

## **MEDIAL BRANCH RADIOFREQUENCY NEUROTOMY**

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These safety practices have been developed to highlight the important elements in the safe performance of interventional pain procedures. Adherence to these practices will help decrease the risk of preventable complications. For additional information about the indications and technical aspects that yield improved treatment outcomes, refer to the *SIS Practice Guidelines for Spinal Diagnostic and Treatment Procedures*.

### **PERSONNEL**

- Only physicians trained in the performance of medial branch radiofrequency neurotomy should perform this procedure.
- Appropriately trained personnel are needed for the operation of the fluoroscopy unit and to assist the physician.

### **CONTRAINDICATIONS**

#### **ABSOLUTE**

- An active systemic infection or a localized infection within the procedural field
- Uncooperative patient
- Allergy to medication(s) that cannot safely be mitigated by pre-treatment
- Pregnancy

#### **RELATIVE**

- Concurrent treatment with anticoagulants constitutes a relative contraindication for cervical medial branch radiofrequency neurotomy. The risks of continuing or discontinuing anticoagulants should be discussed with the patient, possibly involving the patient's cardiologist and/or primary care provider if indicated.
- Spinal hardware is not a contraindication to medial branch radiofrequency neurotomy, but its presence may complicate needle placement. The risk of heating spinal hardware exists as well. Tissue temperature and impedance should be continuously monitored, and patients should remain able to communicate pain or other adverse sensations.
- Caution is advised in patients who have cardiac pacemakers and defibrillators. If a decision is made to proceed with radiofrequency neurotomy in these patients, physicians should consider the following recommendations to maximize safety and minimize complications:
  - o Educate the patient on the potential hazards and risks of radiofrequency neurotomy in the setting of a pacemaker or defibrillator.
  - o Ensure the patient is followed by a cardiologist/electrophysiologist and obtain prior approval from the provider, which should be documented in the patient's medical record.
  - o If recommended by a cardiologist or electrophysiologist, consider coordination of the radiofrequency neurotomy procedure with the cardiac device manufacturer to have on-site support for interrogation of the cardiac device during the procedure in the event that reprogramming of the device is required. If recommended by a cardiologist or



electrophysiologist, placement of a magnet over the device during the procedure may be necessary to prevent triggering the device by radiofrequency energy. Removal of the magnet or use of external defibrillator/pacing electrodes may be necessary in case of occurrence of cardiac arrhythmias during the radiofrequency neurotomy procedure (if recommended by a cardiologist or electrophysiologist).

- Other implantable devices, such as spinal cord stimulators and deep brain stimulators, should be turned off during the procedure. A neurologic exam should be performed before and after the procedure as well, and the stimulator should be restarted after the procedure to ensure proper functioning. The grounding pad should be placed such that the path for the electrical current is as far as possible from the device. The procedure should be abandoned if the risk of stimulator electrode heating during the neurotomy cannot be eliminated.
- Immunosuppression

## SEDATION

- Sedation is not intrinsically necessary for medial branch radiofrequency neurotomy, but if employed in unique circumstances (e.g. movement disorder, cases of extreme anxiety, previous vasovagal response), the patient should remain able to communicate pain or other adverse sensations or events.
- The decision to use sedation should be made on a case-by-case basis.
- If the physician performing the procedure decides to administer and supervise the sedation, they should be trained and qualified to do so. In these situations, a separate healthcare provider is required to assist with the administration of the medications and monitoring of the patient.
- Resuscitation drugs, monitoring equipment, and oxygen must be available if sedation is utilized.

## SAFE, ASEPTIC PRACTICES

- Strict aseptic technique should be followed at all times as they pertain to the facilities, materials, patient preparation, physician preparation, personnel, and injectate/syringe preparation. Examples include, but are not limited to:
  - Skin overlying the target region should be prepared for an aseptic procedure, preferably using chlorhexidine in alcohol. The area should then be draped to create a sterile field, not only for the physician's hands but also for the electrodes and cables that will be brought into the field.
  - A face mask should and sterile gloves must be worn during the procedure.
  - Sterile single-use syringes and needles are required, and single-dose vials should be utilized when available. Centers for Disease Control and Prevention (CDC) guidelines for safe injection practices must be followed.
  - Acquisition, storage, and utilization of medications should be in accordance with relevant governmental guidelines such as those of the CDC in the United States.
  - Single-use or reusable probes are appropriate if proper sterilization techniques are employed between patients and procedures.



## IMAGING

- Use of image guidance is critical and necessary to ensure appropriate needle placement.
- The imaging technique should follow the ALARA protocols (as low as reasonably achievable) to minimize x-ray exposure for both the patient and the healthcare team.
- Fluoroscopic guidance has been used in the primary literature validating the safety and efficacy of medial branch radiofrequency neurotomy. There is no current, robust evidence validating the use of ultrasound, MRI, or other imaging guidance, and their routine use is not recommended unless such evidence becomes available; CT scan is an extension of fluoroscopic guidance with increased cost and is not widely available.
- Obtain image(s) showing final electrode position in at least two views [AP and foraminal (lateral for lumbar and anterior-oblique for cervical)].
- A neurotomy should not be initiated if imaging does not allow visualization of the bony margin and location of the electrode tip.

## NEUROTOMY

- Bilateral neurotomy and neurotomy at multiple levels should only be executed after the judicious performance of medial branch blocks and careful considerations of potential complications.
- A dispersive pad should be completely adhered to the skin with the long axis of the pad facing the active RF electrode to minimize risk of a dispersive pad skin burn. The pad should be placed to maximize its distance from the RF electrode.
- If at any time during temperature escalation or coagulation an adverse sensation indicative of ventral ramus involvement is reported by the patient, the generator should be turned off and causes evaluated and corrected. If adverse symptoms persist, consideration should be given to aborting the procedure.
- Sensory and motor testing is not required for either safety or efficacy if appropriate care is taken in electrode placement.
- Lesioning above 90°C is not recommended due to the risk of cavitation resulting in inconsistent lesion sizes and shapes.

## CERVICAL MEDIAL BRANCH CONVENTIONAL RADIOFREQUENCY NEUROTOMY

- At all times, the electrode must remain behind the anterior margin of the articular pillar on a lateral view, and overlap just medial or parallel to the lateral silhouette of the articular pillar on an anterior-posterior view during an oblique pass or sagittal pass, respectively. The electrode should contact the articular pillar on an anterior-posterior view and outside the foramen in contralateral oblique view.

## LUMBAR MEDIAL BRANCH CONVENTIONAL RADIOFREQUENCY NEUROTOMY

- The electrode should avoid the ventral quarter of the neck of the superior articular process to avoid unnecessarily capturing the lateral branch or intermediate branch in the lesion. Further advancement beyond this point can directly damage the ventral ramus or spinal nerve.



## POST-PROCEDURE MONITORING/FOLLOW-UP

- Patients should be monitored for an appropriate time following the procedure depending upon the nature of the intervention and the agents utilized.
- Provide detailed oral and written discharge instructions to patients that outline:
  - activity restrictions for the immediate post-procedure period (e.g. not to operate a motor vehicle or machinery for the remainder of the day of the procedure),
  - potential expected side effects that may occur immediately post-procedure and in the first few days following the procedure (e.g. pain at procedure site),
  - symptoms that merit immediate medical attention, and
  - when to resume usual medications and anticoagulants if discontinued for the procedure.
- Ensure patients have a follow-up plan.

## SOURCES

Bogduk N (ed). Practice Guidelines for Spinal Diagnostic and Treatment Procedures, 2nd edn. International Spine Intervention Society, San Francisco, 2013.

Barbieri M, Bellini M. Radiofrequency neurotomy for the treatment of chronic pain: interference with implantable medical devices. *Anaesthesiology Intensive Therapy* 2014;46:162.

Lamer TJ, Smith J, Hoelzer BC, Mauck WD, Qu W, Gazelka HM. Safety of lumbar spine radiofrequency procedures in patients who have posterior spinal hardware. *Pain Medicine* 2016;17:1634-7.

McCormick ZL, Smith CC, Engel AJ. Factfinders for patient safety: preventing external skin burns during thermal radiofrequency neurotomy. *Pain Med* 2019;20(4):852-853.

Smith CC, DeFrancesch F, Patel J. Factfinders for patient safety: radiofrequency neurotomy for facet joint pain in patients with permanent pacemakers and defibrillators. 2018 Oct 24. doi: 10.1093/pm/pny213. [Epub ahead of print]

## DISCLOSURES

Sharma, Anil:

*Any position in a healthcare, medical, or physician society/association (committee, board, workgroup/taskforce, etc.):* NASS- evidence committee.

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No Financial Relationships to Disclose.

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*Any position in a healthcare, medical, or physician society/association (committee, board, workgroup/taskforce, etc.):* ASA Educational Track Subcommittee on Regional Anesthesia and Acute Pain.

*Service as a consultant, expert witness, speaker, or author:* Jaypee Publishing, Editor on "Decision Making in Pain Management, 3rd Edition" Editor in chief for Dannemiller, Inc Painstracts abstracting service for CME AAPMR speaker at annual event 2016/2017.

*Travel Expenses:* AAPMR Annual Meeting 2017 travel coverage and honorarium.

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*Other:* Pain Practice Journal - Editorial Work Reimbursement.

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MODULE 2.2 FACET INTERVENTIONS: INTRA-ARTICULAR (ZYGAPOPHYSIAL) JOINT INJECTIONS  
MODULE 2.3 FACET INTERVENTIONS: MEDIAL BRANCH RADIOFREQUENCY NEUROTOMY  
MODULE 2.4 FACET INTERVENTIONS: LATERAL ATLANTO-AXIAL JOINT INJECTIONS  
MODULE 3.1 SACROILIAC INTERVENTIONS: SACRAL LATERAL BRANCH BLOCKS  
MODULE 3.2 SACROILIAC INTERVENTIONS: SACROILIAC JOINT INJECTIONS  
MODULE 3.3 SACROILIAC INTERVENTIONS: SACRAL LATERAL BRANCH RADIOFREQUENCY NEUROTOMY  
MODULE 4.1 NEUROSTIMULATION: SPINAL CORD AND DORSAL ROOT GANGLION STIMULATION  
MODULE 4.2 NEUROSTIMULATION: PERIPHERAL NERVE STIMULATION  
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THE INTERVENTIONAL SPECIALISTS'  
FREE RESOURCE TO HELP DECREASE  
THE RISK OF PREVENTABLE  
COMPLICATIONS

For additional information about the indications and technical aspects that yield improved treatment outcomes, refer to the *SIS Practice Guidelines for Spinal Diagnostic and Treatment Procedures*.



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