A It says remain -- there's a blank there and it says "Remained stable up to this point and then abruptly stopped." That was referring to the somatosensory-evoked potentials.
Q And just in reading this operative report, someone reading it wouldn't be able to understand that you mean SSEPs, would they?

MR. ROBINSON: Object to the form.

MR. DAVIS: Same objection.

THE WITNESS: Another physician familiar with this surgery would have.

BY MR. GOINGS:
Q Do you -- do you use the word or phrase intraoperative neuromonitoring or SSEPs at any point in time in this surgery op note?

A Well, it's blanked out.
Q Do you know why it's blanked out?
MR. DAVIS: This is just an objection. I'm going to let him answer the question, but this whole line of questions has already been asked and answered for him by him at his deposition on May 11, 2020.
MR. GOINGS: Okay.
MR. DAVIS: Do you want him to just answer the same questions? Go ahead and answer the question.
MR. GOINGS: I'm just trying to find out, Doctor.
MR. DAVIS: Answer the question if you can. Go ahead.
BY MR. GOINGS:
Q Do you know why there's a blank there.
A I believe that's a transcription error.
Q Okay. And then it says, "The identifiable cause within the wound was demonstrated." What identifiable cause within the wound was demonstrated?
A Instead of "the", it should have been "no".
Q Okay. And this operative report you signed and verified on July 30, 2016; isn't that correct?
A I signed it.
Q Did you have the opportunity to read it before you signed it?
A I did read it over. I didn't read every word.

Q Did you have the opportunity to fix these blanks in the operative report or change any words that may cause this report to read -- to read incorrectly?
A I could have.
MR. DAVIS: Could I have -- I don't want to keep interrupting, but could I have a continuing objection --
MR. GOINGS: Sure.
MR. DAVIS: -- that all this has been covered in his deposition? Thank you.
BY MR. GOINGS:
Q Did you, Doctor?
A Do what? Could I have changed it? Yes, I could have.
Q Any reason why you didn't change it?
A I didn't catch that. I didn't read every word of it. I didn't catch that.
Q Before you signed and verified it, you were able to see the blanks as shown on this document, though, weren't you?
A If I had looked at every word on it, I could have seen that, but I didn't.
Q Do you agree with me that improving cord perfusion may reverse cord ischemia?
MR. ROBINSON: Object to the form.
MR. BRADLEY: Objection.

MR. DAVIS: Same objection.

THE WITNESS: So what's your question?

BY MR. GOINGS:

Q Do you agree that, during surgery, increasing or improving cord perfusion can reverse cord ischemia caused by lack of cord perfusion?

MR. BRADLEY: Objection.

MR. ROBINSON: Object to form.

THE WITNESS: Well, in this case, there was no hypotension, and so, no, it would not have been of benefit in this case using the parameters in your own article.

BY MR. GOINGS:

Q So, as I understand the testimony as it relates to Exhibit 5, entitled Management of Intraoperative Neuromonitoring Signal Loss, you agree that the five steps listed in this article are a reasonable and prudent process to manage intraoperative neuromonitoring signal loss during surgery, but you do not believe that it always has to be followed. Is that -- is that a fair assessment?

MR. ROBINSON: Object to form.

THE WITNESS: Is that this one?

BY MR. GOINGS:

Q Yes, sir.

A I think those are suggestions.
Q Okay. Is there anything wrong with these suggestions? I mean, are the suggestions incorrect?
A Well, as it states in here when they tell you, you know, that they are recommending this or that, they say that it's up to the surgeon's discretion and meaning that each individual patient is different and that you have to individualize the treatment. You can't rigidly go by a set of -- of protocol.
Q Just like you can't rigidly go by a one-size-fits-all analysis for setting and monitoring blood pressure during surgery?
MR. ROBINSON: Object to form.
THE WITNESS: Well, I don't understand that.
BY MR. GOINGS:
Q Number five, do you have it in front of you, sir?
A This is a different one?
Q Yes, sir. That's another article.
MR. TODD: Is that Exhibit 5? So you referenced to Exhibit 5 and you handed him Exhibit 5, again?
MR. GOINGS: No. Before you walked in, I gave him Exhibit 5.
MR. TODD: Okay. And you questioned him about it.
MR. GOINGS: I have not questioned him on Exhibit 5. We just marked it as Exhibit 5. We didn't discuss

Exhibit 5 yet.
BY MR. GOINGS:
Q Have you seen this article before, Doctor?
A I think that's one of the ones we got from you. Is it? I can't remember. Is that one of them?
Q Have you -- do you recall reading this document or reviewing this document before today's deposition?
A If it's one of the ones you gave us, I did.
Q Are you familiar with the publication, Contemporary Spine Surgery?
A I've heard of it.
Q Is this one that Midlands Orthopaedics or you subscribe to?
A I don't think so.
Q You testified that the last article I showed you, marked as Exhibit 4, had a sentence that was favorable to your position or the position of Midlands Orthopaedics in this case. Is there any statement, result, conclusion, or sentence in this article that is favorable to the position of Midlands Orthopaedics in this case?
MR. ROBINSON: Object to form.
THE WITNESS: Maybe.
BY MR. GOINGS:
Q Okay. Have you reviewed this article?

A I've read it in the past.
Q Okay. What sentence or statement in this exhibit, Exhibit 5, is favorable to the position of Midlands in this case?
A I haven't read it lately.
Q Well, this is the only occasion I have to ask you about this document. So, to the extent --
MR. ROBINSON: Subject to my objection.
BY MR. GOINGS:
Q To the extent that you need to read document in its entirety, I'm happy to give you all the time you need.
A Well, if you've got a specific question about it, but this has gone on long enough. I can't read this whole thing. Not right now. I'll take it home with me and read it, but I can't do it today.
Q I'm happy to give you the time that you need to take a break so you can read it, but I do need to ask you questions about it.
A Okay. Well, ask me.
MR. DAVIS: Just, with all due respect, I don't mean to interrupt your flow of questions, but we've been at it for five hours now on this 30(b)(6) deposition. At some point, we're going to have to draw this to a close or I'll just need to shut it down. So, I mean, we've been patient, in spite of my objections,

which we're all going to have to take up later, but that's for another day.

MR. GOINGS: Okay. I need to ask the witness questions about this document. I want to ask him about what he agrees or disagrees with this peer review article.

MR. DAVIS: I think you just did.

MR. GOINGS: And if he doesn't want to read it right now so I can ask him questions, then we can go in front of the judge and get an order from the judge if that's what you're telling me you want me to do.

MR. DAVIS: I'm not saying that. I'm just saying we've been going five hours on a 30(b)(6) deposition. How long are we going to go?

MR. GOINGS: Do we need to give him a break to read it?

MR. DAVIS: Ask him.

BY MR. GOINGS:

Q Will you please read the document in its entirety and allow me to ask you questions today.

MR. ROBINSON: Object to form.

THE WITNESS: If you have a specific question you want me to look at in this article, I'll be glad to look at it. I'll read it tonight.

BY MR. GOINGS:

Q I don't get to ask you questions after today, though.
A You can call me.
Q I don't want to call you.
MR. DAVIS: That's a pretty generous offer.
THE WITNESS: What is it you want to know? I'll answer any specific question you have about this --
BY MR. GOINGS:
Q Here's the question --
A But I'm not going to take the time to read it, right now.
Q Okay. This was a document that was previously produced in the case. It's been relied upon in the case by experts. I'm asking you the question, so if it requires you to read it to give me a full answer, I would -- I would request that you do so. Is there anything in this article, entitled Contemporary Spine Surgery, that you disagree with, or you take issue with, or you criticize, for purposes of the statements contained herein?
MR. ROBINSON: Object to form.
MR. DAVIS: Same objection.
THE WITNESS: Based on having read it in the past, I can't give you a specific about it.
BY MR. GOINGS:
Q Do you agree with one of this article's conclusions

that intraoperative alerts should be evaluated in a stepwise fashion to rule out technical temperature, anesthetic, or surgical etiologies?

A Where's that at?

Q Page 6?

A In the conclusion?

Q Yes, sir.

A Like the other one, I think this is meant as a guideline and that each case has to be individualized to that particular patient, which is what I did in this case.

Q And it says, "Should be evaluated in a stepwise fashion." What steps did you take and what steps did you consider when the signal went out for Crystal Goodwin?

MR. DAVIS: Asked and answered.

THE WITNESS: I already answered that.

MR. ROBINSON: Object to form.

BY MR. GOINGS:

Q Okay. I'm going to ask you again, what steps did you take. We talked about --

A You asked me that exact question. I already answered it.

Q You told me that you asked that the equipment be checked and you looked at the wound. Did you take any

other steps besides those two steps?

MR. ROBINSON: Object to form.

THE WITNESS: Yes.

BY MR. GOINGS:

Q And what is that?

A Checked with anesthesia.

Q You did check with anesthesia?

A I sure did. I already said that.

Q All right. So those are the three things you did?

A Those were the first three things I did.

Q Okay. And then it says, "If motor function remains in question, a Stagnara wake-up test can be used to assess motor function." Was a Stagnara wake-up test ever used?

A I believe that was contraindicated in this case.

Q And why was that?

MR. DAVIS: Asked and answered.

THE WITNESS: It had only risks and no benefit.

BY MR. GOINGS:

Q Did you consider doing the wake-up test but then, based on your judgment, you thought it would be too risky to do it and you didn't do it?

A I thought there would be no benefit to it and only risk, so there was no reason to even consider that.

Q What are the risks of performing a Stagnara wake up

test?
A It would take a long time to do. Time that would be wasted when you could have taken a patient to MRI, like we did.
Q Have you ever performed a Stagnara wake-up test?
A Yes.
Q How many times in your career have you performed a Stagnara wake-up test?
MR. ROBINSON: Objection to form.
THE WITNESS: Usually, I understand it as just the wake-up test or the Miami wake-up test, but I think it's the same thing. But I've probably done it 50 times.
BY MR. GOINGS:
Q Doctor, in this case, some discovery requests were served on Midlands Orthopaedics and this was a question that was asked. And the question is for Midlands Orthopaedics to admit that chronic hypertension is a condition that, depending on its degree and duration, can impact how a patient's intraoperative blood pressure should be managed?
MR. DAVIS: Could you please -- I'm sorry. Would you identify the title of the article and the date, please? I mean, the discovery.
MR. GOINGS: Midlands Orthopaedics first set of

requests for admission.

MR. DAVIS: Okay.

MR. GOINGS: Number five.

MR. DAVIS: Thank you.

BY MR. GOINGS:

Q Does Midlands Orthopaedics admit that chronic hypertension is a condition that, depending on the degree and duration, can impact how a patient's intraoperative blood pressure should be managed during surgery?

A Maybe.

Q And what does that depend on?

A The patient.

Q And what factors of the patient does it depend on?

A The patient, the type of surgery, the patient's other illnesses, their age.

Q What else?

A Those would be some of the things I would consider.

Q So the answer is yes to that question; right?

MR. ROBINSON: Object to the form.

MR. DAVIS: Same objection.

THE WITNESS: What?

BY MR. GOINGS:

Q The answer would be yes to that question that chronic hypertension is a condition that, depending on degree

and duration, can impact how a patient's intraoperative blood pressure should be managed?

MR. ROBINSON: Object to the form.

THE WITNESS: I think that each individual patient's care is individualized to that patient and it may or may not need to consider that.

BY MR. GOINGS:

Q The chart that you were shown of the mean arterial pressure during the surgery, you had seen that chart before today, haven't you?

A Yes.

Q Do you know when you first saw that chart?

A No.

Q Do you know when you were asked to see that chart the first time?

A No.

Q Do you know when you were shown that chart for the first time?

A No.

Q Was it in preparation for today's deposition?

A No.

Q Was it in the last four months?

A I think so. I think it was in some other deposition, as I recall seeing it.

Q Would it have been in a deposition that you saw it for

the first time?
A Maybe. I can't remember.
Q Doctor, in the answer to the amended complaint -- let me pull that up, Doctor. In the answer to the amended complaint, there's a defense that's asserted in paragraph 47, and Midlands says this: "The defendants allege that the injuries and damages stated in the amended complaint were due to and proximately caused by the underlying injuries, medical conditions, and/or complications of the patient, Ms. Goodwin, in question." Our question is what was Ms. Goodwin's underlying injuries, medical conditions, or complications referred to in this defense?
A Where did that come from?
Q The answer of Midlands Orthopaedics and yourself in this case.
MR. DAVIS: Have any of these documents that you've been referring to the last five hours been supplied to me two days prior to --
MR. GOINGS: And this is your answer --
MR. DAVIS: Excuse me. Let me finish. Have any of the documents that you've been asking my client about for the last five hours been supplied to me two days prior to this deposition commencing, including the document you've just asked him about?

MR. GOINGS: Yeah. The notice says, the undersigned hereby identifies any and all documents and other material that have been produced, shared, or served, or otherwise identified by the parties in discovery. That was in the notice.

MR. DAVIS: Okay. So the answer is no.

MR. GOINGS: No, the answer is yes. This is the answer that was filed. So let me ask the question, and I would request that you leave your objections to the form and not give speaking objections.

MR. DAVIS: Well, it's pretty hard to object to form when it's fundamental to this rule.

MR. GOINGS: All right.

MR. DAVIS: So, but thank you for letting me put that on the record.

BY MR. GOINGS:

Q Doctor, Midlands Orthopaedics and yourself filed an answer to the complaint, to the amended complaint, and one of the defenses that was alleged was that Ms. Goodwin's current condition was caused by underlying injuries, medical conditions, and/or complications of the patient in question. My question is what are the underlying injuries, medical conditions, and/or complications of the patient in question as referenced in the answer?

A What condition are you referring to in the question?
Q It doesn't say. I can show it to you so you can read the --
A Well, without knowing the condition, you can't say what it caused or what it's related to.

MR. DAVIS: Just so I can make sure I've got a footnote. You're talking about Midlands and Dr. Holbrook's filed answer to your amended 45 paragraph amended complaint, or however many paragraphs it was. Which paragraph are you looking at?

MR. GOINGS: Paragraph 47, filed February 25, 2021.

MR. DAVIS: Thank you.

MR. ROBINSON: Do you have a copy of that for the witness or for us?

MR. DAVIS: Thank you. Because I don't have a copy.

MR. GOINGS: It's the answer. I think you were provided a copy. I don't --

MR. DAVIS: Do you have a copy that you can show the witness?

MR. GOINGS: You can print one out if you want to. Who do I need to send this to to print?

MR. DAVIS: Beats me. I don't have a printer.

MR. GOINGS: It's your answer that y'all filed.

MR. DAVIS: I'm not doubting that.

MR. GOINGS: So I'm just asking him a question about this and he can have it in front of him. Y'all can all huddle around him and look at it, but it's paragraph 47 of the answer.

MR. DAVIS: 47, okay. Do you have a copy of the complaint that paragraph 47 is responding to?

MR. GOINGS: That's an affirmative defense that you filed. It's not in response to a particular complaint allegation.

MR. DAVIS: I see. Thank you.

BY MR. GOINGS:

Q Have you been able to read paragraph 47 of the answer of Midlands Orthopaedics and --

A Yes.

Q -- yourself?

A Yes.

Q Okay. Do you need me to ask the question again?

A Please.

Q What are the underlying injuries, medical conditions, or complications of the patient, that Midlands Orthopaedics is alleging to be the cause of her injuries and damages?

A Well, when I read that, what I get out of that is that the condition that she suffers from currently is not

related to any negligence or malpractice. That's what I get out of that.

Q Okay. It says, though, that "Her injuries are due to or proximately caused by underlying injuries, medical conditions or complications of the patient." And we can take those one at a time. What are you aware of, if any, any underlying injuries that Ms. Goodwin would have that would have caused her injuries alleged in this case?

A Well, she had a stroke in her spinal cord.

Q Anything else?

A That's the main thing that caused the condition that she has with her spinal cord.

Q Okay. What medical condition did she have that caused the alleged injuries? Is it the same thing? Stroke in the spinal cord?

A A stroke is a medical condition.

Q Is that also the complication that is being referred to, as well?

A That is a complication from the surgery.

Q Okay. Based on everything you know and understand about this procedure, Doctor, that Ms. Goodwin underwent, is there anything that should have or could have been done differently in the surgery room that would have prevented the condition that she currently

suffers from today?

MR. DAVIS: Objection to the form of the question.

MR. ROBINSON: Object to the form.

THE WITNESS: There is no way that I could have predicted this would happen to Crystal. There's nothing else that I could have done that I didn't do to prevent it. And once it happened, there was nothing else that I could have done to minimize the effects of it, other than what I did.

BY MR. GOINGS:

Q And I understand you are not critical of anything that anesthesia or the anesthesiologist did or didn't do; is that correct?

A What would there be to be critical of that they did? I don't think there's anything else that they could have done.

Q And you don't think there's anything that anesthesiology, Dr. Root, or anyone on her behalf, could have done differently, as well; right?

A I think if she'd have been in the room the entire time, there's nothing differently that she could have done, even looking back at it in hindsight.

Q Can a period of hyper fusion -- hypo fusion make a stroke more likely to occur?

MR. ROBINSON: Object to form.

THE WITNESS: Can it?
BY MR. GOINGS:
Q Yes, sir.
A It's possible.
Q Are you able to rule out, with certainty, that the ischemia that Ms. Goodwin sustained to the T9 region was caused by lack of perfusion, or hypoperfusion?
MR. ROBINSON: Object to the form.
MR. DAVIS: Same objection.
MR. TODD: Object to the form.
MR. BRADLEY: Object to the form.
THE WITNESS: Her blood pressure was within normal limits throughout the entire case.
BY MR. GOINGS:
Q Let's take a short break and then we may be able to wrap up.
A Lovely.
(OFF THE RECORD 3:14 P.M. - 3:22 P.M.)
BY MR. GOINGS:
Q Dr. Holbrook, when you testified that Ms. Goodwin sustained a stroke in her spinal cord, are you saying that that was attributed and caused by a clot or a thrombus?
A We didn't have an exact cause. One was never determined.

Q When you say stroke in the spinal cord, does that also include ischemia that could be caused by lack of perfusion?
A A stroke is an ischemic event.
Q Okay. So, when you use the word "stroke" to reference what happened with Ms. Goodwin in her spinal cord, you say stroke to mean an ischemic event?
A A stroke is an ischemic event.
Q Is there any other ischemic events, other than -- so I'm clear. I want to make sure I'm clear on this. When you say stroke, what ischemic events are you referencing?
A Her spinal cord.
Q Okay. What ischemic events to her spinal cord are you referencing when you say that she had a stroke to her spinal cord?
A T9.
Q What kind of stroke -- kind of strokes?
A Well, all strokes are ultimately vascular in origin.
Q Okay. Does that include tissue damage or tissue death, due to lack of perfusion, as well as potential tissue death or tissue damage due to a clot or thrombus?
MR. DAVIS: Object to the form.
THE WITNESS: There are different causes for an ischemic event.

BY MR. GOINGS:
Q Okay. And I just want to make sure I get this right. Tell me what the different causes are for an ischemic event in the spinal cord.
A What could possibly cause an ischemic event?
Q Yes, sir.
A Bleeding.
Q Okay. Got that.
A Infection.
Q Okay.
A Inflammation.
Q Okay.
A Tumor and vascular.
Q And within vascular, what are the different vascular causes that would result in a stroke to the spinal cord?
A Bleeding could cause it. An abnormal blood vessel could cause it.
Q Okay.
A Those are things that could cause it that would be vascular in nature.
Q If lack of perfusion was indicated, could that cause it?
A It could, but as indicated in the articles that you gave me, her parameters were well within the articles

that you provided.

Q Okay. Doctor, those are all the questions I have today. Please answer any questions that any of the other lawyers in the room may have for you. Okay?

MR. TODD: Monty Todd, I have no questions.

MR. ROBINSON: Jon Robinson, no questions.

MR. BRADLEY: John Bradley, no questions.

MR. DAVIS: Ashby Davis, no questions.

(WHEREUPON, THE DEPOSITION CONCLUDED AT 3:26 P.M.)

CERTIFICATE

This is to certify that the foregoing deposition of THOMAS J. HOLBROOK, M.D., consisting of 169 pages is a true and correct transcript of the testimony given by said deponent after first being duly sworn; said deposition was reported by method of Stenomask with digital backup. This transcript may contain quoted material; said material is transcribed as read or quoted by the speaker.

I further certify that I am neither employed by nor related to any of the parties in this matter nor their counsel; nor do I have any interest, financial or otherwise, in the outcome of the same.

IN WITNESS WHEREOF I have hereunto set my hand and seal this 19th day of April, 2021.

Jill Bishop Edwards, CVR-CM
Certified Verbatim Reporter

Notary in and for the State of South Carolina
My Commission Expires: July 10, 2030

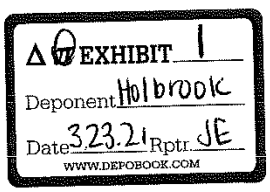
STATE OF SOUTH CAROLINA	)	IN THE COURT OF COMMON PLEAS
	)	
COUNTY OF RICHLAND	)	FIFTH JUDICIAL CIRCUIT
Crystal Goodwin and James Goodwin,	)	CIVIL ACTION №.: 2019-CP-40-4185
	)	
Plaintiff,	)	**NOTICE OF TAKING VIDEOTAPED DEPOSITION OF THOMAS J. HOLBROOK, JR., M.D., AS THE 30(B)(6) DEPONENT ON BEHALF OF DEFENDANT MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, AND REQUESTS FOR PRODUCTION TO MIDLANDS ORTHOPAEDICS AND NEUROSURGERY**
vs.	)	
Midlands Orthopaedics and Neurosurgery, Thomas J. Holbrook, Jr., M.D., Carolina Anesthesiology Associates, P.A., Jennifer R. Root, M.D., and Prisma Health, f/k/a Palmetto Health,	)	
Defendants.	)	

Pursuant to Rules 30 and 34, SCRCP, Plaintiffs, by and through the undersigned counsel, will take the videotaped deposition of Defendant Midlands Orthopaedics and Neurosurgery ("Midlands Orthopaedics") and hereby serves supplemental request for production:

NOTICE OF VIDEOTAPED DEPOSITION

YOU WILL PLEASE TAKE NOTICE that Plaintiff will take the videotaped deposition of Midlands Orthopaedics upon oral and video examination at the time and location specified listed below:

DEPONENT:	**Thomas J. Holbrook, Jr. M.D.**
DATE/TIME:	**March 23, 2021, at 10:00 a.m.**
PLACE:	**MAG Mutual Office** **2000 Center Point Road, Suite 2275** **Columbia, SC 29210**
COURT REPORTER:	**Bishop Reporting Services, LLC**



Further, the undersigned hereby identifies any and all documents or other material that have been produced or otherwise identified by the parties in discovery may be shown to the deponent or otherwise used during the course of the deposition.

Pursuant to Rule 30(b)(6), Defendant Midlands Orthopaedics and Neurosurgery ("Midlands Orthopaedics") shall designate one or more officers, directors, agents or other persons who can testify on its behalf with knowledge of the following:

1. The investigation of Midlands Orthopaedics into the surgeries performed on Crystal Goodwin on July 28, 2016 and any complications that arose;

2. The treatment and care of Crystal Goodwin by Midlands Orthopaedics and its physicians, including the surgeries performed on July 28, 2016;

3. Any errors or deviations from the standard of care of Dr. Holbrook related to the treatment and care of Crystal Goodwin;

4. The efforts of and any determinations by Midlands Orthopaedics to determine any errors or deviations from the standard of care related to the treatment and care of Crystal Goodwin;

5. The cause of Crystal Goodwin's neurologic deficits and motor impairment of her lower extremities;

6. The factual basis of the defenses asserted by Midlands Orthopaedics in its Answer in this litigation;

7. The factual basis of any admissions or denials asserted by Midlands Orthopaedics in its Answer in this litigation;

8. The factual basis for Midlands Orthopaedics compilation of answers and responses to Plaintiffs' interrogatories and requests for production in this litigation;

9. The standard of care known to Midlands Orthopaedics for performing a decompressive thoracic laminectomy on Crystal Goodwin;

10. The purpose for neuromonitoring and the standard of care known to Midlands Orthopaedics related to neuromonitoring of Crystal Goodwin during the surgery on July 28, 2016;

11. The facts and circumstances related to treatment of patients other than Crystal Goodwin that have been rendered paralyzed or suffered neurologic deficits and/or motor impairment following a surgery performed by Dr. Holbrook;

12. The employment of Dr. Holbrook with Midlands Orthopaedics;

13. The history and substance of all employment agreements, including any amended agreements among and between Dr. Holbrook and Midlands Orthopaedics;

14. The separation of employment of Dr. Holbrook at Midlands Orthopaedics;

15. Any meeting minutes of Midlands Orthopaedics related to Dr. Holbrook;

16. Any resolution(s) passed by Midlands Orthopaedics related to Dr. Holbrook;

17. The legal relationship with Midlands Orthopaedics and Arcis Healthcare, LLC, including any and all written agreements related to ownership and control;

18. Any communications (orally, written, including by email or any electronic means) in the possession or control of Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

19. Any complaints received by Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

20. Any communications (orally, written, including by email or electronic means) in the possession of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

21. Any emails, correspondence, and documentation sent to and/or received by employees and physicians of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

22. Any health and/or medical conditions of Dr. Holbrook, including any physical or mental disabilities or limitations;

23. Any emails, correspondence, and documentation of any nature at Midlands Orthopaedics related to Dr. Holbrook having instability, motor function complaints, tremors, or shaking of his upper extremities and hands.

24. Patient complaints received by Midlands Orthopaedics on Dr. Holbrook from January 1, 2013 to present;

25. The clinical and hospital privileges of Dr. Holbrook, spanning from January 1, 2013 until present, including the reasons for any changes to these privileges;

26. Any and all policies, procedures, and/or protocols promulgated or adopted by Midlands Orthopaedics to in any way guide or direct its healthcare providers in their duties, both as existed on July 28, 2016, and as exists today;

27. Policies, procedures, and/or protocols related to physicians "charting" and writing operative reports and treatment records that were in any way appliable to the surgeries Dr. Holbrook performed on Crystal Goodwin on July 28, 2016;

28. Claims, Notices of Intent to File, and/or Summons and Complaints made against Midlands Orthopaedics that in any way involve Dr. Holbrook;

29. Insurance policies/coverage for Dr. Holbrook and Midlands Orthopeadics appliable to cover incidents/occurrences which took place on July 28, 2016;

30. Any and all insurance coverage that would possibly be applicable to cover any injuries resulting from the surgery Dr. Holbrook performed on Crystal Goodwin on the morning of July 28, 2016.

31. Malpractice insurance coverage for Dr. Holbrook and/or Arcis Healthcare, LLC;

32. The income and current net worth of Midlands Orthopaedics.

This deposition will be taken before some officer authorized by law to take depositions and will continue from day to day until complete. The deposition may be conducted via videoconferencing or telephonic means, and may be recorded on videotape in addition to stenographic transcription.

This deposition is being taken for the purpose of discovery, for use at trial, and for all other purposes as may be permitted under the rules of this Court and all applicable statutes and laws.

****

REQUEST FOR PRODUCTION

FURTHER, pursuant to Rule 34, SCRCP, **Plaintiffs directs Midlands Orthopaedics to produce and allow to inspect within 30 days of this Notice and to also bring to this deposition** the following documents, materials, information, computer application and/or data for production and inspection:

1. All employment agreements, including any amended agreements among and between Dr. Holbrook and Midlands Orthopaedics;

2. Any employment and/or shareholder resolution of Midlands Orthopaedics related to Dr. Holbrook;

3. Any meeting minutes of Midlands Orthopaedics related to Dr. Holbrook;

4. Documentation and agreements demonstrating the legal relationship with Midlands Orthopaedics and Arcis Healthcare, LLC, including any and all written agreements related to ownership and control;

5. Any communications (orally, written, including by email or electronic means) in the possession of Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

6. Complaints received by Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

7. The facts and circumstances related to treatment of patients other than Crystal Goodwin that have been rendered paralyzed, or suffered paralysis, following a surgery performed by Dr. Holbrook;

8. Communications and documents, including but not limited to email or electronic, in the possession of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

9. Any emails, correspondence, and documentation sent to and/or received by employees and physicians of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

10. Any emails, correspondence, and documentation of physicians at Midlands Orthopaedics related to Dr. Holbrook's employment, separation, and/or his care and treatment of patients;

11. Documentation related to any health and/or medical conditions of Dr. Holbrook, including any physical or mental disabilities or limitations;

12. Emails, correspondence, and documentation of any nature at Midlands Orthopaedics related to Dr. Holbrook having instability, motor function complaints, tremors, or shaking of his upper extremities and hands.

13. Patient complaints received by Midlands Orthopaedics on Dr. Holbrook from January 1, 2013 to present;

14. Documentation showing the clinical and hospital privileges of Dr. Holbrook, spanning from January 1, 2013 until present, including documentation showing the reasons for any changes to these privileges;

15. Documentation showing application for clinical and hospital privileges of Dr. Holbrook, spanning from January 1, 2013 until present;

16. Policies, procedures, and protocols at Midlands Orthopaedics related to physicians "charting" and writing operative reports and treatment records;

17. Notice of Intent to File Medical Malpractice actions and/or Summons and Complaints against Midlands Orthopaedics involving Dr. Holbrook;

18. Malpractice insurance coverage for Dr. Holbrook and Midlands Orthopeadics in effect as of July 28, 2016;

19. Malpractice insurance coverage that would cover Arcis Healthcare, LLC.

20. Any and all insurance coverage that would possibly be applicable to cover any injuries resulting from the surgery Dr. Holbrook performed on Crystal Goodwin on the morning of July 28, 2016.

Respectfully submitted,

By: _____

Robert F. Goings (S.C. Bar # 74855)
Jessica L. Gooding (S.C. Bar # 101210)
Christopher M. Paschal (S.C. Bar # 104722)
Goings Law Firm, LLC
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and

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Email: brink@hhplawgroup.com

Attorneys for Plaintiffs

March 1, 2021
Columbia, South Carolina

CERTIFICATE OF SERVICE

The undersigned does hereby certify that the following named individual(s) were served with a copy of the following indicated below by mailing a copy of same to said person(s) via EMAIL and the United States Postal Service, with sufficient postage affixed thereto and return address clearly marked on the date indicated below:

PARTY SERVED:

G. Murrell Smith, Jr., Esquire
Jonathan Robinson, Esquire
Smith | Robinson
2530 Devine Street
Columbia, SC 29205

Ashby W. Davis, Esquire
Davis Snyder Williford & Lehn, PA
5 Hawthorne Park Court
Greenville, SC 29615

Monteith P. Todd, Esquire
Vordman Carlisle Traywick, III
1310 Gadsden Street
Post Office Box 11449
Columbia, SC 29211

James Edward Bradley, Esquire
John C. Bradley, Jr., Esquire
Moore Taylor Law Firm PA
PO Box 5709
West Columbia, SC 29171

PLEADINGS/DOCUMENTS:

- **NOTICE OF TAKING VIDEOTAPED DEPOSITION OF THOMAS J. HOLBROOK, JR., M.D., AS THE 30(B)(6) DEPONENT ON BEHALF OF DEFENDANT MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, AND REQUESTS FOR PRODUCTION TO MIDLANDS ORTHOPAEDICS AND NEUROSURGERY**

Leslie C Clamp

Columbia, South Carolina
March 1, 2021

STATE OF SOUTH CAROLINA	)	IN THE COURT OF COMMON PLEAS
	)	
COUNTY OF RICHLAND	)	FIFTH JUDICIAL CIRCUIT
Crystal Goodwin and James Goodwin,	)	CIVIL ACTION №.: 2019-CP-40-4185
	)	
Plaintiff,	)	**NOTICE OF TAKING VIDEOTAPED DEPOSITION OF MS. ANN MARGARET MCCRAW, AS THE 30(B)(6) DEPONENT ON BEHALF OF DEFENDANT MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, AND REQUESTS FOR PRODUCTION TO MIDLANDS ORTHOPAEDICS AND NEUROSURGERY**
vs.	)	
Midlands Orthopaedics and Neurosurgery, Thomas J. Holbrook, Jr., M.D., Carolina Anesthesiology Associates, P.A., Jennifer R. Root, M.D., and Prisma Health, f/k/a Palmetto Health,	)	
Defendants.	)	

Pursuant to Rules 30 and 34, SCRCP, Plaintiffs, by and through the undersigned counsel, will take the videotaped deposition of Defendant Midlands Orthopaedics and Neurosurgery ("Midlands Orthopaedics") and hereby serves supplemental request for production:

NOTICE OF VIDEOTAPED DEPOSITION

YOU WILL PLEASE TAKE NOTICE that Plaintiff will take the videotaped deposition of Midlands Orthopaedics upon oral and video examination at the time and location specified listed below:

DEPONENT:	**Ms. Ann Margaret McCraw**
DATE/TIME:	**March 23, 2021, at 1:00 p.m.**
PLACE:	**MAG Mutual Office** **2000 Center Point Road, Suite 2275** **Columbia, SC 29210**
COURT REPORTER:	**Bishop Reporting Services, LLC**

Further, the undersigned hereby identifies any and all documents or other material that have been produced or otherwise identified by the parties in discovery may be shown to the deponent or otherwise used during the course of the deposition.

Pursuant to Rule 30(b)(6), Defendant Midlands Orthopaedics and Neurosurgery ("Midlands Orthopaedics") shall designate one or more officers, directors, agents or other persons who can testify on its behalf with knowledge of the following:

1. The investigation of Midlands Orthopaedics into the surgeries performed on Crystal Goodwin on July 28, 2016 and any complications that arose;

2. The treatment and care of Crystal Goodwin by Midlands Orthopaedics and its physicians, including the surgeries performed on July 28, 2016;

3. Any errors or deviations from the standard of care of Dr. Holbrook related to the treatment and care of Crystal Goodwin;

4. The efforts of and any determinations by Midlands Orthopaedics to determine any errors or deviations from the standard of care related to the treatment and care of Crystal Goodwin;

5. The cause of Crystal Goodwin's neurologic deficits and motor impairment of her lower extremities;

6. The factual basis of the defenses asserted by Midlands Orthopaedics in its Answer in this litigation;

7. The factual basis of any admissions or denials asserted by Midlands Orthopaedics in its Answer in this litigation;

8. The factual basis for Midlands Orthopaedics compilation of answers and responses to Plaintiffs' interrogatories and requests for production in this litigation;

9. The standard of care known to Midlands Orthopaedics for performing a decompressive thoracic laminectomy on Crystal Goodwin;

10. The purpose for neuromonitoring and the standard of care known to Midlands Orthopaedics related to neuromonitoring of Crystal Goodwin during the surgery on July 28, 2016;

11. The facts and circumstances related to treatment of patients other than Crystal Goodwin that have been rendered paralyzed or suffered neurologic deficits and/or motor impairment following a surgery performed by Dr. Holbrook;

12. The employment of Dr. Holbrook with Midlands Orthopaedics;

13. The history and substance of all employment agreements, including any amended agreements among and between Dr. Holbrook and Midlands Orthopaedics;

14. The separation of employment of Dr. Holbrook at Midlands Orthopaedics;

15. Any meeting minutes of Midlands Orthopaedics related to Dr. Holbrook;

16. Any resolution(s) passed by Midlands Orthopaedics related to Dr. Holbrook;

17. The legal relationship with Midlands Orthopaedics and Arcis Healthcare, LLC, including any and all written agreements related to ownership and control;

18. Any communications (orally, written, including by email or any electronic means) in the possession or control of Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

19. Any complaints received by Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

20. Any communications (orally, written, including by email or electronic means) in the possession of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

21. Any emails, correspondence, and documentation sent to and/or received by employees and physicians of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

22. Any health and/or medical conditions of Dr. Holbrook, including any physical or mental disabilities or limitations;

23. Any emails, correspondence, and documentation of any nature at Midlands Orthopaedics related to Dr. Holbrook having instability, motor function complaints, tremors, or shaking of his upper extremities and hands.

24. Patient complaints received by Midlands Orthopaedics on Dr. Holbrook from January 1, 2013 to present;

25. The clinical and hospital privileges of Dr. Holbrook, spanning from January 1, 2013 until present, including the reasons for any changes to these privileges;

26. Any and all policies, procedures, and/or protocols promulgated or adopted by Midlands Orthopaedics to in any way guide or direct its healthcare providers in their duties, both as existed on July 28, 2016, and as exists today;

27. Policies, procedures, and/or protocols related to physicians "charting" and writing operative reports and treatment records that were in any way appliable to the surgeries Dr. Holbrook performed on Crystal Goodwin on July 28, 2016;

28. Claims, Notices of Intent to File, and/or Summons and Complaints made against Midlands Orthopaedics that in any way involve Dr. Holbrook;

29. Insurance policies/coverage for Dr. Holbrook and Midlands Orthopeadics appliable to cover incidents/occurrences which took place on July 28, 2016;

30. Any and all insurance coverage that would possibly be applicable to cover any injuries resulting from the surgery Dr. Holbrook performed on Crystal Goodwin on the morning of July 28, 2016.

31. Malpractice insurance coverage for Dr. Holbrook and/or Arcis Healthcare, LLC;

32. The income and current net worth of Midlands Orthopaedics.

This deposition will be taken before some officer authorized by law to take depositions and will continue from day to day until complete. The deposition may be conducted via videoconferencing or telephonic means, and may be recorded on videotape in addition to stenographic transcription.

This deposition is being taken for the purpose of discovery, for use at trial, and for all other purposes as may be permitted under the rules of this Court and all applicable statutes and laws.

****

REQUEST FOR PRODUCTION

FURTHER, pursuant to Rule 34, SCRCP, **Plaintiffs directs Midlands Orthopaedics to produce and allow to inspect within 30 days of this Notice and to also bring to this deposition** the following documents, materials, information, computer application and/or data for production and inspection:

1. All employment agreements, including any amended agreements among and between Dr. Holbrook and Midlands Orthopaedics;

2. Any employment and/or shareholder resolution of Midlands Orthopaedics related to Dr. Holbrook;

3. Any meeting minutes of Midlands Orthopaedics related to Dr. Holbrook;

4. Documentation and agreements demonstrating the legal relationship with Midlands Orthopaedics and Arcis Healthcare, LLC, including any and all written agreements related to ownership and control;

5. Any communications (orally, written, including by email or electronic means) in the possession of Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

6. Complaints received by Midlands Orthopaedics about Dr. Holbrook as a physician, including his clinical judgment and skill as a physician;

7. The facts and circumstances related to treatment of patients other than Crystal Goodwin that have been rendered paralyzed, or suffered paralysis, following a surgery performed by Dr. Holbrook;

8. Communications and documents, including but not limited to email or electronic, in the possession of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

9. Any emails, correspondence, and documentation sent to and/or received by employees and physicians of Midlands Orthopaedics related to the separation and/or retirement of Dr. Holbrook from Midlands Orthopaedics;

10. Any emails, correspondence, and documentation of physicians at Midlands Orthopaedics related to Dr. Holbrook's employment, separation, and/or his care and treatment of patients;

11. Documentation related to any health and/or medical conditions of Dr. Holbrook, including any physical or mental disabilities or limitations;

12. Emails, correspondence, and documentation of any nature at Midlands Orthopaedics related to Dr. Holbrook having instability, motor function complaints, tremors, or shaking of his upper extremities and hands.

13. Patient complaints received by Midlands Orthopaedics on Dr. Holbrook from January 1, 2013 to present;

14. Documentation showing the clinical and hospital privileges of Dr. Holbrook, spanning from January 1, 2013 until present, including documentation showing the reasons for any changes to these privileges;

15. Documentation showing application for clinical and hospital privileges of Dr. Holbrook, spanning from January 1, 2013 until present;

16. Policies, procedures, and protocols at Midlands Orthopaedics related to physicians "charting" and writing operative reports and treatment records;

17. Notice of Intent to File Medical Malpractice actions and/or Summons and Complaints against Midlands Orthopaedics involving Dr. Holbrook;

18. Malpractice insurance coverage for Dr. Holbrook and Midlands Orthopeadics in effect as of July 28, 2016;

19. Malpractice insurance coverage that would cover Arcis Healthcare, LLC.

20. Any and all insurance coverage that would possibly be applicable to cover any injuries resulting from the surgery Dr. Holbrook performed on Crystal Goodwin on the morning of July 28, 2016.

Respectfully submitted,

By: _____

Robert F. Goings (S.C. Bar # 74859)
Jessica L. Gooding (S.C. Bar # 101210)
Christopher M. Paschal (S.C. Bar # 104722)
Goings Law Firm, LLC
1510 Calhoun Street
Post Office Box 436 (29202)
Columbia, South Carolina 29201
Phone: (803) 350-9230
Fax: (877) 789-6340
Email: rgoings@goingslawfirm.com
jgooding@goingslawfirm.com
cpaschal@goingslawfirm.com

–and–

Francis M. Hinson, IV (S.C. Bar # 74917)
Hinson Hiller & Padget
HHP Law Group, LLC
PO Box 83
Columbia, SC 29202
Phone: (803) 381-0108
Email: brink@hhplawgroup.com

Attorneys for Plaintiffs

March 1, 2021
Columbia, South Carolina

CERTIFICATE OF SERVICE

The undersigned does hereby certify that the following named individual(s) were served with a copy of the following indicated below by mailing a copy of same to said person(s) via EMAIL and the United States Postal Service, with sufficient postage affixed thereto and return address clearly marked on the date indicated below:

PARTY SERVED:

G. Murrell Smith, Jr., Esquire
Jonathan Robinson, Esquire
Smith | Robinson
2530 Devine Street
Columbia, SC 29205

Ashby W. Davis, Esquire
Davis Snyder Williford & Lehn, PA
5 Hawthorne Park Court
Greenville, SC 29615

Monteith P. Todd, Esquire
Vordman Carlisle Traywick, III
1310 Gadsden Street
Post Office Box 11449
Columbia, SC 29211

James Edward Bradley, Esquire
John C. Bradley, Jr., Esquire
Moore Taylor Law Firm PA
PO Box 5709
West Columbia, SC 29171

PLEADINGS/DOCUMENTS:

- **NOTICE OF TAKING VIDEOTAPED DEPOSITION OF MS. ANN MARGARET MCCRAW, AS THE 30(B)(6) DEPONENT ON BEHALF OF DEFENDANT MIDLANDS ORTHOPAEDICS AND NEUROSURGERY, AND REQUESTS FOR PRODUCTION TO MIDLANDS ORTHOPAEDICS AND NEUROSURGERY**

Leslie C Clamp

Columbia, South Carolina
March 1, 2021

Goings Law Firm

1510 CALHOUN STREET
P.O. BOX 436 (29202)
COLUMBIA, SC 29201

(P) 803.350.9230
(F) 877.789.6340

March 1, 2021

VIA UNITED STATES MAIL
Ashby W. Davis, Esquire
Davis Snyder Williford & Lehn, PA
5 Hawthorne Park Court
Greenville, SC 29615

Re: Crystal Goodwin and James Goodwin v. Midlands Orthopaedics and Neurosurgery, Thomas J. Holbrook, Jr., M.D., et. al.
Civil Action №.: 2019-CP-40-4185

Dear Ashby:

Please find enclosed for service upon you in the above-referenced matter a copy of the following:

1. Notice of Taking Videoptaped Deposition of Thomas J. Holbrook, Jr., M.D., as the 30(b)(6) Deponent on behalf of Defendant Midlands Orthopaedics and Neurosurgery, and Requests for Production to Midlands Orthopaedics and Neurosurgery; and
2. Notice of Taking Videoptaped Deposition of Ms. Ann Margaret McCraw, as the 30(b)(6) Deponent on behalf of Defendant Midlands Orthopaedics and Neurosurgery, and Requests for Production to Midlands Orthopaedics and Neurosurgery.

These depositions are scheduled to be held on March 23, 2021. My office has retained the services of a court reporter.

Sincerely,

Robert F. Goings
rgoings@goingslawfirm.com

RFG:lcc
Enclosure
cc: G. Murrell Smith, Jr., Esquire/Jonathan Robinson, Esquire
Monteith P. Todd, Esquire/Vordman Carlisle Traywick, III, Esquire
James Edward Bradley, Esquire/John C. Bradley, Jr., Esquire
Francis M. Hinson, IV, Esquire

CURRICULUM VITAE — THOMAS JEFFERSON HOLBROOK, JR., M.D.

Present Position: Midlands Orthopaedics and Neurosurgery
Current Address: 1910 Blanding Street
Columbia, SC 29201
Phone No.: 803-256-4107
Fax: 803-461-7624

Personal Data: Birthplace: Huntington, West Virginia
Spouse: Martha
Children: Three

Education: University of Kentucky
B.S. Biology
June 1977

Medical Education: West Virginia University School of Medicine
M.D. Degree, 1981
Surgical Internship – Vanderbilt University
Affiliated Hospitals - 1981-1982
Neurosurgical Residency – Vanderbilt University
Affiliated Hospitals - 1982-1987

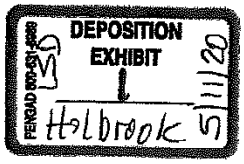
Licensure and Board Status: Board Certified: Am. Board of Neurological Surgery-9/89 #8987
SC State License # 13378

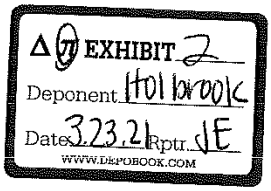
Hospital Appointments: Palmetto Health Baptist, Columbia, SC (active)
Palmetto Health Parkridge (active)
Providence NE Hospital, Columbia, SC (active)
Lexington Medical Center, West Columbia, SC(courtesy)

Professional Memberships: South Carolina Medical Association
Columbia Medical Society
Congress of Neurological Surgeons
American Association of Neurological Surgeons
SC Society of Neurosurgeons

Honors: Phi Beta Kappa, University of Kentucky

Bibliography: Holbrook, TJ; Fogo, A; Smith, HP
Histocytosis X Involving the Cervical Dura.
Childs Nerv Syst 1987; 3(10):50-Z





Surgical Documentation

Integumentary : No Significant Findings

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Ancillary Referrals
Referral Functional : No Referral Indicated
Referral Nutrition : No Referral Indicated
Referral Spiritual Care : No Referral Indicated
Referral Case Mgmt-Social History : No Referral Indicated

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Pain Evaluation
Primary Pain Location : Back
Laterality : Bilateral
Quality : Aching
Primary Pain Onset : Gradual
Primary Pain Time Pattern : Constant
Self Report Pain Tool : Numeric rating scale

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Numeric/FACES Pain Scale
Numeric Pain Scale : 4
Numeric Pain Score : 4

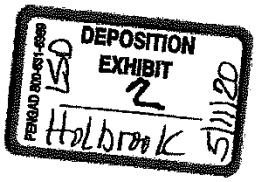
Wegrzyn RN, Pamela C - 07/22/2016 08:34

Image 1 - Images currently included in the form version of this document have not been included in the text rendition version of the form.

DOCUMENT NAME: Operative Report
SERVICE DATE/TIME: 7/28/2016 11:18 EDT
RESULT STATUS: Auth (Verified)
PERFORM INFORMATION: Holbrook MD,Thomas J (7/28/2016 11:18 EDT)
ELECTRONICALLY SIGNED BY: Holbrook MD,Thomas J (7/30/2016 13:34 EDT)

Operative Report
DATE OF OPERATION: 07/28/2016

SURGEON: Thomas J. Holbrook Jr., MD



PREOPERATIVE DIAGNOSIS: Thoracic spinal stenosis.

POSTOPERATIVE DIAGNOSIS: Thoracic spinal stenosis.

PROCEDURE: Decompressive thoracic laminectomy T9-10 through T11-12.

ATTENDING SURGEON: Holbrook.

ASSISTANT SURGEON: Maurio Riley

DESCRIPTION OF PROCEDURE: Patient brought to operating room. After the induction of satisfactory general endotracheal

anesthesia, the back was prepared and draped in the usual sterile manner. Fluoroscopy was used to localize the level. A portion of the previous incision was reopened extending inferiorly down through the posterior fascia. Paraspinous muscles were taken down bilaterally in a subperiosteal manner. Scar tissue from previous surgery was noted. The spinous processes at T11-12 were removed with a Leksell rongeur. Lamina were removed bilaterally with the Midas Rex, nosing the dura in the midline and dissection was continued in the midline and superiorly, dissecting scar tissue, partial calcification over the posterior dura up through the T9-10 level. This temporarily suspended correct some ventilation issues. Was continued and some additional bone in the lateral recesses. Examination with the Midas Rex and a small Kerrison rongeur. [____] remained stable up to this point and then abruptly stopped. The identifiable cause within the wound was demonstrated. Decompression was completed, thecal sac supple and was now well decompressed. Was irrigated, soft tissues were infiltrated with local anesthetic. A small Hemovac drain was left in the epidural space at the level of the [____] through a separate stab incisions superiorly and connected to an external drainage device. The paraspinous muscles were reapproximated with interrupted Vicryl, the posterior fascia with interrupted zero Nurolon, the subcutaneous tissues in layers of interrupted 2-0 Vicryl and the skin was skin staple approximator. The wound was dressed. Riley assisted with exposure and closing.

D: 07/28/2016 11:09 T: 07/28/2016 11:43 TID: 90079
Job #: 20940 Doc #: 20866988
cc: Thomas J. Holbrook Jr., MD

Electronically Signed & Verified on 07/30/2016 13:34 by Holbrook MD, Thomas J

DOCUMENT NAME:	Operative Report
SERVICE DATE/TIME:	7/28/2016 16:19 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Holbrook MD,Thomas J (7/28/2016 16:19 EDT)
ELECTRONICALLY SIGNED BY:	Holbrook MD,Thomas J (7/30/2016 13:34 EDT)

Operative Report
DATE OF OPERATION: 07/28/2016

SURGEON: Thomas J. Holbrook Jr., MD

PREOPERATIVE DIAGNOSES: [____] spinal stenosis with cord edema.

Surgical Documentation

POSTOPERATIVE DIAGNOSES: [____] spinal stenosis with cord edema.

PROCEDURE: Reexploration of laminectomy wound, stenosis.

ATTENDING SURGEON: Thomas J. Holbrook Jr., MD.

ASSISTANT SURGEON: Not dictated.

INDICATIONS: In recovering from anesthesia from the initial surgery, the patient had no voluntary movement in the lower extremities. She could localize sensation over the left lower extremity, but had no sensation below about a T10 level on the right. Repeat MRI scan of the thoracic spine was done which demonstrated some residual stenosis originating from the left at the superior portion of the laminectomy. Also edema within the cord at the superior portion of the laminectomy. The condition and findings were discussed with the husband by phone as he had already left the hospital, and the need for a repeat surgery. I believed that he understood and agreed to proceed.

DESCRIPTION OF PROCEDURE: The patient was returned to the operating room. After the induction of satisfactory general endotracheal anesthesia the back was prepared and draped. The wound was reopened down to the previous laminectomy site. On inspection, normal postoperative changes were identified. No hematoma was identified. On inspection of the superior portion of the laminectomy site showed partially calcified scar tissue was encountered on the left [____] the canal on the left side. Further dissection was done in this area [____] the scar tissue from the thecal sac and excising it to free up this portion of the spinal canal. The dura remained supple and did not appear to be under any tension. The wound was irrigated and careful attention paid to hemostasis. A small Hemovac drain was left in the wound at the level of the lamina, brought out through a separate stab incision superiorly and connected to an external drainage device. Paraspinous muscles were reapproximated with interrupted 2-0 Vicryl. The posterior fascia with interrupted 0 Nurolon, the subcutaneous tissue in layers of interrupted 2-0 Vicryl, and the skin with skin staple approximator. The wound was dressed.

D: 07/28/2016 16:11 T: 07/28/2016 16:55 TID: 420198
Job #: 21242 Doc #: 20867060
cc: Thomas J. Holbrook Jr., MD

Electronically Signed & Verified on 07/30/2016 13:34 by Holbrook MD, Thomas J

* Auth (Verified) *

NKA

PH Baptist Anesthesia Record

Continuous Anesthesia Start Time 0720	Continuous Anesthesia End Time 1156	Date 7-28-16
ASA 1 E	Surgeon Holbrook	
Anesthetist: ☐ Local ☐ MAC (☐ General ☐ Spinal ☐ Epidural) ☐ Type of Block:	Anesthesiologist	
Block By:	CRNA	
Post Op Analgesia	Diagnosis spinal stenosis @ T9-T12	
Post op Epidural by:	Procedure	
Art Line by:		
Central Line by:		

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536
03/02/1978 38Y F
HOLBROOK, THOMAS J

Time → 0720 30 0740 30 0800 30 0830 30 1000

Legend: BP, Pulse, Heart Area, Heart Op, End Anes, Respirations: Spontaneous / Assisted / Controlled, Pressor/Inotrope VS

BP 160/99
P 100
RR
O_2 99 %

Pre-anesthetic Checklist: OR #; Pt. I.D.; Pt. Chart; Consent; Anes. Equip; Anes. Monitors; NPO after 8A

Infusion: O_2; IV routine; IV with Buretrol; Infusion; Saf-Connector

Positions: Supine; Prone; Lithotomy; Lateral R/L; Arms Padded <90° Secured; Axillary Roll

Airway Maintenance: Nasal Cannula; Mask; Oral Airway; Nasal Airway; LMA #; Endotracheal Size 7.0 mm; Nasal; LTA; Bytel; ETT size 7; Fiberoptic Larynx; Smooth; Difficult Secured @ 21 cm; Tube position confirmed by: BS=B, ETCO2, Fiberoptic

Monitors: BP Cuff R/L; Arm ☐ Leg; Pulse Oximeter; $ETCO_2$; Temp S E R; Precordial Stethoscope; Bispectral Index; PaO_2 Analyzer; Disconn. Alarm; TWS

Invasive Monitors: Arterial Line; CVP

Eye Care: Lubrifresh ☐ Tape; Opticare; Left ☐ Right

NG Tube ___ Fr; OG Tube ___ Fr; Foley ___ Fr

Warming Equipment: Hot Line; Bair Hugger Upper; Bair Hugger Lower; Bair Hugger Pads; Level 1; WMS Fiber

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the anesthetic as planned.

Signature

Oxygen L/M	10	2	1.5	1.5	1.5	1.5	1.5	1.5	4	1.5	1.5	1.5
N_2O / O_2 L/M			1.5	1.5	1.5	1.5	1.5	1.5	X	1.5	1.5	1.5
%D F	8	6.5	5.7	7.0	1.0	1	1	1	1.0	1.0	1.0	1.0
Sev / SUX	4	6.0	3.4					2.5				
Propofol / Diprivan	200	100										
Versed (mg)												
Rocuronium / Other	10	10	7.5			10		10	10			10
Ketamine		20				10			10			
Precedex												10

EKG	SR	ST	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
$ETCO_2$	40	34	32	32	33	34	34	33	36	36	34	35
SAO_2	100	100	100	100	100	99	99	100	100	100	100	100
FIO_2	100	0.6	0.6	0.6	.6	.6	.6	.6	100	.6	.6	.6
Temp: E - R - S		35.0		36.1	35.7	35.7	35.4	35.4		35.7		
		✓	✓	✓	✓	✓	✓	✓	✓	✓		
SC / PIP	33	15	14	16	15	16	18	18	16	16	14	14
RR / Peak	12	15	14	15	10	15	10	15	9	15	9	15

Fluids: LR 1000 ml

Blood

EBL - Interval/Total: 50 / 50 / 100

Urine-Interval/Total: 40

IV Antibiotic: Ancef 2g IV
↑ 0745 ↓ 0759 Incision 0808
Surgeon Ordered ☑N ; Orders Changed Y☐

PRE MEDS: Q100 Reglan 10mg IVP's-83
Q115 Versed 2mg IV, Robinul 0.2mg IV-83

COMMENTS:
0648 Zantac 150mg IVP-83
(1) Still intermittent hiccups
both internal and ext — Fentanyl given
Pronounced at Eyebrow None present
800 head neck resected
(2) pt biting ETT, Rocc 25mg, IV, Solucort 10, Cefazolin 2g given, heart RATE to 130's, Pronounced 10 given, heart RATE to 130's, Pronounced Lennie Jones topped with Propofol, oral airway placed, head repositioned on foam pillow, eyes OK, head and suture. 97% SpO_2 100%

Prepared By:
☐ Pre-anesthesia Exam/Eval Performed
☐ Anesthesia Plan Prescribed
☐ Qualified Anesthetist

OR In Time: 0724

Post Anesthesia Evaluation: Patient Taken to: ☐ PACU ☐ OR Rec
OR Out Time:
BP: ___/___ LOC: ☐ AW ☐ AR ☐ NAR
Pulse: Airway: ☐ Oral ☐ Nasal ☐ Intubated
Resp:
SaO_2: ___% O_2 by: ☐ Mask ☐ N/C ☐ Room Air
Temp:
☐ No Anesthetic Complications @ Date:
Time: Signed:

82% Quick Dose-Diprivan → 0810
All meds are IV unless noted.

282019mr r6/99 r5/05 r7/07 r8/09 r12/09 r4/10 r7/15

DEPOSITION EXHIBIT 3 04/11/17 GOODWIN

* Auth (Verified) *

PH Baptist Anesthesia Record

Anesthesia Anesthetic Start Time: 0723 | Anesthesia Anesthetic End Time: 1155 | Date: 7/29/16

ASA 1 2 3 4 5 E

Anesthetic: ☐ Local ☐ MAC ☑ General ☐ Spinal ☐ Epidural

☐ Type of Block: _____

Block By: _____

Post Op Analgesia: _____

Post op Epidural by: _____

Art Line by: _____

Central Line by: _____

Surgeon: Holbrook

Anesthesiologist: JA

CRNA: _____

Diagnosis: _____

Procedure: See page 1

GOODWIN, CRYSTAL JAQUAY 942 01
B1620200813
MR 000275536 HOLBROOK, THOMAS
03/02/1978 38Y F

Time → 1115 30 1130 30

Legend: BP ▼ | Pulse ● | Start Anes ✖ | Start Op ◉ | End Anes ◎ | Respirations: Spontaneous ☐ Assisted ⊘ Controlled ⊗ | Pulse ox/Resp Vs: BP ___/___ P ___ RR ___ O2 ___

Pre-anesthetic Checklist: OR # ___ ☐ Pt. I.D. ☐ Pt. Chart ☐ Consent ☐ Anes. Form ☐ Anes. Machine NPO after ___

Induction: ☐ Pre-O2 ☐ IV induction ☐ IV with Sellick ☐ Inhalation ☐ Awake Intubation

Position: ☐ Supine ☐ Prone ☐ Lithotomy ☐ Lateral R/L ☐ Arms Padded ☐ < 90° Secured ☐ Axillary Roll

Airway Maintenance: ☐ Nasal Cannula ☐ Mask ☐ Oral Airway ☐ Nasal Airway ☑ LMA # 4 ☐ Intubation ☐ Extubation ☑ ETT Size 7.0 Fr ☐ Oral ☐ Nasal ☐ DTA ___ ☐ Rae ___ ☐ Lt. or ___ ☐ Fiberoptic Laryng ☐ Smooth ☐ Difficult Secured @ ___ cm. Tube position confirmed by: ☐ BS=B ☐ ETCO2 ☐ Fiberoptic

Monitors: ☐ EKG ☐ BP Cuff RA ☐ Arm ☐ Leg ☐ Pulse Oximeter ☐ ETCO2 ☐ Temp E R ☐ Precordial Stethoscope ☐ Esoph Steth ☐ O2 Analyzer ☐ Resp. Alarm ☐ Vent

Invasive Monitors: ☐ Arterial Line ☐ CVP

Eye Care: ☐ Lubricant ☐ Tape ☐ Opti-gard ☐ Left ☐ Right

☐ NG Tube: ___ Fr ☐ OG Tube: ___ Fr ☐ Foley

Warming Equipment: ☐ Hot Box ☐ Bair Hugger Upper ☐ Bair Hugger Lower ☐ Bair Hugger Pads ☐ Level 1 ☐ HME Filter

Re-evaluation and assessment of the physiologic state of the patient and readiness of the surgical environment has been done immediately prior to induction and administration of anesthesia and it is appropriate to proceed with the anesthetic as planned.

Signature

| | | |

* Auth (Verified) *

Palmetto Health Baptist
PRE-ANESTHESIA EVALUATION

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536
03/02/1978 38Y F
HOLBROOK, THOMAS J

Date 7-28-16 Time 1045

Proposed Operation Decompress IG - T12

Age 38 NPO 1 990 P 100 BP 140/99 Ht 162cm Wt 120kg OSAT 99%

BMI=45

Allergies Ø

NO	YES	PERTINENT HISTORY AND PHYSICAL FINDINGS
☐	☑	CARDIOVASCULAR (MI, Angina, CHF, PVD, (High BP) Arrhythmia)
☑	☐	PULMONARY DISEASE (Asthma, COPD, OSA, Tobacco)
☐	☑	CNS, NEUROMUSCULAR (CVA, Seizures, Dementia) Back Surg x2 - CLBP, thoracic stenosis
☑	☐	RENAL DISEASE (ESRD, CRI)
☑	☐	HEPATIC DISEASE (Hepatitis, Cirrhosis)
☑	☐	GASTROINTESTINAL (Hiatal Hernia, Obesity, GERD) Exam: ~~GI-RRL~~ -Other
☐	☑	ENDOCRINE (Diabetes, Thyroid) Hyp-clea
☑	☐	GYNECOLOGICAL (HCG -)
☑	☐	HEMATOLOGICAL (Anemia, Sickle Cell Disease or Trait, Bleeding Disorder)
☐	☐	ORAL CAVITY (Loose Teeth, Dentures, Difficult Airway) Ø loose, Clear
☐	☐	PREVIOUS PROBLEMS WITH ANESTHESIA (MH, PONV) Nausea
☐	☐	CURRENT MEDICATIONS Metformin, HCTZ, Lisinopril ✓ stopped today
	☐	PAIN SCORE 4 / 10
		OTHER BBS - 91

PERTINENT LAB:

12 / 36 — 335 — 3.7 — Cr. 7 — BUN — EKG

91 — B. S. — CXR

As A PHYSICAL STATUS CLASS (1.) 2, 3, 4, 5, E

RISK, BENEFITS, AND ALTERNATIVES DISCUSSED WITH PATIENT

PATIENT CONSENT TO PLAN OF Ga — 7/28/16 — M.D.

28203Bmr 8/12/02 r 6/08 r 11/10 r 7/13

BMC 91 @ 0.620
7-28-16

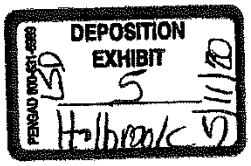
DEPOSITION EXHIBIT 4 02/11/15 Gaddis CSR

[redacted]

Nursing Documentation

DOCUMENT NAME:	SN PreOp Assessment
SERVICE DATE/TIME:	7/22/2016 08:34 EDT
RESULT STATUS:	Modified
PERFORM INFORMATION:	Wegrzyn RN,Pamela C (7/22/2016 08:34 EDT)
ELECTRONICALLY SIGNED BY:	Wegrzyn RN,Pamela C (7/22/2016 09:26 EDT); Wegrzyn RN,Pamela C (7/22/2016 08:34 EDT)

SN PreOp Assessment Entered On: 07/22/2016 08:44
Performed On: 07/22/2016 08:34 by Wegrzyn RN, Pamela C



Vital Signs- PAT
Temperature Oral : 98 DegF
Peripheral Pulse Rate : 86 bpm
Pulse Equipment : Dinamap
Resp. Rate : 20 br/min
Pulse Ox Sat : 97 %
Systolic : 156 mmHg
Diastolic : 92 mmHg
NIBP Cuff Site : Right arm
NIBP Position : Sitting
NIBP Equipment : Automatic

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Height & Weight
Dosing Weight : 119.5 kg
Dosing Height : 162 cm
Dosing BMI : 45.53 kg/m2
Scale Type : Stand up
Patient Stated Weight : 119.5 kg(Converted to: 263 lb 7 oz, 263.45 lb)
Patient Stated Height/Length : 162 cm(Converted to: 5 ft 4 in, 5.31 ft, 63.78 in)
Body Mass Index Calc Patient Stated : 45.53 kg/m2
Ideal Body Weight Calculated : 54.193 kg

Wegrzyn RN, Pamela C - 07/22/2016 08:34

General Information
Chief Complaint : numbness and tinglin g bilateral legs with letf leg weakness
Reason for Admission : posterior thoracic laminectomy for decompression t9- t12
Mode of Arrival : Ambulatory
Admitted From : Home
Primary Care Provider : No
Other Physicians : DR D FISHER-hx
holbrook
Actively Enrolled in a Clinical Trial : No
Information Source-Admission : Patient
Contact Numbers : HUSBAND IN WR DOS
james goodwin 803-477-5460
Orientation : Unit

Nursing Documentation

Who Was Oriented : Patient
Type of Housing : Home
Lives With : Family, Spouse
Patient's Preferred Language: : English
Literacy : Can Read and Write
Modes of Communication : Verbal
Communication Barriers : None

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Advanced Directives
Advanced Directives : No Living Will, No Health Care Power of Attorney, Info Offered/Pt Refused

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Allergies
Latex Sensitivity General : No
Latex Sensitivity Food : No
Allergy Information : Allergy Information Complete

Wegrzyn RN, Pamela C - 07/22/2016 08:34
(As Of: 7/22/2016 8:44:05 EDT)

Allergies (Active)

NKA — *Estimated Onset Date:* Unspecified ; *Created By:* Maldonado, Linda T; *Reaction Status:* Active ; *Category:* Drug Allergy ; *Substance:* NKA ; *Type:* Allergy ; *Updated By:* Maldonado, Linda T; *Reviewed Date:* 07/22/2016 08:38

Psychosocial-Cultural
Cultural-Religious Practices : NONE
Religion: : None
Religion : Baptist
Body Piercing(s) : Yes
Body Piercing(s) Comment : ears

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Social History
Social History

(As Of: 7/22/2016 9:27:37 EDT)

Tobacco:
Never smoker (Last Updated: 7/22/2016 8:38:32 EDT by Wegrzyn RN, Pamela C)

Alcohol:
Denies Alcohol Use (Last Updated: 7/22/2016 8:38:39 EDT by Wegrzyn RN, Pamela C)

Health History- PAT
Current Procedures-Treatments : None
History of Positive PPD : No
History of Active TB : No
History of Treatment : No

Nursing Documentation

Assistive Devices : None
Implantable Devices : Caps/Crowns
Anesthesia History : No Anesthesia Complications

Wegrzyn RN, Pamela C - 07/22/2016 08:34

ID Travel Screen
Symptomatic After Exposure to Contagion : No
Symptomatic After Travel High-Risk Area : No

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Problem History

(As Of: 7/22/2016 9:27:37 EDT)

Problems(Active)

Arthritis (SNOMED CT :13ED4849-4C1C-40A2-8F9C-EFF7C070C626)	*Name of Problem:* Arthritis ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* 13ED4849-4C1C-40A2-8F9C-EFF7C070C626 ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:27 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT
Back pain (SNOMED CT :2646370015)	*Name of Problem:* Back pain ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* 2646370015 ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:27 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT
Hypertension (SNOMED CT :64176011)	*Name of Problem:* Hypertension ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* 64176011 ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:26 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT
Pre-diabetes (SNOMED CT :D53A029B-437F-4029-A1CB-5E7C4CE4FCFF)	*Name of Problem:* Pre-diabetes ; *Recorder:* Wegrzyn RN, Pamela C; *Confirmation:* Confirmed ; *Classification:* Patient Stated ; *Code:* D53A029B-437F-4029-A1CB-5E7C4CE4FCFF ; *Contributor System:* PowerChart ; *Last Updated:* 7/22/2016 09:27 ; *Life Cycle Date:* 7/22/2016 ; *Life Cycle Status:* Active ; *Vocabulary:* SNOMED CT

Procedure History

Procedure History

(As Of: 7/22/2016 9:27:37 EDT)

Anesthesia Minutes: 0 ; *Procedure Name:* Thoracic back surgery x2 ; *Procedure Minutes:* 0 ; *Last Reviewed Dt/Tm:* 7/22/2016 9:27:33 EDT

Anesthesia Minutes: 0 ; *Procedure Name:* lap tubal ligation ; *Procedure Minutes:* 0 ; *Last Reviewed Dt/Tm:* 7/22/2016 9:27:33 EDT

Anesthesia Minutes: 0 ; *Procedure Name:* vaginal delivery x3 ; *Procedure Minutes:* 0 ; *Last Reviewed Dt/Tm:* 7/22/2016 9:27:33 EDT

Family History
Family History

(As Of: 7/22/2016 8:44:06 EDT)

Father: *Relation:* Father ; *Gender:* Male ;

Nomenclature: Hypertension ; *Value:* Positive

Nomenclature: Acute myocardial infarction ; *Value:* Positive

Mother: *Relation:* Mother ; *Gender:* Female ;

Nomenclature: Hypertension ; *Value:* Positive

SN System History Part 1
Respiratory : No Significant Findings, Bronchitis
Cardiovascular : Hypertension, Heart Murmur
Endocrine : Other: prediabetes on metformin
Hematological-Immunological : No Significant Findings
Neurological-Musculoskeletal : Alert & Oriented Times Three, Arthritis, Numbness & Tingling, Back Problems/Surgery
Psychological : No Significant Findings

Wegrzyn RN, Pamela C - 07/22/2016 08:34

SN System History Part 2
EENT : No Significant Findings
Gastroenterological : No Significant Findings
Genito-Urinary : No Significant Findings
Gynecological Status : Reproductive Age, Tubal Ligation
Pregnant? : No
LMP Date : 7/18/2016
Hepatic : No Significant Findings
Integumentary : No Significant Findings

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Ancillary Referrals
Referral Functional : No Referral Indicated
Referral Nutrition : No Referral Indicated
Referral Spiritual Care : No Referral Indicated

Nursing Documentation

Referral Case Mgmt-Social History : No Referral Indicated

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Pain Evaluation
Primary Pain Location : Back
Laterality : Bilateral
Quality : Aching
Primary Pain Onset : Gradual
Primary Pain Time Pattern : Constant
Self Report Pain Tool : Numeric rating scale

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Numeric/FACES Pain Scale
Numeric Pain Scale : 4
Numeric Pain Score : 4

Wegrzyn RN, Pamela C - 07/22/2016 08:34

Image 1 - Images currently included in the form version of this document have not been included in the text rendition version of the form.

DOCUMENT NAME:	Braden Scale
SERVICE DATE/TIME:	7/28/2016 06:22 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Foster RN,Rebecca E (7/28/2016 06:22 EDT)
ELECTRONICALLY SIGNED BY:	

Braden Scale
07/28/16 06:22 EDT Performed by Foster RN, Rebecca E
Entered on 07/28/16 06:23 EDT

Braden

Sensory Perception	No Impairment (4)
Moisture	Rarely moist (4)
Activity	Walks frequently (4)
Mobility Braden	No limitations (4)
Nutrition	Adequate (3)
Friction and Shear	No apparent problem (3)
Braden Score	22

DOCUMENT NAME:	Admission History
SERVICE DATE/TIME:	7/28/2016 20:15 EDT
RESULT STATUS:	Auth (Verified)
PERFORM INFORMATION:	Moore RN,Chari R (7/28/2016 22:32 EDT)
ELECTRONICALLY SIGNED BY:	Moore RN,Chari R (7/28/2016 22:32 EDT)

Admission History Entered On: 07/28/2016 22:32
Performed On: 07/28/2016 20:15 by Moore RN, Chari R

* Auth (Verified) *

JUL/22/2016/[redacted] 10:45 AM [redacted] [redacted] FAX No. [redacted] 002/006

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DELBRIDGE GOODWIN, CRYSTAL J (id #2176596, dob: 03/02/1978)

Encounter Summary

Patient

Name	DELBRIDGE GOODWIN, CRYSTAL (38yo, F) ID# 2176596	[redacted]	07/18/2016 08:45AM
DOB	03/02/1978	[redacted]	MOPA_PNE
Provider	THOMAS J. HOLBROOK, JR., MD		
Insurance	Med Primary: BCBS-SC: (PPO) Insurance # : ZCW052657245612 Policy/Group # : 031456000 Prescription: ESI1 - Member is eligible. Prescription: ESI1 - Member is eligible.	GOODWIN, CRYSTAL JAQUAY B1620200813 MR 000275536 HOLBROOK, THOMAS J JR 03/02/1978 38Y F	

Chief Complaint

Followup: Spinal stenosis of lumbar region

HPI

This lady returns for follow-up of thoracic stenosis. She states essentially she was last seen that her symptoms have improved. She has no back pain she still has some intermittent discomfort around the left knee particularly with standing for more than about 30 minutes or so at a time. She feels that her strength is normal. MRI scanning of her thoracic and lumber spine have the main finding of marked stenosis at the T10-11 and T11-T12 areas with some recurrent stenosis at the T9-10 level with an osteophyte noted on the left.

Vitals

07/18/2016 08:28 am
BP: 128/81 sitting

Medications

Reviewed Medications

benzonatate 200 mg capsule	03/18/16	filled
ergocalciferol (vitamin D2) 50,000 unit capsule	02/10/16	filled
hydrochlorothiazide 25 mg tablet	03/01/16	filled
hydrochlorothiazide 50 mg tablet	06/21/16	filled
hydrocodone-homatropine 5 mg-1.5 mg/5 mL syrup	03/18/16	filled
lisinopril 10 mg tablet	03/01/16	filled
meloxicam 15 mg tablet	06/03/16	filled
metformin 1,000 mg tablet	06/12/16	filled
sulfamethoxazole 800 mg-trimethoprim 160 mg tablet	03/18/16	filled

Allergies

Reviewed Allergies

PENGAD 800-631-6989 LSD DEPOSITION EXHIBIT D-1 Holbrook 5/11/20

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DELBRIDGE GOODWIN, CRYSTAL J (Id #2176596, dob: 03/02/1978)

ROS

Patient reports no fever, no night sweats, no significant weight gain, no significant weight loss, and no exercise intolerance. She reports no dry eyes, no irritation, and no vision change. She reports no difficulty hearing and no ear pain. She reports no frequent nosebleeds and no nose/sinus problems. She reports no sore throat, no bleeding gums, no snoring, no dry mouth, no mouth ulcers, no oral abnormalities, and no teeth problems. She reports no chest pain, no arm pain on exertion, no shortness of breath when walking, no shortness of breath when lying down, no palpitations, and no known heart murmur. She reports no cough, no wheezing, no shortness of breath, no coughing up blood, and no sleep apnea. She reports no abdominal pain, no vomiting, normal appetite, no diarrhea, not vomiting blood, no dyspepsia, and no GERD. She reports no incontinence, no difficulty urinating, no hematuria, and no increased frequency. She reports no muscle aches, no muscle weakness, no arthralgias/joint pain, no back pain, and no swelling in the extremities. She reports no abnormal nails, no jaundice, and no rashes. She reports no loss of consciousness, no weakness, no numbness, no seizures, no dizziness, and no headaches. She reports no depression, no sleep disturbances, feeling safe in relationship, and no alcohol abuse. She reports no fatigue. She reports no swollen glands and no bruising. She reports no runny nose, no sinus pressure, no itching, no hives, and no frequent sneezing.

Physical Exam

Patient is a 38-year-old female.

On examination there is no point tenderness to palpation over the thoracolumbar spinous processes. She ambulates satisfactorily. There is no gross focal motor deficit in the lower extremities. She is able to step up onto a low stool with either legs satisfactorily. Sensation is intact to pinprick in the lower extremities.

Assessment / Plan

This lady has some marked progressive thoracic spinal stenosis from T9-T12 at the disc levels. There is encroachment on the spinal cord. As the stenosis is marked and progressive I have recommended surgery I have discussed with her the surgical procedure for a decompression from T9-T12. I also discussed with her the indications and risks for surgery as well believe that she understands and would like to go ahead and schedule this to be done.

1. **Spinal stenosis of lumbar region**
   M48.06: Spinal stenosis, lumbar region
   - SPINAL STENOSIS: CARE INSTRUCTIONS

Return to Office

- Thomas J. Holbrook, Jr., MD for Operating at MOPA_BMC Surgery on 07/28/2016 at 07:30 AM
- Thomas J. Holbrook, Jr., MD for NS-SR at MOPA_PNE on 08/08/2016 at 09:45 AM
- Thomas J. Holbrook, Jr., MD for NS-OV at MOPA_PNE on 08/29/2016 at 01:00 PM

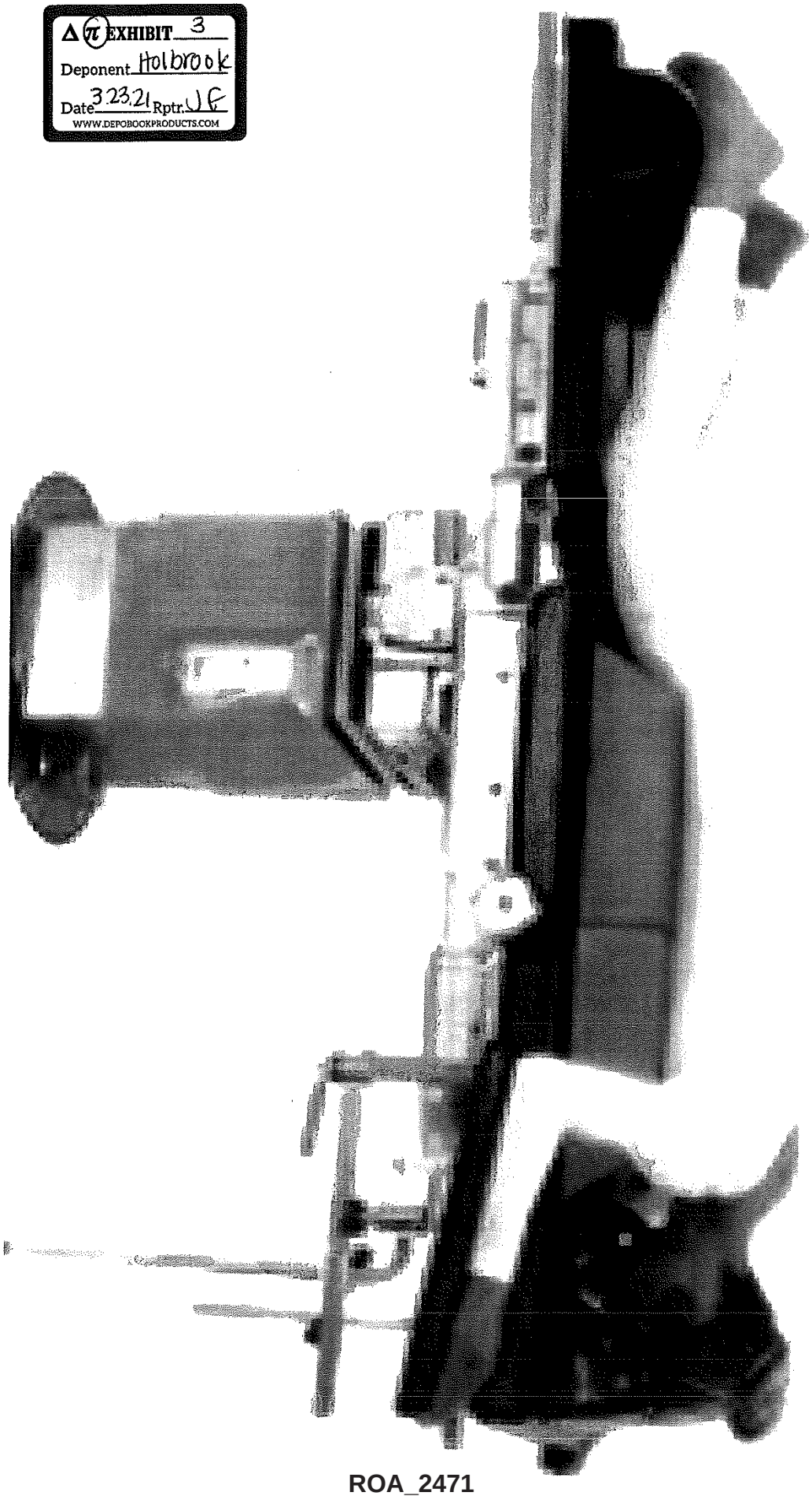
Encounter Sign-Off

Encounter signed-off by Thomas J. Holbrook, Jr., MD, 07/18/2016.

Encounter performed and documented by Thomas J. Holbrook, Jr., MD
Encounter reviewed & signed by Thomas J. Holbrook, Jr., MD on 07/18/2016 at 2:39pm

GOODWIN, CRYSTAL JAQUAY
B1620200813
MR 000275536 HOLBROOK, THOMAS J JR
03/02/1978 38Y F

EXHIBIT 3
Deponent Holbrook
Date 3.23.21 Rptr. JF
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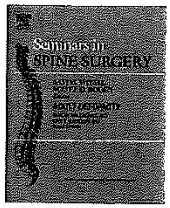
Semin Spine Surg 27 (2015) 229–232



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Management of intraoperative neuromonitoring signal loss



Amit Jain, MD[a], *A. Jay Khanna, MD, MBA*[a], *and Hamid Hassanzadeh, MD*[b,*]

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[b]*Department of Orthopaedic Surgery, University of Virginia, P.O. Box 800159, Charlottesville, VA 22908*

ABSTRACT

Intraoperative neuromonitoring is an important tool for providing safe and effective care to patients undergoing spine surgery. Combined neuromonitoring modes, including transcranial motor evoked potentials and somatosensory evoked potentials, are frequently used. Loss of neuromonitoring signals can be associated with potentially devastating consequences. This review discusses management of intraoperative neuromonitoring signal loss during spine surgery. The authors describe a stepwise algorithm for troubleshooting signal loss.

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1. Introduction

Loss of neuromonitoring signals can be associated with potentially devastating consequences, yet it may also occur because of technical issues that result in false-positive findings. The objective of this review is to discuss the management of intraoperative neuromonitoring signal loss during spine surgery.

2. Background

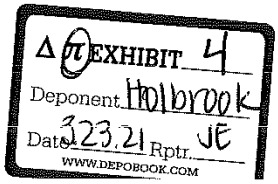
Since its development in the 1970s, intraoperative neuromonitoring has become a vital component in performing spine surgery safely.[1] At most institutions, traditional neuromonitoring relies on a combination of somatosensory evoked potential (SSEP) and motor evoked potential (MEP) methods.[2,3] SSEPs assess the transmission of the afferent signal from the periphery up to the somatosensory portion of the cerebral cortex. They rely primarily on intact dorsal column pathways that cross over at the medullary lemniscal decussation and result in signal detection at the contralateral somatosensory cortex, measured via electrodes placed on the scalp. MEPs assess the transmission of the efferent signal from the cortex to the periphery.[4] However, because of the difficulty in stimulating the motor cortex directly, transcranial stimulation motor evoked potentials (TcMEPs) are frequently used as a surrogate. Signals generated via TcMEPs can be measured directly from the spinal cord or, more frequently, from the skeletal muscle in the form of compound muscle action potentials.

TcMEPs can detect cord-level changes in real time and help prevent potentially devastating outcomes. In a study of 176 patients who underwent surgery for spinal deformity correction, the sensitivity and specificity of combined MEP and SSEP neuromonitoring were 92.9% and 99.4%, respectively, in the detection of neurologic deficits.[5] Similarly, a study of 172 scoliosis patients found that combined MEP and SSEP neuromonitoring had sensitivity and specificity of 100% and 98%, respectively, for the detection of neurologic impairment.[6]

SSEP data, by definition, are not available in real time, because they rely on averaging of signal to exclude background noise. This results in latency compared with MEPs. In a study of 176 patients who underwent spine surgery for

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deformity correction, SSEPs lagged MEPs by an average of 15 min when both were found to be positive.[5] In another study, SSEP changes lagged TcMEP changes by 5 min.[7] Nevertheless, in a study of 213 patients undergoing spine surgery, SSEP changes were associated with 94.7% specificity for the detection of new postoperative neurologic deficit.[8]

3. Managing signal change

The criteria for determining a positive signal change that prompts surgeon notification with SSEPs and MEPs are frequently institution dependent. For SSEPs, a threshold of 50% amplitude loss is often used. For TcMEPs, definition of a positive result varies widely, and a drop of 50–80% may be accepted as a positive result, depending on the surgeon's practice. A Dutch group studied 145 patients undergoing spinal deformity surgery and concluded that a threshold of more than 80% amplitude reduction in TcMEP in one recording during surgery was sufficient to consider it a positive response.[9] In the authors' institutions, unilateral or bilateral amplitude loss of approximately 50% in TcMEP is used as a trigger.

Regardless of the threshold used, signal change during intraoperative neuromonitoring can be an anxiety-provoking experience for the operative team. It is essential to develop a stepwise troubleshooting algorithm to manage problems effectively. In this review, the discussion is limited to combined TcMEP and SSEP neuromonitoring and describes a stepwise algorithm (Fig.) for management of intraoperative neuromonitoring signal loss during spine surgery.[10–13]

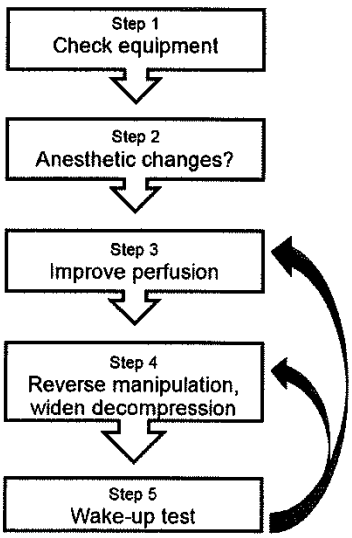


Fig. – Management of intraoperative neuromonitoring signal loss during spine surgery.

4. Stepwise algorithm

4.1. *Step 1: Check equipment*

It is important to ensure that the loss of signal is not caused by an equipment malfunction. Electrode dislodgement from the scalp (in the case of SSEPs) or the muscle (in the case of compound muscle action potentials) can frequently occur during surgery, especially with mechanical manipulation of the spine and positioning of the patient on the operating table. After checking electrode integrity, the next step is to check the wire circuit for discontinuity. Finally, monitoring equipment, including stimulation devices and recording boxes, should be inspected because they may malfunction after exposure to irrigation and blood.

Another source of signal distortion may be electrical interference from digital equipment such as warming blankets, fluoroscopy units, electrocautery equipment, large magnetic devices, and the operating microscope. It is important to exclude these potential sources of electrical interference as the reason for signal change.

4.2. *Step 2: Assess for changes in anesthesia*

Inhaled agents are known to alter SSEP and MEP characteristics.[3,14] These effects tend to be more pronounced on MEPs. Similarly, muscle relaxants tend to affect MEPs, given MEPs' reliance on compound muscle action potential generation. Thus, changes in the anesthetic gas or administration of specific agents such as nitrous oxide can alter MEP and SSEP signals. It is important to communicate with the anesthesia team to ensure that the anesthesia and surgical plans are well aligned to avoid these events at inopportune times such as during instrumentation or during a three-column osteotomy. Further, total intravenous anesthesia has been proposed as an alternative to inhaled agents because of its potentially smaller effect on signal integrity of SSEPs and MEPs compared with volatile agents.[15] However, further studies are required to validate the benefits of total intravenous anesthesia in spine surgery patients.

4.3. *Step 3: Optimize cord perfusion environment*

The next step after ruling out equipment failures and anesthetic changes is the optimization of spinal cord perfusion. SSEP amplitude decreases with ischemia and anoxia because of temporal dispersion of the afferent volley, as well as conduction block in the affected axons.[16] A minor drop in blood pressure can lead to significant SSEP changes that may reverse with increasing perfusion pressure.

In the authors' experience, to ensure adequate cord perfusion, mean arterial pressure should be elevated to 80–90 mm Hg, any anemia with hemoglobin below 8 mg/dL should be reversed, and patient oxygenation should be increased. In a study of 37 patients undergoing three-column osteotomies for rigid pediatric spinal deformities who developed >50% TcMEP signal loss, increasing the mean arterial pressure resolved MEP signal loss in 50% of

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cases.[17] Similarly, in another study of 35 adults with fixed sagittal balance undergoing deformity correction surgery, an increase in cord perfusion pressure through volume or pharmacologic measures resulted in TcMEP improvement in 10 of 25 patients.[18] In addition to improving cord perfusion, any hypocapnic alkalosis and hypothermia should be reversed, because they may lead to cord ischemia and further changes in monitoring.

4.4. *Step 4: Reverse manipulation and widen decompression*

Sometimes the MEP and SSEP changes persist despite intact equipment, no changes in anesthetic agent, normal electrolyte balance and hemoglobin, and good cord perfusion pressures. The signal changes frequently occur after mechanical manipulation of the spine. It is important to address, or if possible, reverse, the offending step. For example, if the signal change developed after compression or distraction across a spinal level, then it is important to reverse that manipulation. In the authors' experience, it may take ≥ 10 min after reversing the mechanical manipulation for the signals to return.

However, if the signals still do not return, in some cases, further decompression at the concerning level is warranted to ensure that epidural hematoma formation or remaining osseous compression is not responsible for the signal change. The authors have found that in the setting of three-column osteotomies, signal reduction or loss can often be reversed by closing the osteotomy, which decompresses the spinal cord. If neuromonitoring alerts continue to arise during the osteotomy closure stage, signal may be restored by opening the osteotomy to adjust the cage and reduce the correction, followed by eventual closure.

4.5. *Step 5: Stagnara wake-up test*

The Stagnara wake-up test, first described by Vauzelle et al.[19] in 1973, is the "gold standard" for ultimate assessment of functional integrity of the spinal cord during surgery. It requires partially awakening the patient intraoperatively to test motor function. Although the test does not provide information on sensory pathways, it provides an assessment of motor function, indicating any potential injuries to the cord. Aside from being cumbersome, associated with some risk, and difficult to perform repeatedly, the major problem with the Stagnara wake-up test is that, unlike the real-time monitoring available via TcMEP, substantial time may elapse between injury and deficit detection. As a result, it is impossible to make real-time changes to the surgical plan to minimize cord injury. Further, there may be a mismatch in timing in terms of motor function activation between the upper and the lower extremities, depending on the patient's level of sedation, which may confound the results. However, if steps 1–4 do not lead to a satisfactory restoration of SSEP and TcMEP amplitudes, a Stagnara wake-up test may be considered if the surgical team believes that the potential benefits outweigh the risks. A positive Stagnara wake-up test will necessitate further changes as listed in steps 3 and 4 (Fig.).

5. Conclusions

Intraoperative neuromonitoring is a vital component in providing safe and effective care to patients undergoing spine surgery. Appropriately addressing neuromonitoring signal changes in a systematic and timely manner can help avert potentially devastating outcomes. The five-step algorithm described herein can be used for troubleshooting neuromonitoring signal changes in adults and children undergoing spine surgery.

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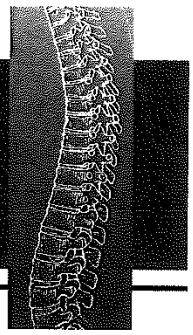
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Contemporary Spine Surgery

VOLUME 13 ■ NUMBER 8 ■ AUGUST 2012



Intraoperative Neuromonitoring in Spine Surgery

Keith W. Michael, MD, and Scott D. Boden, MD

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LEARNING OBJECTIVES: After participating in this CME activity, the spine surgeon should be better able to:

1. Evaluate the indications for, limitations of, and clinical evidence associated with each available form of intraoperative monitoring.
2. Identify the anatomy monitored by each modality.
3. Create an intraoperative monitoring plan tailored to the needs of a case.

Intraoperative neurologic injury is a complication feared by patients and spine surgeons alike. Postoperative neurologic deficits occur in 1% of spine surgeries, with slightly higher rates in more complex operations or revision surgeries.[1] The Stagnara wake-up test[2] was one of the earliest forms of intraoperative neuromonitoring but required awakening the patient during surgery. Along with developments in spine surgery instrumentation, techniques, and approaches, there have been parallel developments in intraoperative monitoring (IOM). It is possible to monitor the sensory and motor tracts in the spinal cord and nerve roots using electromyography (EMG). Monitoring the neurologic elements without direct visualization has fostered the development of percutaneous pedicle screw placement and numerous minimally invasive fusion techniques. IOM can make traditional procedures such as deformity corrections, tumors, and spinal cord decompression safer.

Although the benefits are numerous, IOM introduces a number of new challenges. First, it can place restrictions on neuromuscular blockade and inhalational agents for anesthesia (Table 1). Second, the surgeon must understand the indications and limitations of each type of IOM to ensure the desired monitoring goal is achieved. Finally, learning how to respond to intraoperative triggers or alerts from the IOM is paramount.

Triggers can represent evidence of neurologic embarrassment, changes in patient temperature, blood pressure, anesthesia, or may represent false-positive results. Determining the etiology of these triggers during the case may delay or alter the surgical plan, which may be unnecessary in the setting of a false-positive trigger. IOM has the potential to facilitate intraoperative recognition of impending neurologic embarrassment, but to maximize its efficacy, it requires a team effort among the neurophysiology, anesthesia, and surgical teams.

The goal of this article is to review the indications, limitations, and clinical evidence for each form of IOM and to review management of intraoperative alerts. This will allow the surgical team to tailor the types of IOM specifically to each case to maximize clinical benefit.

INTRAOPERATIVE AWAKE NEUROMONITORING TECHNIQUES

The Stagnara wake-up test,[2] named after one of the original authors in 1973, is the gold standard for awake neuromonitoring. Anesthesia is lightened intraoperatively until the patient is able to demonstrate lower extremity movement on command. Patient-driven respiratory effort confirms that chemical paralysis has resolved sufficiently to allow active motor function. Upper extremity movement serves as a positive control, reducing the chance of a false result from oversedation. Benefits of the Stagnara wake-up test include direct confirmation of motor function, low cost, and the absence of complex technology with the potential for failure. Drawbacks include single-point-in-time testing because this procedure is usually performed only once during the case, typically after the deformity is corrected.

This test introduces a delay into the procedure while the patient is gradually lightened from and then returned to general anesthesia. In addition, it requires patient cooperation and sufficient mental capacity to understand the exercise. Patient pain during the awakening or dislodgment of provisionally fixed hardware, which were initial concerns, have not been observed. Most patients are amnestic to the events,

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with only approximately 12% of patients reporting any recollection.[3]

Hall et al[3] and Dorgan et al[4] collectively reported 268 scoliosis cases monitored with the Stagnara wake-up test. Seven intraoperative neurologic deficits were identified; 6 resolved fully with release of distraction on the Harrington rod. There was a single case of an intraoperative deficit from which the patient did not fully recover, despite intraoperative attempts at correction. The authors concluded that the Stagnara wake-up test was safe and reliable, and had the potential to reduce postoperative neurologic deficits by facilitating intraoperative recognition.

The ankle clonus test, reported by Hoppenfeld in 1997,[5] is another method of IOM that requires gradually awakening the patient. The test takes advantage of progressive levels of anesthesia depth. As anesthesia is lightened, cortical and upper motor neuron function are suppressed to a greater degree than lower motor neuron function. An intact reflex is indicated by the presence of clonus with rapid forced dorsiflexion at the ankle at a specific time during emergence from anesthesia. This tests both sensory and motor pathways, including the upper and lower motor neurons. Testing in 1006 instrumented spinal fusion cases and 115 controls resulted in 100% sensitivity and 99.7% specificity.[5]

The ankle clonus test is highly dependent on timing the correct anesthesia stage, which is typically at the end of the case just after the patient is extubated. The absence of clonus may indicate neurologic deficit or may indicate inappropriate timing relative to the level of anesthesia. Today most surgeons prefer the intraoperative Stagnara wake-up test to obtain earlier and more concrete confirmation. The ankle clonus test never gained popularity, and in 2005, Ewen and colleagues[6] reported significant decreases in specificity and sensitivity when the primary anesthetic agent included isoflurane or sevoflurane, limiting its use.

Among the awake neuromonitoring tests, the Stagnara wake-up test remains the gold standard for IOM. Today it can be used to evaluate a patient's motor function in the setting of an intraoperative alert from motor evoked potentials (MEPs).

SOMATOSENSORY EVOKED POTENTIALS

Somatosensory evoked potentials (SSEPs) were the first form of intraoperative neuromonitoring used in spine surgery and remain the most commonly used method.[7] Neurologically intact patients with changes in SSEP signals that correlated with application and release of distraction with Harrington rods suggested that IOM had the potential to identify neurologic deficits without awakening the patient.[7,8]

SSEPs monitor the somatosensory cortex and the dorsomedial tracts in the spinal cord, which carry proprioceptive signals from the peripheral nerves. Although motor deficits resulted in greater morbidity than proprioceptive deficits, SSEPs were initially chosen because the dorsal tracts had the closest proximity to direct damage from wires and surgical instruments.[9] It was thought that SSEPs served as a proxy for overall spinal cord function, including the motor tracts. With time, reports surfaced describing patients with postoperative motor deficits in the setting of unchanged SSEP signals.[10] In the presence of anterior spinal artery occlusion, it is possible to have an ischemia-induced motor deficit that may not be detected by SSEPs. The dorsomedial tracts are supplied by the radicular arteries, so focal ischemic from the anterior spinal artery may be not detected. This increased understanding of the limitations

This continuing education activity is intended for orthopaedic and neurologic surgeons and other physicians with an interest in spine surgery.

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Table 1. Anatomy, Advantages, Disadvantages, and Anesthesia Restrictions for Intraoperative Monitoring Modalities

Monitoring Modality	Anatomy Monitored	Advantages	Disadvantages	Anesthesia Limitations
Stagnara wake-up test	Voluntary motor pathway including upper and lower motor neurons	No monetary cost, reliable results	Single point-in-time testing, patients need to be prepared and able to follow commands, operative delay, prolonged anesthetic time	No specific restrictions, but short reversal times are beneficial
Clonus test	Motor and sensory, upper and lower motor neurons	No monetary cost, simple, tests motor and sensory functions	Narrow timing window at end of case, results can be effected by anesthesia	Unreliable with isoflurane or sevoflurane
SSEP	Somatosensory cortex, brainstem, dorsomedial tracts, peripheral sensory nerves	Continuous monitoring without patient movement, can be used with neuromuscular blockade	Does not monitor motor tracts or anterior spinal cord, alerts delayed compared with MEPs	Signals diminished with high concentrations of inhalational gases or nitrous oxide greater than 50%
MEP	Motor cortex, anterior corticospinal tracts, upper and lower motor neurons	Reliable motor function monitoring with high sensitivity and specificity	Restricted anesthesia, no neuromuscular blockade for CMAPs, run only at requested intervals, patient moves during testing	Ideally, requires total IV anesthesia, no neuromuscular blockade
EMG	Nerve roots at select levels	Real-time results, high sensitivity, facilitates minimally invasive surgery	Low sensitivity with sEMG	tEMG is reliable with up to 80% neuromuscular blockade

CMAP, compound motor action potential; EMG, electromyography; sEMG, spontaneous EMG; tEMG, triggered EMG; MEP, motor evoked potential; SSEP, somatosensory evoked potential.

of SSEPs contributed to an increase in use of MEPs and multimodal IOM (MIOM).

SSEP signals are measured by stimulating the peripheral nerve in the extremity. Most commonly, the posterior tibial nerve is stimulated at the medial malleolus. The peroneal or sural nerves may also be used.[8] The signal travels from the peripheral nerve to the dorsomedial tract in the spinal cord, through the brainstem, terminating in the somatosensory cortex. Signals are measured centrally in the cortical or subcortical region. Subcortical recordings allow for greater muscle relaxation and are less susceptible to inhalational anesthetics. Typically, a decrease in amplitude of 50% or latency of 10% is considered a threshold for an alert.[9] An additional lead is commonly placed in the popliteal fossa as a control. Loss of a signal in the popliteal fossa suggests a peripheral problem, ruling out a spinal etiology.

SSEPs have several advantages over other IOM modalities. First, SSEPs place fewer restrictions on anesthesia. Although SSEPs can be measured with total IV anesthesia (TIVA), it is not required. The most common anesthetic used with SSEPs is a low-dose inhalational agent with IV narcotics and sedatives.[11] A concentration up to 50% of nitrous oxide can be used with low-dose inhalation agents without signal degradation.[12] Propofol provides deeper hypnosis and improved cortical SSEPs when compared with a combination of low-dose isoflurane and nitrous oxide.[13] SSEPs can be monitored while the patient is paralyzed by muscle relaxants, which may help to reduce signal interference. Because signals are run continuously without patient movement, detection of an alert is not dependent on the proximity to the last time the case was paused and signals were tested, as is the case for other modalities. Although temperature and blood pressure can affect SSEP results, physiologic temperature and mean arterial pressure greater than 60 mm Hg are compatible with normal SSEPs.

The disadvantages of SSEPs are the delay in signal detection, isolated monitoring of the dorsal sensory tract, and overall sensitivity and specificity. Although signals are monitored continuously with SSEPs, the results are summed over time. There can be a delay in the detection of the neurologic insult, which has been estimated at between 5 and 33 minutes.[14,15] There are neurologic insults that may not be detected by SSEPs, such as those caused by occlusion of the anterior spinal artery that result in ischemia in the anterior two thirds of the spinal cord, as discussed earlier. Sometimes the infarct is global enough to be detected by SSEPs. SSEP sensitivity and specificity vary in the literature from 0% to 100% and 27% to 100%, respectively.[16] Many of the reports of sensitivity and specificity relate to postoperative motor deficits because they are most clinically significant. SSEPs will only detect motor deficits when the injury extends into the dorsomedial tract of the spinal cord. Additional modalities should be employed if monitoring of the motor tracts is desired.

In 2004, SSEP monitoring was available to 95% of surgeons in the United States and was the most common modality for the spinal cord monitoring.[17] In Canada in 2010, SSEP monitoring was available to only 65% of respondents.[18] Availability and usage may have evolved in the intervening time. Dawson et al[19] in 1991 reported SSEP results from 2 groups consisting of 60,366 and 33,000 cases, respectively. The rate of neurologic

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injury was 1.6%. This was identified intraoperatively by SSEPs 72% of the time. There were 26 false negatives and 248 false positives reported in the 33,000 case subgroup. Although decreases of 50% in amplitude and 10% change in latency are common thresholds for alerts, the average in this study group was a 44.3% decrease in amplitude and 10.9% change in latency since multiple protocols were combined. Altering thresholds will change specificity and sensitivity.[19] Isolated use of SSEPs in patients with neuromuscular scoliosis has less favorable results. Somatosensory cortical evoked potentials (SCEPs) had lower amplitudes and higher variability in patients with neuromuscular conditions, specifically spastic cerebral palsy, myelomeningocele, Friedreich ataxia, and peripheral neurologic deficits.[20] Reportedly, in 28% of neuromuscular cases, reliable SCEP tracings were not obtainable.[21] Later studies in this population suggested that the use of multiple recording sites for SSEPs significantly improved reliability, as did the addition of MEPs[22] or the use of epidural recording electrodes.[23]

Overall, SSEPs are one of the most commonly used IOM modalities. They allow less restrictive anesthesia protocols, are monitored continuously, and do not interrupt the flow of surgery. However, SSEPs only monitor the dorsomedial spinal tract, so multimodal monitoring is recommended if there is need for motor tract monitoring.

MOTOR EVOKED POTENTIALS

There is an emphasis on the ability to monitor motor tracts because motor deficits have a greater clinical morbidity than do sensory deficits. Initially, MEPs presented a number of challenges including stimulation, recording, and anesthetic restrictions. Advancements have significantly improved the use of MEP monitoring. In 1980, Merton and Morton[24] reported a method using high voltage to stimulate the motor cortex transcranially. Before this discovery, it was difficult to stimulate the motor cortex selectively without a craniotomy. The discovery enabled clinical use of transcranial MEPs (tcMEPs). Still, this single high-voltage spike was difficult to detect peripherally as a compound motor action potential (CMAP) because it degraded in the presence of inhalational anesthetics and neuromuscular blockade. Detection was limited to monitoring of the D-wave, the initial transmitted spike, over the spinal cord using an epidural electrode. These restrictions reduced enthusiasm for early MEPs. The development of total IV anesthesia and the practice of delivering a short train of 5 to 7 electrical pulses transcranially made CMAP measurement possible, dramatically increasing use of MEP monitoring.

A variation of MEPs called neurogenic MEP (NMEP) monitoring initially seemed promising. NMEPs produce reliable signals with complete neuromuscular blockade so that monitoring can proceed without patient movement.[25] NMEPs require direct stimulation of the spinal cord, so there was debate over whether sensory, motor, or both tracts were monitored. Although initial studies[25,26] suggested that the motor tracts were monitored with NMEP, later reports of postoperative motor deficits in the setting of unchanged NMEP signals raised further uncertainty.[27] Although NMEP monitoring places fewer restrictions on anesthesia, tcMEPs are now generally preferred to ensure direct monitoring of the motor tracts.[28]

As opposed to SSEPs, MEPS are stimulated proximally and recorded distally. There are 2 methods for transcranial motor cortex stimulation: magnetic or electrical. Magnetic stimulation is performed with a coil positioned over the motor cortex. Electrical stimulation using a subdermal corkscrew electrode is commonly used today. The signal can be detected using an electrode over the spinal cord (D-wave) or peripherally as CMAP, similar to EMG readings. Although D-waves can be detected during muscle paralysis and place fewer restrictions on anesthesia, measurement of CMAPs require TIVA and the absence of chemical muscle paralysis. Usually an upper extremity control is recorded in the abductor pollicis brevis, whereas the lower extremity signal can be recorded in the adductor hallucis brevis or tibialis anterior.[29]

The biggest advantage of MEPs is the ability to monitor the motor tracts directly. Typically, they detect intraoperative neurologic compromise faster than SSEPs, giving the surgical team a better chance at reversing the injury. Compared with SSEPs, they consistently perform at higher sensitivities and specificities, both ranging from 81% to 100%.[16]

Although MEPs are powerful, there are a number of drawbacks. First, there are significant restrictions on anesthesia. Most recommend TIVA when MEPs are performed because inhalational agents degrade signals. This may require special training for the anesthesia team. Short-acting inhalational agents and paralytics can be used during induction, but must clear quickly because baseline MEPs are typically acquired just before or shortly after positioning. MEPs are not run continuously like SSEPs. When CMAPs are measured, MEPs cause the patient to move on the operative table. Therefore the test is performed only at discrete time intervals, typically on request of the surgical team. This may result in decreased frequency of monitoring, and changes in MEPs can only be detected as frequently as the test is performed. Finally, MEPs are contraindicated in patients with seizure disorders, pace-dependent cardiac conditions, brain lesions, or cranial defects.[28]

Langeloo et al[30] reported a series of 142 patients monitored with tcMEP to compare the use of monitoring 2 versus 6 muscle groups. Using a decrease in amplitude of 80% in 1 of the 6 leads as the criterion for an alert resulted in a sensitivity of 100%, specificity of 91%, positive predictive value (PPV) of 61%, and negative predictive value (NPV) of 100% in detecting a postoperative neurologic deficit. Using the same criterion when only 2 recording sites were used yielded a sensitivity of 88%, specificity of 95%, PPV of 70%, and NPV of 98%. The recommendation was made for 6-lead monitoring for tcMEP.[30]

A number of studies have compared the performance of MEPs and SSEPs in detecting neurologic deficits. Hilibrand et al compared SSEPs with MEPs in 427 patients treated with cervical spine surgery. Twelve motor alerts occurred, 10 of which completely reversed after intraoperative adjustments. Of the 2 patients with postoperative motor deficits, 1 triggered a SSEP alert 33 minutes after the MEP alert, but in the other patient SSEPs never met the criteria for an alert. Reportedly, tcMEP

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sensitivity and specificity were 100%, whereas SSEP monitoring was 25% sensitive and 100% specific for postoperative motor deficits.[15]

Kim et al[31] evaluated the factors that contributed to high false-positive rates in tcMEP in cervical myelopathy. Although MEPs detected only the new postoperative deficit in the series of 52 consecutive patients, there were 5 additional false-positive tcMEP alerts. Sensitivity and specificity of tcMEP were both 100% but the PPV was only 17%. Obesity and prolonged operative time correlated with an increased risk of false-positive alerts. False positives are not innocuous. They delay the case and may unnecessarily alter the operative plan. This study highlights the importance of distinguishing true versus false tcMEP alerts intraoperatively.[31]

Schwartz et al[14] reported 1121 patients with adolescent idiopathic scoliosis treated with surgery monitored with both SSEPs and MEPs. Using 65% amplitude loss in MEP and 50% amplitude loss of SEP, 38 patients (3.4%) met the criteria for an alert. Of the 38 alerts, 17 were MEPs alone, whereas the remaining 21 met both the MEP and SEP criteria. The sensitivity was 100% for MEPs and 43% for SSEPs in detecting motor deficits. Although technically true, SSEPs monitor the sensory tracts in the posterior column, though some use them as a surrogate for overall spinal cord health and motor deficits. Clamping segmental vessels resulted in 3 of the MEP alerts without SEP alerts. Although this matches perfusion patterns of the spinal cord, it illustrates the need for MEPs in monitoring anterior cord perfusion. As in this study, a 65% decrease in MEP amplitude is a commonly used cutoff criterion for triggering an alert as sensitivity remains at 100%.[14]

IOM using tcMEP can be challenging in patients with neuromuscular scoliosis. Eighty-six percent of patients with neuromuscular scoliosis unrelated to cerebral palsy (CP) had recordable MEPs. Only 63% of patients with mild to moderate CP had recordable MEPs compared with 39% of those with severe CP. Seizure disorders, common in patients with severe CP, are a contraindication to tcMEP monitoring. In the study by DiCindio et al,[32] the only postoperative neurologic deficit was identified by tcMEPs 5 minutes before SSEP, suggesting tcMEPs and SSEPs can be used reliably in neuromuscular scoliosis.

MEPs are the preferred method for monitoring the motor tracts of the spinal cord. Impending motor deficits are typically identified faster and with greater accuracy with MEPs than with SSEPs. Use of tcMEP places additional restrictions on anesthesia by requiring TIVA. In addition to deformity correction and intradural spinal tumors, the data suggest that MEPs are reliable in myelopathy and neuromuscular scoliosis.

ELECTROMYOGRAPHY

With the popularization of segmental pedicle screw fixation, especially percutaneous placement, EMG monitoring is the primary method for monitoring selective nerve roots intraoperatively. There are 2 types of EMG monitoring: spontaneous (sEMG) and triggered (tEMG). In sEMG, muscles innervated by the desired nerve roots are monitored continuously for EMG activity. This can be used to help to localize nerve roots in complex cases and prevent excessive manipulation of the root.[33,34] In tEMG, a direct stimulus is applied to structures, commonly pedicle screws, to determine if there is a breach in the pedicle resulting in contact with a nerve root. Although applicable to many cases with segmental instrumentation, it is particularly useful in minimally invasive surgery and percutaneous pedicle screw placement. It can also localize the lumbar plexus in minimally invasive transpsoas approaches to the lumbar spine.

In sEMG, electrical discharges are detected almost immediately with nerve root compression, stretch, or impingement; this gives surgeons immediate feedback on impending problems. In one study,[35] sEMG activation was detected in 77.5% of 213 patients, although only 6.6% of patients had a postoperative deficit. Although sEMG had a sensitivity of 100%, the specificity was only 23.7%. This gives the surgeon a real-time warning of nerve root manipulation but is a poor predictor of actual postoperative neurologic deficits. Beaty et al[33] used sEMG signals as an indicator of adequate nerve root decompression. Approximately 22% of compressed nerve roots had spontaneous electrical discharges before surgery that typically resolved with adequate decompression, although resolution could take 24 hours. This slow resolution and high false-negative rates limited clinical applicability.

tEMG assesses the accuracy of pedicle screw placement by stimulating the screw and recording through the muscles innervated by the nerve roots at risk. A study[36] of 4857 pedicle screws monitored with tEMG reported thresholds of stimulation that were predictive of medial wall breeches. At 8 mA, tEMG had a specificity of 94% and a sensitivity of 86% in identifying a medial wall pedicle breech. As expected, specificity increased and sensitivity decreased when the threshold was lowered to 2.8 mA. tEMG has also been used to stimulate compressed nerves to determine when adequate decompression has been achieved with promising results.[37] tEMG can be performed with up to 80% neuromuscular blockade with results similar to thresholds without blockade.[38] Chronically compressed nerves may have higher than normal stimulation thresholds; this can be determined by direct stimulation of the nerve root as a reference.

Intraoperative sEMG and tEMG are particularly valuable in minimally invasive spine surgery. With smaller incisions and limited exposure, there is a higher dependence on fluoroscopy, bone landmarks, and neuromonitoring. Although fluoroscopy is still required, confirming pedicle screw placement with tEMG may reduce overall radiation exposure for the surgeon and patient. Uribe et al. estimate, "the addition of EMG to the lateral approach [to the spine] has contributed to decrease the complication rate from 30% to less than 1%." Specifically, the use of tEMG in percutaneous pedicle screw placement and minimally invasive transpsoas approach to the lumbar spine has reduced rates of postoperative new neurologic deficits and improved localization of neurologic structures.[34]

Bindal and Ghosh[39] reported the use of tEMG and sEMG in minimally invasive transforaminal lumbar interbody fusion. The trajectory of the pedicle access needle was altered in 76.2% of the cases based on intraoperative tEMG. There were only 4 pedicle breaches as assessed by a postoperative CT scans and radiographs. All breaches were through the lateral

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wall of the pedicle and considered not to be clinically significant, suggesting this technique has the potential to prevent medial wall pedicle breaches.[39]

Advantages of sEMG and tEMG include real-time feedback on nerve root traction or compression injury, intraoperative identification of malposition pedicles screws, and facilitation of minimally invasive surgery. The main disadvantages are the need for incomplete neuromuscular block and relatively low sensitivity for sEMG. It can be coupled with other modalities for MIOM and is a significant asset in preventing intraoperative injury to nerve roots.

MULTIMODAL IOM

MIOM combines modalities to improve overall sensitivity and specificity by monitoring more tracts in the spinal cord and/or nerve roots. MIOM does not represent a preset combination of IOM but generally includes ascending and descending spinal tracts and nerve root monitoring as indicated on the basis of the surgical plan. A prospective study[40] of 1017 patients undergoing spinal surgery with MIOM, including SSEP, MEP, and EMG resulted in a sensitivity of 89% and specificity of 99%. The false-positive rate in this study was 0.8%. A similar prospective study[41] of 217 patients undergoing a similar form of MIOM reported a sensitivity of 92.3% and specificity of 98.5%. The authors concluded that MIOM was an effective form of spinal cord and nerve root monitoring that obviated the need for the wake-up test at their institution.[41] Although there are no official indications for MIOM in spinal surgery, 1 proposal includes all patients with scoliosis greater than 45 degrees, congenital spinal anomalies, intramedullary and extramedullary tumors, and decompression in cervical, thoracic, or lumbar stenosis causing myelopathies or disturbance of the cauda equina.[42]

A recent review[16] of IOM compared unimodal with multimodal monitoring. The authors concluded that MIOM was indicated in spine surgery when the spinal cord or nerve roots are at risk due to its increased sensitivity and specificity. In unimodal SSEP monitoring, sensitivity ranged from 0% to 100% and specificity from 27% to 100% in 15 studies in the English literature. Unimodal MEP ranged from 81% to 100% sensitivity and specificity.[16] When MIOM is employed, both sensitivity and specificity increase. The disadvantages of MIOM are increased setup time and cost and need for TIVA if MEPs are needed.

INTRAOPERATIVE ALERTS

It is important to determine if an intraoperative alert is a false positive attributable to technical problems or a true alert that represents an impending neurologic injury. In the latter scenario, the surgeon may have the opportunity to prevent neurologic injury.

When an intraoperative alert is triggered, attention is turned to identify possible causes. Using positive controls such as upper extremities leads in thoracolumbar cases or peripheral popliteal leads can help to identify technical versus spinal etiologies. Communication with the anesthesia team is made to determine whether there have been any changes in the anesthetic plan or drug administration, particularly neuromuscular blockade and inhalational anesthetics. It is also important to ensure the patient is euthermic and to consider increasing the mean arterial pressure if perfusion is in question. The neurophysiology team should perform an assessment of the leads and technical equipment. The wound should be inspected for a potential explanation. If changes in signals correlated with instrumentation, deformity correction, or other reversible surgical procedures, undoing the last few steps to restore signals is to be considered. If no cause is identified, options include performing a Stagnara wake-up test to help to determine if the signal change is a false- or true-positive finding. If this is not possible, advanced imaging or intensive care unit observation may be indicated at case completion.[28]

CONCLUSIONS

A number of different IOM modalities are available. Each is designed to monitor a different pathway of the spinal cord or nerve roots. Although each modality has a unique profile of advantages and disadvantages, they serve different functions. SSEPs are designed to monitor the dorsomedial aspect of the spinal cord where proprioceptive signals are transmitted. MEPs monitor the anterior motor tracts, and EMG monitors the nerve roots. Combining modalities will allow the surgeon to create an MIOM plan that will maximize sensitivity and specificity for the detection of a neurologic deficit. Intraoperative alerts should be evaluated in a stepwise fashion to rule out technical, temperature, anesthetic, and surgical etiologies. If motor function remains in question, a Stagnara wake-up test can be used to assess motor function.

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1. SSEPs monitor which one of the following tracts in the spinal cord?
- A. Anterolateral
- B. Dorsomedial
- C. Lateral corticospinal
- D. Spinothalamic
- E. Vestibulospinal

2. tEMG can be performed with up to which one of the following percentages of neuromuscular blockade, with reliable results?
- A. 0
- B. 20
- C. 40
- D. 80
- E. 100

3. tEMG is performed intraoperatively on a 64-year-old woman with L4–L5 spondylolisthesis. Stimulation of the right-sided L5 pedicle screw is positive at 9 mA. Preoperatively, the patient has decreased sensation in the L5 nerve distribution on the right, with 3/5 strength in the right extensor hallucis longus. Which one of the following statements is *true*?
- A. Breach of the pedicle wall is unlikely because it does not stimulate at less than 8 mA.
- B. Given that the right L5 nerve root showed signs of preoperative compression, it may be resistant to stimulation; this may indicate a pedicle wall breach adjacent to a chronically compressed nerve root.
- C. This finding is not significant and is not possible to interpret, because tEMG on nerve roots that have preoperative weakness is not reliable.

4. During a T10 corpectomy, just after controlling the bleeding from the lateral body, MEP signals are lost; however, SSEP signals are unchanged. All of the following could explain this *except*
- A. excessive neuromuscular blockade is suppressing motor potentials
- B. compromise of flow in the anterior spinal artery may be causing anterior spinal cord ischemia
- C. loss of a motor cortical lead
- D. increased inhalation anesthetic
- E. TIVA

5. Which one of the following statements describes the limiting factor of the clonus test, performed by applying a rapid dorsiflexion force to the ankle?
- A. The patient must have neuromuscular scoliosis.
- B. The patient must have sustained clonus preoperatively.
- C. It must be timed precisely with the emergence from anesthesia.
- D. It can be performed only in patients with cervical myelopathy.

6. The method of monitoring with the highest overall sensitivity and specificity is
- A. SSEP
- B. MEP
- C. EMG
- D. MIOM

7. D-waves are recorded over the
- A. somatosensory cortex
- B. spinal cord
- C. muscle innervated by a specific nerve root
- D. pedicle screw

8. MEPs are recorded
- A. continuously
- B. only on request
- C. every 5 minutes
- D. only at the conclusion of the case

9. All of the following may result in loss of intraoperative signals *except*
- A. technical malfunction with wiring/leads
- B. excessive neuromuscular blockade
- C. hypothermia
- D. tachycardia
- E. hypotension

10. Contraindications to MEP monitoring include all of the following *except*
- A. low pain tolerance
- B. seizure disorder
- C. cardiac defibrillator/pacemaker
- D. brain tumor
- E. cranial defects

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