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 *IPSIS Technical Manual and Atlas of Interventional Pain and Spine Procedures*.

As an alternative to traditional monopolar electrodes, some physicians use bipolar electrodes, internally cooled RF probes, or multi-tined electrodes, which change or expand the morphology of the thermal lesion. These alternative modalities convey different safety considerations from the conventional MBRFN technique. This document considers the safety practices regarding the latter technique, which uses a single, large-gauge RF cannula.

/// PERSONNEL

- Only physicians trained in MBRFN should perform this procedure.
- Appropriately trained personnel are needed to operate the fluoroscopy unit or assist the physician.

/// CONTRAINDICATIONS

ABSOLUTE

- An active systemic infection or a localized infection within the procedural field
- Uncooperative patient or inability to obtain informed consent
- Allergy to medication(s) that cannot safely be omitted or mitigated by pre-treatment
- Hypotensive emergency/urgency
- Uncontrolled blood pressure
- Pregnancy
- Anatomical derangements that compromise the safe and successful conduct of the procedure

RELATIVE

- Concurrent treatment with anticoagulants/antiplatelets (AC/AP) constitutes a potential relative contraindication for cervical MBRFN.
- Asymptomatic blood pressure >180/110
- Uncorrected coagulopathy
- Spinal hardware is not a contraindication to MBRFN, but its presence may complicate needle placement. In addition, direct contact of the lesioning cannula with spinal hardware should be avoided to reduce the risk of heat transfer to vulnerable structures. Tissue temperature and impedance should be continuously monitored.
- Caution is advised in patients who have cardiac pacemakers and defibrillators. If a decision is made to proceed with RFN in these patients, physicians should educate the patient on the potential hazards and risks of RFN in the setting of a pacemaker or defibrillator and consider the following recommendations:
  - 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.
  - If recommended by a cardiologist or electrophysiologist:
    - Have on-site support for interrogation of the cardiac device during the procedure if reprogramming is required.
    - Place a magnet over the device during the procedure to prevent triggering the device by radiofrequency energy.
    - Remove the magnet or use an external defibrillator or pacing electrodes in case of cardiac arrhythmias during the RFN procedure.
    - Discussion with the patient's cardiologist is recommended to ensure that safety is optimized, as technology associated with cardiac devices changes rapidly.
- Other implantable devices, such as spinal cord and deep brain stimulators, should be turned off during the procedure. A neurologic exam should be performed before and after the procedure, and the stimulator should be restarted after the procedure to ensure proper functioning. The grounding pad should be placed so that the electrical current's path 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.

/// ANTITHROMBOTICS AND BLEEDING DISORDERS

- The decision to continue or how to temporarily discontinue AC/AP therapy must take into account potential complications in each scenario.
- There is a quantifiable risk of life-threatening thrombotic events associated with discontinuation of therapeutic AC/AP agents for spine interventions.
- The decision to temporarily discontinue AC/AP therapy and whether to employ a bridging strategy should include the patient and the physician prescribing the AC/AP therapy.
- The bleeding risk is classified as low for lumbar MBRFN procedures, for which the general consensus is that AC/AP therapy does not need to be discontinued.
- The bleeding risk is classified as low-intermediate for cervical and thoracic MBRFN.

PROCEDURAL SEDATION

- Sedation is not intrinsically necessary for MBRFN, 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. Deep sedation and general anesthesia are contraindicated.
- The decision to use sedation for an appropriate indication should be made on a case-by-case basis. Patients should be advised during informed consent that procedural sedation is not necessary but elective.
- If the physician performing the procedure decides that sedation is indicated, a separate healthcare provider must administer the medications and monitor the patient.
- Resuscitation drugs, appropriate monitoring equipment, and oxygen must be available if sedation is utilized.

SAFE, ASEPTIC PRACTICES

- Strict aseptic techniques should always be applied to the facility, patient, physician, assisting personnel, injectate/syringe, and other procedural materials. 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.
  - A face mask 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.
  - Acquisition, storage, and utilization of medications should adhere to relevant regulatory guidelines.
  - Single-use or reusable probes are appropriate; reusable probes are appropriate if proper sterilization techniques are employed between patients and procedures.

IMAGING

- The use of image guidance is critical for appropriate cannula placement.
- Fluoroscopic guidance has been used in the primary literature validating the safety and efficacy of MBRFN. There is no current, robust evidence validating 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.
- The fluoroscopic technique should follow the ALARA (As Low As Reasonably Achievable) principles to minimize X-ray exposure for the patient and the healthcare team.
- Obtain image(s) showing the final cannula/lesioning device position in at least two views (AP and lateral).
- RF lesioning should not be performed if the physician is uncertain about the cannula's position in relation to the targeted medial branch and other vulnerable neural structures.

NEUROTOMY

- A dispersive pad should be completely adhered to the skin with the long axis of the pad facing the active RF electrode to minimize the risk of a dispersive pad skin burn. The pad should be placed to maximize its distance from the RF electrode.
- Sensory and motor testing is not required for safety or efficacy if appropriate care is taken in electrode placement.
- Impedance and temperature at the electrode tip should be monitored. Lesioning above 90°C is not recommended due to the risk of cavitation resulting in inconsistent lesion sizes and shapes. 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 the causes evaluated and corrected. If adverse symptoms persist, consideration should be given to aborting the procedure.

CERVICAL MEDIAL BRANCH RADIOFREQUENCY NEUROTOMY (CMBRFN)

- At all times, the electrode must remain behind the anterior margin of the articular pillar on the true lateral segmental view and overlap just medial or parallel to the lateral silhouette of the articular pillar on the AP pillar view during an oblique pass or sagittal pass, respectively. During lesioning, the cannula's active tip should maintain contact with the articular pillar on true AP/lateral views, and the tip of the cannula should remain safely posterior to the foramen in the foraminal oblique view.
- Bilateral CMBRFNs should be avoided. Each side should be performed at separate visits because of the increased risk of compromise of the cervical musculature and permanent head drop. In addition, bilateral third occipital nerve RFN should be avoided, with each side performed on separate visits because of the risk of disabling ataxia.

LUMBAR MEDIAL BRANCH RADIOFREQUENCY NEUROTOMY

- The electrode should avoid the ventral quarter of the neck of the superior articular process (SAP) to avoid unnecessarily lesioning the lateral or intermediate branches. Further advancement beyond the anterior aspect of the SAP 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 the following:
  - restrictions and recommendations for the immediate post-procedure period
  - potential common side effects that may occur immediately post-procedure and in the
  - days following the procedure
  - symptoms that merit immediate medical attention
  - timing for resumption of usual medications and anticoagulants if discontinued for the procedure.
- Ensure patients have a follow-up plan.

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DISCLAIMER

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