Procedure Notes for Interventional Pain Medicine Fellows

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By

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I dedicate this book to my wife who stood by my side
through hard times,
to my parents who helped me immigrate to this amazing country
in hope of prosperity,
and to my son who has brought joy to my life.

—K. C. Maasumi

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INTRODUCTION

The discipline of pain medicine is complex and fascinating. It reaches out to a variety of medical disciplines in order to provide a comprehensive treatment for patients. Pain is generally defined as a localized or generalized unpleasant bodily sensation or complex of sensations that causes mild to severe physical discomfort and emotional distress. Therefore, in order to treat pain properly, a provider has to utilize their knowledge from orthopedics, psychology, anatomy, neurology and more. Since we all come from different disciplines, it is very important to collaborate with our colleagues and know our limitations. We often use interventional pain management techniques to alleviate pain temporarily. This provides a window of opportunity for the patient to utilize other modalities to help with the pain including but not limited to physical therapy, which helps strengthen the muscles surrounding the painful body parts. As basic sciences in pain medicine progress, we may utilize more specific molecular treatments focused on the painful areas to alleviate the pain.

The purpose of this book is to provide you with a glimpse of how a typical intervention can be performed. Please know, this is just a template and the details on how the procedure is actually performed is in the hand of the practitioner and remains your responsibility. This book does not cover all the possible procedures, their variations, nor does it replace a fellowship in pain medicine. This is a collection of procedures that are commonly performed by interventional pain providers whose experience and knowledge dictates the probable outcome of the procedure. Performing a procedure is a team effort. Depending on the complexity of the procedure, several people may be involved including but not limited to the interventional pain physician, radiological technologist and nursing staff. Communication with radiologic technologist is very crucial and helpful to the flow of the procedure which can aid in achieving favorable outcomes.

Fluoroscopy (C-arm) is the most common imaging modality used in interventional pain management. The true benefit of utilizing a C-arm during interventional pain procedures is the ability to alter the angle to better define the pathway to the target. The practitioner advances the needle in the same parallel plane(s) as the angle and obliquity of the C-arm. Frequently

adjustments to the angles are very minute for optimal identification of the anatomy and the pathway to the target point. Proper protection against radiation, practicing safe distance, reducing fluoroscopy-time, and proper shielding should be practiced reducing exposure.

CHAPTER 1

HEAD & NECK PROCEDURES

K.C. MAASUMI, M.D., M.S.

List of procedures in this chapter:

- Gasserian/Trigeminal Ganglion Block
- Gasserian Ganglion Radiofrequency Ablation under Fluoroscopy
- Supraorbital and Supratrochlear Nerve Block
- Supraorbital Nerve Radio Frequency Ablation with Ultrasound Guidance
- Temporo-auricular Nerve Block
- Greater and Lesser Occipital Nerve Block
- Occipital Nerve Block under Ultrasound Guidance
- Radiofrequency Ablation of Greater Occipital Nerves
- Sphenopalatine Ganglion Block
- OnabotulinumtoxinA Injections (PREEMPT Protocol)

Procedure name: Gasserian/Trigeminal Ganglion Block

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure details: The patient was brought into the procedure room and placed in the supine position on the fluoroscopy table. Standard monitors were placed, and vital signs were observed throughout the procedure. The patient's affected side of the face was prepped and draped in a sterile manner. Fluoroscopic views of the foramen ovale were optimized with oblique angulation in a submental trajectory. The skin and subcutaneous tissues over the intended trajectory, 2 cm lateral to the apex of the mouth, were anesthetized. A 3.5-inch, 22-gauge spinal needle was inserted through the anesthetized skin towards the foramen ovale in a coaxial fashion under fluoroscopic guidance. Intermittent lateral views were obtained to assess the depth of the needle tip. Proper depth of the spinal needle was confirmed with the needle tip just into the foramen ovale at the junction of the posterior clinoid process and the skull base. After negative aspiration, contrast was injected with spread along the foramen ovale, without vascular uptake. After repeat aspiration, 2 cc of a mixture composed of 1 cc of ropivacaine 0.5%, and 1 cc of 10mg/ml dexamethasone preservative free was injected in a slow incremental fashion while monitoring the patient's response. The needle stylet was replaced, and the needle was removed with the tip intact.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Gasserian Ganglion Radiofrequency Ablation under Fluoroscopy

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was brought to the procedure room and positioned supine on the fluoroscopy table. A 27-gauge peripheral IV was inserted and intravenous fluid was provided prior to the start of the procedure. Standard monitors were placed, and vital signs were observed throughout the procedure. The patient's affected side of the face was prepped and draped in a sterile manner. Fluoroscopic views of the foramen ovale were optimized with oblique angulation in a submental trajectory. At a location 2 cm lateral to the apex of the mouth, the skin and subcutaneous tissues over the intended trajectory were anesthetized. A radiofrequency needle was inserted through the anesthetized skin towards the foramen ovale in a coaxial fashion under fluoroscopic guidance. Intermittent lateral views were obtained to assess the depth of the needle tip. Proper depth of the spinal needle confirmed with the needle tip just into the foramen ovale at the junction of the posterior clinoid process and the skull base.

Sensory testing was done once the needle tip was deemed to be in the correct location with patient reporting sensation in the right upper and lower lip. Motor testing showed masseter muscle pulsation. Pulsed radiofrequency ablation at 42 degrees Celsius for 120 seconds was performed with the needle tip pointing medially. Ablation was repeated a few times, each time turning the tip of the needle 90 degrees. Contrast was injected to ensure that there is not any vascular uptake. Then 0.5 cc of 10 mg/ml dexamethasone was injected. The needle was then removed after being restyletted with the tip intact. There was appropriate paresthesia in the affected trigeminal nerve distribution.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Supraorbital and Supratrochlear Nerve Block

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The area of injection was identified above the plane of the affected eyebrow. The area was cleaned and prepped in sterile fashion. A 1-inch 30-gauge hypodermic needle was attached to a 1 cc syringe. The needle was inserted into the dermis and directed medially, parallel and above the glabella to a point passing slightly the vertical plane of the ipsilateral pupil. Aspiration ensured the injection is not intravascular. The injectate was slowly given; as the injection continued, the needle was gently withdrawn to cover the supratrochlear nerve.

Disposition: The patient tolerated the procedure well without apparent complications. Patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.[*]

[*] NOTE: This procedure can also be done using ultrasound. A linear ultrasound probe is draped with a sterile probe cover. Sonographic examination with sterile sonographic gel is utilized to reveal supraorbital ridge. A 27ga 1.5-inch needle is advanced with ultrasound guidance until the needle tip is visualized to advance to the supraorbital foramen. Once negative aspiration is confirmed, the injectate was given.

Procedure name: Supraorbital Nerve Radio Frequency Ablation with Ultrasound Guidance

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure details: The patient was brought to the procedure room and placed in the supine position on the fluoroscopy table. Proper support was provided under the head to make patient comfortable. Standard monitors were placed, and vital signs were observed throughout the procedure. The area of the forehead was prepped and draped in a sterile manner. A linear ultrasound probe was draped with a sterile probe cover. Sonographic examination with sterile sonographic gel revealed supraorbital foramen. The skin and subcutaneous tissues at the targeted point were anesthetized with 1% lidocaine. A 22ga radiofrequency needle was advanced with ultrasound guidance until the needle tip landed over the supraorbital foramen. Then after sensory testing at 1.5V, pulsed radiofrequency ablation was carried out for 2 minutes. This step can be repeated as deemed appropriate.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Temporo-auricular Nerve Block

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure details: The area of injection was identified as the affected anterior tragus. The auriculo-temporal artery was palpated and identified. The area was cleaned draped in a sterile fashion. A 30-gauge 0.5-inch hypodermic needle was attached to a 1 cc syringe. The needle was inserted just deep to the dermis and pushed superior and posteriorly and advanced for 1 cm. Aspiration ensured lack of intravascular injection. 1 cc of the 0.5% bupivacaine mixed with 1 cc of 10m/ml dexamethasone was used to inject 1-2 cc of the mixture and the needle was slowly withdrawn with the tip intact.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Greater and Lesser Occipital Nerve Block

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was brought into the procedure room and placed in a seated position. The occipital artery was palpated and the point of maximal tenderness lateral to the artery was identified for the blockade of the greater occipital nerve. This area was prepped and cleaned. A 27-gauge, 1.25-inch needle was inserted into the dermis. Care was taken not to contact the occipital bone. Negative aspiration was confirmed and a subcutaneous deposition of 1-3 cc of a mixture of 1 cc of 1% lidocaine, 1 cc of 0.5% bupivacaine and 1 cc of 10mg/ml dexamethasone was injected. The needle was then removed with the tip intact.

Attention was directed toward injecting the lesser occipital nerve. The inion and the mastoid process was palpated. A location 1/3 the distance between the mastoid process and the inion was chosen medial to the mastoid process. Again, a 27-gauge, 1.5-inch hypodermic needle was used to inject 1-2 cc of the same mixture above.

Disposition: Patient tolerated the procedure well without apparent complications. Patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Occipital Nerve Block under Ultrasound Guidance

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was brought into the procedure room and placed in a prone position on the procedure table. C2 spinous process was identified under ultrasound visualization. Scanning laterally revealed the trapezius, semispinalis capitis, and inferior oblique capitis muscles. An ellipsoid hyperechoic structure between the inferior oblique and semispinalis was identified as the greater occipital nerve approximately 2 cm deep in the skin. After identifying the proper location, the area was prepped and draped in a sterile fashion. A 30-gauge, 1-inch needle was used to anesthetize the skin and subcutaneous tissue. Then, a curved probe covered with sterile ultrasound cover was used to guide a 23-gauge, 3.5-inch spinal needle in an out-of-plane approach to the identified location. If needed, incremental tissue dissection was used to identify the tip of the needle. Negative aspiration was confirmed, and 1-2 cc of a mixture consisting of 1 cc of 0.5% bupivacaine and 1 cc of 10mg/ml dexamethasone was injected. The needle was then removed with the tip intact.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Radiofrequency Ablation of Greater Occipital Nerves

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was brought into the procedure room and placed in a prone position on the procedure table. The occipital artery was palpated and the point of maximal tenderness lateral to the artery was identified. This area was prepped and draped in a sterile fashion. A 2-inch radiofrequency (RF) needle was used to insert medial to the palpated occipital artery. Care was taken not to touch the occipital bone. The stimulator probe was inserted through the RF needle. Using stimulation, a proper location was achieved. Pulsed radiofrequency ablation treatment was initiated with an RF generator using the following parameters:

Voltage output: Usually between 40V and 60V
Frequency: 2 Hz
Pulses: 20 ms pulses in a 1-second cycle
Duration: 120 second per cycle
Impedance: can range between 150 and 400 Ω
Temperature: 42°C
Number of cycles: 3 cycles with slight adjustments of the electrodes (i.e., 45° clockwise, then 45° counterclockwise).
The stimulator was removed, keeping the RF needle in place.
1 cc solution composed of 1 cc of 10mg/ml dexamethasone and 1 cc of 1% lidocaine was used to inject.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Sphenopalatine Ganglion Block

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was brought into the procedure room and placed in a supine position with the head slightly extended. The area was cleaned and prepped in sterile fashion. Using fluoroscopy, the mandibular nerve 1-2 mm past the posterosuperior border relative to the lateral pterygoid plate OR the maxillary nerve 1-2 mm past the AP border toward the pterygomaxillary fissure were chosen. These landmarks were confirmed using lateral views. A 22-gauge 3.5-inch spinal needle was advanced toward the respective border of the pterygoid plate. Once contact was made with the lateral pterygoid plate, the tip of the needle was walked off 1-2 mm inferiorly. In the AP view, the tip of the needle should lie at the edge of the medial orbital line. Contrast was used to confirm proper placement. 1-2 cc of mixture consisting of 1 cc of 10mg/ml dexamethasone and 1 cc of 0.25% bupivacaine was injected.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: OnabotulinumtoxinA Injections (PREEMPT Protocol)

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail:

Lot #:
Expiration date:
Diluent: Normal saline 0.9%

Injection Sites

Muscle	Total units	Number of sites	Left	Right
Corrugator	10	2	5	5
Procerus	5	1		
Frontalis	20	4	10	10
Temporalis	40	8	20	20
Occipitalis	30	6	15	15
Cervical paraspinal muscles	20	4	10	10
Trapezius	30	6	15	15
Total	155	31		

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

CHAPTER 2

CERVICAL PROCEDURES

SAM SCIRE, R.T., (R)(CT), ARRT, CRT
AND K.C. MAASUMI, M.D., M.S.

List of procedures in this chapter:

- Cervical Interlaminar Epidural Steroid Injection (CESI)
- Cervical Transforaminal Epidural Steroid Injection (TFESI)
- Cervical Selective Nerve Root Block (SNRB)
- Cervical Intra-articular Facet Joint Injection
- Cervical Medial Branch Blocks (MBB)
- Radiofrequency of Cervical Medial Branches
- Cervical Discography

Procedure name: Cervical Interlaminar Epidural Steroid Injection (CESI)

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was transported into the procedure room and was positioned prone on the fluoroscopy table. Monitors were placed and vital signs were observed throughout the procedure. The patient's neck and upper back were prepped and draped in a sterile manner. Using AP and contralateral views, an 22-gauge Touhy epidural needle with an attached loss of resistance syringe was advanced in a coaxial fashion until the ligamentum flavum was engaged and loss of resistance was attained. After negative aspiration to rule out vascular return, contrast was injected under live fluoroscopy demonstrating epidural spread without vascular uptake. 2-5 cc of a mixture of 1 ml of 10mg/ml dexamethasone and 1 cc of 1% lidocaine and normal saline was injected into the epidural space. The needle was then removed, and hemostasis was achieved.

Disposition: Patient tolerated the procedure well without apparent complications. Patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Cervical Transforaminal Epidural Steroid Injection (TFESI)

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was transported into the procedure room and was positioned supine on the fluoroscopy table. A time out was performed per the usual clinical fashion. Monitors were placed and vital signs were observed throughout the procedure. The patient's neck was prepped and draped in a sterile manner. The patient's head was turned away from the affected side. The C-arm was positioned in an AP/caudal view and then obliqued towards the patient's affected side until a definitive visualization of the targeted foramen with flattened vertebral endplates was demonstrated. The skin and subcutaneous tissues overlying the foramen were anesthetized. Using oblique and AP views, a 22-gauge spinal needle with a slight bend at the tip was advanced towards the inferior/posterior aspect of the foramen. An AP view was then used to advance the needle to approximately the center of the pillar or when patient response was noted. After negative aspiration to rule out vascular return, a non-ionic contrast was injected under live fluoroscopy confirming epidural spread through the foramen without vascular uptake. 1-2 cc of a mixture of 10mg/ml dexamethasone 1% lidocaine was injected into the epidural space. The needle was then removed, and hemostasis was achieved.

Disposition: Patient tolerated the procedure well without apparent complications. Patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Cervical Selective Nerve Root Block (SNRB)

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was transported into the procedure room and was positioned supine on the fluoroscopy table. A time-out was performed per the usual clinical fashion. Monitors were placed and vital signs were observed throughout the procedure. The patient's head was turned away from the affected side. The patient's neck was prepped and draped in the usual sterile fashion. The C-arm was positioned in an AP/caudal view and then obliqued towards the patient affected side until a definitive visualization of the targeted foramen with flattened vertebral endplates demonstrated. The skin and subcutaneous tissues overlying the foramen was anesthetized. Using oblique and AP views, a 22-gauge spinal needle with a slight bend at the tip was advanced towards the inferior/posterior aspect of the foramen. An AP view was then used to advance the needle slightly inferior and lateral to the foramen or when patient response was noted. After negative aspiration to rule out vascular return, a non-ionic contrast was injected under live fluoroscopy demonstrating spread surrounding the dorsal root without vascular uptake. 1-2 cc of a mixture of 10mg/ml of dexamethasone and 1% lidocaine was then injected. The needle was then removed, and hemostasis was achieved.

Disposition: Patient tolerated the procedure well without apparent complications. Patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Cervical Intra-articular Facet Joint Injection

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was transported into the procedure room and was positioned prone on the fluoroscopy table. A time-out was performed per the usual clinical fashion. Monitors were placed and vital signs were observed throughout the procedure. The patient's head was turned away from the affected side. The back of the patient's neck and upper back were prepped and draped in the usual sterile fashion. The C-arm was positioned in an AP view and then slightly contra-obliqued away from the patient's affected side so that the spinous process did not obscure the visualization of the facet joint. A caudal tilt was applied until the facet joint was demonstrated with clarity. The skin and subcutaneous tissues were anesthetized with 1% lidocaine. Without further adjustment of the C-arm, a 22-gauge spinal needle with a slight bend at the tip was advanced towards the pillar and after bone was reached, the curved tip of the needle was rotated to allow for advancement into the facet joint. After negative aspiration to rule out vascular return, contrast was injected under live fluoroscopy, a linear spread within the facet joint without vascular uptake was confirmed. 0.5 cc of a mixture of 10mg/ml dexamethasone and 1% lidocaine was injected into the epidural space. The needle was then removed, and hemostasis was achieved.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Cervical Medial Branch Blocks (MBB)

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was transported into the procedure room and was positioned prone on the fluoroscopy table. A time-out was performed per the usual clinical fashion. Monitors were placed and vital signs were observed throughout the procedure. The patient's head was turned away from the affected side. The back of the patient's neck and upper back was prepped and draped in the usual sterile fashion. The C-arm was positioned in an AP view and then slightly contra-obliqued away from the patient's affected side so that the spinous process did not obscure the visualization of the facet joint. A caudal tilt was applied until the facet joint was demonstrated with clarity. The skin was anesthetized with 1% lidocaine over cervical pillars, avoiding deep tissue. Without further adjustment of the C-arm, a 25-gauge spinal needle was advanced until bone was reached, and the tip of the needle was placed close to the concavity of the pillar. After negative aspiration to rule out vascular return, contrast was injected under live fluoroscopy demonstrating a curve spread around the pillar while confirming the absence vascular uptake. 1% lidocaine was injected. The needle was then removed, and hemostasis was achieved.

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.

Procedure name: Radiofrequency of Cervical Medial Branches

Diagnosis:

Consent: The risks, benefits and anticipated outcomes of the procedure, the risks and benefits of the alternatives to the procedure, and the roles and tasks of the personnel involved, were discussed with the patient. The patient has given written informed consent to the procedure and agrees to proceed.

Anesthesia:

Attending physician:

Assisting physician:

Patient information:

Procedure detail: The patient was transported into the procedure room and was positioned prone on the fluoroscopy table. A time-out was performed per the usual clinical fashion. Monitors were placed and vital signs were observed throughout the procedure. The patient's head was turned away from the affected side. The back of the patient's neck and upper back were prepped and draped in the usual sterile fashion. The C-arm was positioned in an AP view and then slightly obliqued towards the patient's affected side so that the spinous process did not obscure the visualization of the facet joint. A caudal tilt was applied until the facet joint was demonstrated with clarity. The skin was anesthetized with 1% lidocaine over cervical pillars, avoiding deep tissue. Without further adjustment of the C-arm, a radiofrequency needle was advanced until bone was reached, and the tip of the needle was placed close to the concavity of the pillar. Sensory testing was performed at 50 Hz with the patient confirming sensation at low voltage. Motor testing was then done at 2 Hz up to 2 millivolts while holding the distal extremity. Contractions of the multifidus muscle were noted during motor stimulation at all levels. Absence of muscle contraction in the extremity was confirmed at all levels. The electrodes were removed from the needles and 1% lidocaine was injected. The electrodes were then re-inserted into the needles and a fluoroscopic image was taken to confirm placement without alteration of the needle position. After 30 seconds to allow for local anesthetic to take effect, ablation was completed at 80ºC for 90 seconds. The electrode was removed, and 0.5% bupivacaine was injected. The needles were then removed, and hemostasis was achieved.

Medial branch	Sensory stimulation *(50Hz ~ 0.1-0.8V)*	Motor Stimulation without extremity contraction *(2Hz up to 2V)*
C4	<0.5	None
C5	<0.5	None
C6	<0.5	None
C7	<0.5	None

Disposition: The patient tolerated the procedure well without apparent complications. The patient was able to ambulate out of the facility in the same fashion they had entered. Discharge instructions were given.