SPINE INTERVENTION SOCIETY
SAFETY PRACTICES FOR INTERVENTIONAL PAIN PROCEDURES

EPIDURAL STEROID INJECTIONS

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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 and interpretation of epidural steroid injections (ESI) should perform this procedure.
- Appropriately trained personnel are needed for the operation of the fluoroscopy unit and to assist the physician.

CONTRAINDICATIONS

- Concurrent treatment with anticoagulants constitutes a contraindication for injections involving interlaminar access. Anticoagulants should be stopped in advance of an interlaminar injection with prior approval from the patient's cardiologist and/or primary care provider.
- Concurrent treatment with anticoagulants constitutes a relative contraindication for injections involving transforaminal access.
- 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

SEDATION

- Sedation is not intrinsically necessary for ESIs, 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.
  - 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. 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.

IMAGING

- Use of image guidance is critical to ensuring appropriate needle placement and monitoring injectate flow patterns. Image guidance reduces the risk of complications, allowing the physician to avoid vulnerable vascular or neural structures before any agent is injected or inserted, and to ensure injectate is delivered to the target.
- 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 ESI; if alternative imaging guidance is to be used (e.g. CT or US), it must be utilized so as to exclude vascular or intrathecal uptake and document flow reaching the target tissue. Obtain images documenting final needle position and satisfactory contrast spread.

GADOLINIUM-BASED CONTRAST AGENTS (GBCA)

- Gadolinium is a drug that should be used with caution in interventional pain procedures. It should be administered only when necessary. It is prudent to consider the clinical benefit of the interventional pain treatment against the unknown potential risk of gadolinium deposition in the brain for each individual patient.
- In view of the likelihood of unintentional intrathecal spread of the gadolinium, a GBCA is NOT recommended in epidural injections via an interlaminar approach, including epidurograms.
- In view of the likelihood of unintentional intrathecal spread of the gadolinium, a GBCA is NOT recommended in transforaminal epidural injections. In circumstances of previously well documented severe hypersensitivity reactions to current generation iodinated contrast media (ICM), a shared decision-making process is reasonable to balance the relative risks of using ICM, gadolinium, or alternative interventional procedures not requiring a contrast agent.
- If gadolinium is considered essential to the pain procedure and is to be injected near the epidural/subarachnoid space, measures should be observed to avoid advancement of the needle tip into the subarachnoid space. These measures include multiple radiographic images, stabilizing the needle and repeated aspirations to detect the undesired presence of cerebrospinal fluid. The lowest possible volume of the GBCA should be utilized and if possible, a GBCA with low molar concentration of gadolinium.
- If gadolinium is used, digital subtraction imaging (DSI) guidance may be considered as this increases the detection of intrathecal spread and allows the safer use of a lower molar concentration of GBCA.
- If there is a concern for unintentional intrathecal or subdural administration of a GBCA, appropriate radiographic imaging, such as MRI and CT, should be considered to investigate the occurrence of intrathecal or subdural administration.

INJECTIONS

- The ultimate choice of approach or technique (interlaminar vs. transforaminal) to use should be made by the treating physician by balancing potential risks and benefits with each technique for each patient.

CERVICAL EPIDURAL INJECTION PROCEDURES

- All cervical interlaminar ESIs should be performed using image-guidance, with appropriate AP, lateral, or contralateral oblique views, and a test dose of contrast medium.
  - Cervical interlaminar ESIs can be performed without contrast in patients with a documented contraindication to use of iodinated, non-ionic contrast and gadolinium-based contrast media (e.g. significant history of contrast allergy or anaphylactic reaction) by physicians that are experienced with loss of resistance technique. In these circumstances, particulate steroids are contraindicated and only preservative-free, particulate-free steroids should be used.
- No cervical interlaminar ESI should be undertaken at any segmental level without reviewing, before the procedure, prior imaging studies (in particular, axial and sagittal MRI sequences at the target level) that show there is adequate epidural space for needle placement at the target level. If possible, the actual images, in addition to radiology reports, should be reviewed to determine the location of pathology and targets for contrast and medication spread with risks/benefits of specific approach.
- Cervical interlaminar ESIs are recommended to be performed at C7-T1, but preferably not higher than the C6-C7 level.
- The actual spinal level where the epidural space is entered should be determined based on imaging review.
- Cervical transforaminal ESIs should be performed by injecting contrast medium under real-time fluoroscopy and/or DSA, using an AP view, before injecting any substance that may be hazardous to the patient.
  - For patients with a documented contraindication to use of iodinated, non-ionic contrast and gadolinium-based contrast media (e.g. significant history of contrast allergy or anaphylactic reaction), cervical transforaminal ESIs should not be performed.
- Particulate steroids should not be used in cervical transforaminal injections.
- Dexamethasone should not be mixed with ropivacaine because of the risk of precipitating the steroid so it acts as a particulate.
- Extension tubing is recommended for all transforaminal ESIs to minimize movement of the needle tip once it has reached its appropriate target.

LUMBAR EPIDURAL INJECTION PROCEDURES

- All lumbar interlaminar ESIs should be performed using image-guidance, with appropriate AP, lateral or contralateral oblique views, and contrast medium.
  - Lumbar interlaminar ESIs can be performed without contrast in patients with a documented contraindication to use of iodinated, non-ionic contrast and gadolinium-based contrast media (e.g. significant history of contrast allergy or anaphylactic reaction) by physicians that are experienced with loss of resistance technique. It is

advisable that in this case no local anesthetic be employed and it is preferable to use a non-particulate, preservative-free steroid (e.g. dexamethasone solution).

- Lumbar transforaminal ESIs should be performed by injecting contrast medium under real-time fluoroscopy and/or DSA, using an AP view, before injecting any substance that may be hazardous to the patient.
  - Transforaminal ESIs can be performed without contrast in patients with a documented contraindication to iodinated, non-ionic contrast and gadolinium-based contrast media (e.g. significant history of contrast allergy or anaphylactic reaction), but in these circumstances, only preservative-free, particulate-free steroids should be used.
- A non-particulate steroid (e.g. dexamethasone) should be used for the initial injection in lumbar transforaminal ESIs.
- Dexamethasone should not be mixed with ropivacaine because of the risk of precipitating the steroid so it acts as a particulate.
- There are situations where particulate steroids could be used in the performance of lumbar transforaminal ESIs. However, because transforaminal ESI using particulate steroids is associated with a rare risk of catastrophic neurovascular complications, efforts should be made to minimize their use in transforaminal injections.
- Extension tubing is recommended for all transforaminal ESIs to minimize movement of the needle tip once it has reached its appropriate target.

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-injection 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-injection and in the first few days following the procedure (e.g. pain at injection site, increased blood glucose level),
  - symptoms that merit immediate medical attention,
  - when to resume usual medications and anticoagulants if discontinued for the procedure, and
  - special instructions for diabetic patients.
- Ensure patients have a follow-up plan.

SOURCES

Benzon HT, Maus TP, Kang HR, Provenzano DA, Bhatia A, Diehn F, et al. The Use of Contrast Agents in Interventional Pain Procedures: A Multispecialty and Multisociety Practice Advisory on Nephrogenic Systemic Fibrosis, Gadolinium Deposition in the Brain, Encephalopathy After Unintentional Intrathecal Gadolinium Injection, and Hypersensitivity Reactions. Anesth Analg. 2021 Mar 23. Epub ahead of print.

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

Rathmell JP, Benzon HT, Dreyfuss P, Huntoon M, Wallace M, Baker R, et al. Safeguards to prevent neurologic complications after epidural steroid injections: consensus opinions from a multidisciplinary working group and national organizations. Anesthesiology. 2015;122(5):974-84.

DISCLOSURES

Stojanovic, Milan P.:
Any position in a healthcare, medical, or physician society/association (committee, board, workgroup/taskforce, etc.): World Institute of Pain, Education Committee.
Travel Expenses: World Institute of Pain - FIPP Exam Travel Expenses.
Other: Pain Practice Journal - Editorial Work Reimbursement.

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DISCLAIMER

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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*.

PRACTICE GUIDELINES
FOR SPINAL DIAGNOSTIC AND TREATMENT PROCEDURES

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