C-arm Guided Interventional Pain Procedures

I. Lumbar Facet (Intraarticular) Block

Indications:

- Chronic low back pain due to facet joint arthropathy.
- Diagnostic block to determine facet joint as the pain source.
- Therapeutic block to reduce pain and inflammation within the joint.

Equipment & Monitoring:

- Standard ASA monitoring
- Fluoroscopy machine
- Sterile preparation and draping
- 22-25G needle, 90-150 mm in length (curved needle for better steering)
- Nonionic contrast medium
- Local anesthetic and corticosteroid (optional)
- CPR equipment available

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Place the patient in a prone position with a small pillow under waist to allow easier access to the lumbar facet joints.
    - Ensure the C-arm is positioned to visualize the target joint properly.
2. **C-Arm and Fluoroscopy Setup:**
    - **True AP View:**
        - Use the anteroposterior (AP) fluoroscopic view to identify the spinal level and the relevant facet joint.
        - Count levels from the T12 rib downwards.

- **Squaring of vertebral body:** at the target level
- **Oblique View:**
    - Rotate the C-arm ipsilaterally (toward the side of the joint being targeted) until the facet joint opens up clearly on fluoroscopy and you can imagine a nice Scottie Dog.
    - Adjust the tilt of the C-arm to around 30° to 60° depending on the lumbar level.
    - The upper lumbar joints require a shallower tilt compared to lower lumbar levels.

3. **Needle Insertion:**
    - Begin with a skin entry point at the inferior portion of the facet joint.
    - Advance the needle using a coaxial technique (aligned with the fluoroscopic view) into the joint. You may feel a "pop" or "give way" sensation as the needle enters the joint capsule.
    - Confirm needle positioning in the **AP view** to ensure it is in the center of the joint.
4. **Confirmation of Needle Placement:**
    - **Lateral View:**
        - Check the lateral view to ensure the needle is not placed too deep (to avoid entering the spinal canal) and is correctly positioned within the joint space.
    - Inject 0.2–0.5 ml of contrast medium to confirm the intra-articular needle placement.
        - Avoid using excessive contrast to prevent rupture of the joint capsule.
5. **Injection of Medication:**
    - After confirming the needle placement with fluoroscopy, inject a mixture of local anesthetic and corticosteroid (if therapeutic) or only a local anesthetic (if diagnostic).
    - Avoid excessive pressure during the injection to prevent capsule rupture.

Complications:

- Intravascular injection of the medication, leading to systemic effects.
- Inadvertent needle placement into the spinal canal, causing spinal anesthesia or cord injury.
- Bleeding from bony surfaces.
- Infection at the injection site.
- Vasovagal reactions during the procedure.

- Allergic reactions to medications used.

II. Lumbar Medial Branch Block and Radiofrequency Ablation

Indications:

- Chronic lumbar pain due to facet joint pathology.
- Diagnostic block to confirm facet joint-mediated pain.
- Therapeutic procedure through radiofrequency ablation (RFA) for longer-term pain relief.

Equipment & Monitoring:

- Standard ASA monitoring
- Fluoroscopy machine
- Sterile preparation and draping
- 22-25G needle for diagnostic block, 18-20G RF cannula for ablation.
- Nonionic contrast medium
- Local anesthetic (e.g., lidocaine) for diagnostic block
- RF generator with unipolar and bipolar capability for RFA
- CPR equipment readily available

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Place the patient in a prone position, ensuring a comfortable position to reduce lumbar lordosis.
    - Adjust a pillow under the abdomen to minimize spinal curvature, facilitating needle access.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Start with anteroposterior (AP) fluoroscopy to locate the target levels. Count the vertebral levels from the sacrum upwards.

- **Squaring of vertebral body**
- **Oblique View:**
  - The position of C-arm will be same Scottie Dog view. Rotate the C-arm slightly ipsilateral to the side of the target medial branch until the transverse process and superior articular process (SAP) are clearly visualized. Slight obliquity (20-30°) will help align the target.
  - Ensure alignment of the pedicles and transverse process, especially for L3-L4 medial branches.

3. **Needle Insertion for Medial Branch Block:**
   - Using the fluoroscopic **oblique view**, insert the needle at the junction between the transverse process and superior articular process (SAP).
   - Direct the needle towards the lateral edge of the superior articular process.
   - Confirm needle placement in the **AP view** to ensure correct lateral positioning and depth.
4. **Confirmation of Needle Placement:**
   - **Lateral View:**
     - Use the lateral fluoroscopic view to confirm that the needle lies parallel to the SAP, ensuring proper depth.
   - Inject 0.2-0.5 ml of nonionic contrast to confirm needle placement without vascular uptake.
5. **Injection of Diagnostic Block Medication:**
   - Once the needle placement is confirmed with the fluoroscopy, inject 0.5–1 ml of local anesthetic (e.g., lidocaine).
   - Monitor the patient's response for pain relief as a diagnostic confirmation of facet-mediated pain.
6. **Radiofrequency Ablation (RFA):**
   - **For RFA:**
     - Insert the RF cannula in the same position used for the medial branch block.
     - Sensory stimulation: Perform sensory stimulation at 50 Hz and 1V. This should recreate deep pain in the back, without radiation into the legs (to avoid stimulating motor nerves).
     - Motor stimulation: Check at 2Hz and 2V, ensuring no motor activation in the legs (indicating safe positioning away from the nerve roots).
   - Inject a small amount of anaesthetic (1 ml of lidocaine 2%) before lesioning.
   - Perform RF lesioning at 80-90°C for 60-90 seconds. Rotate the cannula slightly during lesioning to create a larger lesion.

Complications:

- Intravascular injection or incorrect placement causing nerve injury.
- Failure of block due to improper needle placement or incorrect target identification.
- Infection at the injection or RF site.
- Post-procedure pain, bruising, or bleeding.
- Potential thermal injury to adjacent structures during RFA.
- Allergic reactions to medications or materials used.

III. Lumbar Transforaminal Epidural Injection

Indications:

- Lumbar radiculopathy (e.g., sciatica)
- Disc herniation
- Spinal stenosis with nerve root compression
- Failed back surgery syndrome (FBSS)
- Diagnostic tool to confirm radicular pain source

Equipment & Monitoring:

- Standard ASA monitoring
- Fluoroscopy machine
- Sterile preparation and draping
- 22-25G spinal needle (90-150mm)
- Nonionic contrast medium
- Local anesthetic and corticosteroid (optional)
- CPR equipment available

Step by Step C-arm guided Interventional Procedures

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Place the patient in a prone position with a pillow under the lower abdomen to flatten the lumbar lordosis and improve access to the foraminal space.
    - Ensure comfort and stability, with minimal patient movement during the procedure.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Start with an anteroposterior (AP) fluoroscopic view to identify the lumbar spine levels. Count vertebral levels from the sacrum upward.
        - Identify the intervertebral foramen, where the needle will be directed.
    - **Squaring of vertebral body** with cranio-caudal tilt of C-arm
    - **Oblique View:**
        - Rotate the C-arm approximately 20° to 30° ipsilateral to the side of the injection, opening the neural foramen.
        - Align the pedicles with the endplates of the vertebrae.
3. **Needle Insertion:**
    - Insert the spinal needle under fluoroscopic guidance into the foramen at the inferior margin of the pedicle.
    - Direct the needle toward the "safe triangle," which is bordered by the pedicle, vertebral body, and exiting nerve root.
    - Use intermittent fluoroscopic imaging to guide the needle to the superior portion of the foramen.
4. **Confirmation of Needle Placement:**
    - **Lateral View:**
        - Confirm the needle's depth in the lateral view. The tip of the needle should lie just anterior to the inferior articular process at the posterior-most part of foramen, near the nerve root.
        - Ensure the needle tip is positioned just beneath the posterior vertebral line to avoid intradural or intravascular placement.
    - Inject 0.5–1 ml of nonionic contrast medium to verify epidural spread around the nerve root. Look for contrast spread in the epidural space along the nerve root without intravascular uptake.
5. **Injection of Medication:**

- Inject a mixture of local anesthetic (e.g., bupivacaine) and corticosteroid (e.g., dexamethasone) in a total volume of 1-2 ml.
- Avoid excessive pressure during the injection to minimize the risk of nerve injury.

Complications:

- Intravascular injection leading to systemic steroid absorption or local anesthetic toxicity.
- Nerve root injury or damage causing persistent radicular pain.
- Infection or abscess formation at the injection site.
- Epidural hematoma formation, particularly in anticoagulated patients.
- Dural puncture, leading to post-dural puncture headache (PDPH).
- Vasovagal response during the procedure.

IV. Lumbar Sympathetic Block and Radiofrequency Ablation

Indications:

- Complex regional pain syndrome (CRPS)
- Vascular insufficiency-related pain
- Peripheral neuropathy
- Intractable pain due to lower extremity ischemia
- Diagnostic tool to assess sympathetic-mediated pain

Equipment & Monitoring:

- Standard ASA monitoring
- Fluoroscopy machine
- Sterile preparation and draping
- 20-22G needle for diagnostic block
- 18-20G RF cannula for radiofrequency ablation
- Nonionic contrast medium

- Local anesthetic (e.g., lidocaine)
- RF generator for ablation
- CPR equipment available

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Position the patient in a prone position with a pillow under the lower abdomen to reduce lumbar lordosis and improve access to the lumbar spine.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Use an anteroposterior (AP) fluoroscopic view to identify the L2 to L4 vertebrae. Start by identifying the L1 vertebra, as L6 vertebrae may be present in some patients.
        - Ensure the endplates of the lumbar vertebrae are aligned horizontally in the AP view.
3. **Needle Insertion for Sympathetic Block:**
    - **Target Points:**
        - For a diagnostic block, target the anterolateral aspect of the L3 vertebra.
        - For ablation, target the anterolateral aspect of L2, L3, and L4 vertebrae.
    - Insert the needle through the lateral edge of the vertebral body under **oblique fluoroscopic guidance**. The C-arm should be made oblique till transverse process is hided withing vertebral body.
    - The needle should be placed in tunnel vision till it hit the vertebral body at the junction of the lower one-third and upper two-third of the L2 vertebral body; at the junction of the lower two-third and upper one-third of the L3 vertebral body.
4. **Confirmation of Needle Placement:**
    - **Lateral View:**
        - Confirm in a lateral fluoroscopic view that the needle is advanced to the anterior border of the vertebral body, ensuring that the needle tip is positioned in the correct plane.
    - Inject 0.2-0.5 ml of nonionic contrast medium to confirm the appropriate placement of the needle by observing the spread of contrast anterior to the vertebral body.
5. **Injection of Diagnostic Block Medication:**
    - Inject a small amount of local anesthetic (e.g., lidocaine 2%, 5 ml) to perform a diagnostic block.

- Monitor the patient's response for vasodilation (e.g., temperature rise in the lower extremity) and pain relief.

6. **Radiofrequency Ablation (RFA):**
   - **For RFA:**
     - Place RF cannulas at L2, L3, and L4 in the same positions used for the diagnostic block.
     - Perform sensory stimulation at 50Hz and 1V. Look for a deep ache in the abdomen without radiation to the lower limbs.
     - Perform motor stimulation at 2Hz and 2V to ensure there is no motor response in the lower extremities, indicating the needle is safely away from motor nerves.
   - Inject 1 ml of local anesthetic (lidocaine 2%) before lesioning.
   - Perform RF lesioning at 80-90°C for 90 seconds. Rotate the cannula during lesioning to maximize the lesion size.

Complications:

- Injury to adjacent structures, including kidneys, ureters, or nerve roots.
- Genitofemoral nerve damage, resulting in groin pain.
- Vascular puncture leading to bleeding or local anesthetic toxicity.
- Infection at the needle site.
- Post-procedural pain or neuritis.
- Vasovagal reactions during the procedure.
- Hypotension due to sympathetic blockade.

V. Lumbar Discography

Indications:

- Discogenic low back pain.
- Diagnostic tool to provoke pain and evaluate the disc as a pain source.
- Pre-surgical planning for fusion or other disc surgery.

Step by Step C-arm guided Interventional Procedures

Equipment & Monitoring:

- Standard ASA monitoring.
- Fluoroscopy machine.
- Sterile preparation and draping.
- 18-20G introducer with 22G, 3.5-7 inch Chiba needle (dual-needle technique preferred to reduce infection risk).
- Manometry.
- Nonionic contrast medium.
- IV antibiotic pre-procedure.

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Place the patient in a prone position.
    - Use a pillow under the lower abdomen to flatten lumbar lordosis.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Begin by identifying the lumbar vertebral levels and squaring the vertebral bodies.
    - **Oblique View:**
        - Rotate the C-arm 25° to 35° ipsilateral to the target disc.
        - Align the endplates, or also called squaring by cranio-caudal tilt of C-arm for better visualization of the disc.
        - For L5-S1, use cephalad angulation to avoid the iliac crest.
3. **Needle Insertion:**
    - Using an oblique view, insert the needle at the lateral aspect of the superior articular process (SAP) at the desired level.
    - Advance the needle using the coaxial view until it reaches the anterolateral border of the disc.
    - Confirm position using the **AP view** and the **lateral view**.
    - Once the needle reaches the centre of the disc, assess for appropriate depth and positioning.

4. **Confirmation of Needle Placement:**
    - Inject 0.5–1 ml of contrast medium into the disc, while carefully monitoring for patient response.
    - Perform disc manometry to measure the opening pressure and final pressure (should not exceed 50 psi).
5. **Pain Provocation:**
    - Ask the patient to report pain intensity, location, and quality during the injection.
    - A positive discography is indicated if concordant pain is reproduced, with an intensity ≥7/10 on the NRS.
6. **Post-Procedure:**
    - Send the patient for a non-contrast CT scan to evaluate disc morphology further.
    - Document findings including contrast spread, pressure readings, and the patient's pain response.

Complications:

- Discitis or infection.
- Spinal nerve injury or irritation.
- Radicular artery damage, potentially leading to cord ischemia.
- Intradural or intrathecal injection leading to spinal anesthesia.
- Vasovagal reactions during the procedure.
- Hematoma or bleeding from paraspinal structures.

VI. Neuroplasty (Caudal, Transforaminal, and Transgrade Approach)

Indications:

- Chronic low back pain due to adhesions or fibrosis around nerve roots.
- Failed back surgery syndrome (FBSS).
- Post-laminectomy syndrome.
- Sciatica or radicular pain refractory to other conservative treatments.

Equipment & Monitoring:

- Standard ASA monitoring.
- Fluoroscopy machine.
- Sterile preparation and draping.
- 18-20G epidural catheter or specialized neuroplasty catheter.
- Nonionic contrast medium.
- Hypertonic saline, hyaluronidase, and corticosteroid for adhesiolysis.

Step-by-Step Procedure for Caudal Approach:

1. **Patient Positioning:**
   - Place the patient in the prone position with a pillow under the lower abdomen to flatten the lumbar lordosis.
2. **C-Arm and Fluoroscopy Setup:**
   - **AP View:**
     - Begin by identifying the sacral hiatus using an anteroposterior (AP) view. The hiatus is typically below the level of the S3 foramen.
   - **Lateral View:**
     - Switch to a lateral view to visualize the sacral canal and the depth of the needle insertion.
3. **Needle Insertion:**
   - Insert the needle through the sacral hiatus using the **lateral view** to guide the depth.
   - Advance the catheter into the epidural space under fluoroscopic guidance, directing it to the area of adhesion (e.g., L4-L5 or L5-S1).
4. **Confirmation of Catheter Placement:**
   - **AP and Lateral View:**
     - Inject 1-2 ml of contrast medium to verify catheter placement within the epidural space. The contrast should spread evenly in the caudal epidural space.
   - Advance the catheter toward the affected nerve root to break down adhesions.
5. **Injection of Medication:**
   - Inject a mixture of hypertonic saline, hyaluronidase, and corticosteroid to perform neuroplasty and reduce adhesions.

Step-by-Step Procedure for Transforaminal Approach:

1. **C-Arm Setup:**
    - Position the C-arm in an oblique view (25°-30°) to open up the foramen.
2. **Needle Insertion:**
    - Insert the needle at the lateral margin of the superior articular process (SAP), advancing toward the intervertebral foramen.
    - Use the **lateral view** to ensure the needle tip is just anterior to the foramen.
3. **Confirmation of Needle Placement:**
    - Inject contrast medium to verify epidural spread around the nerve root without vascular uptake.
    - Use the neuroplasty catheter to advance through the foramen and break down perineural adhesions.

Step-by-Step Procedure for Transgrade Approach:

1. **C-Arm Setup:**
    - Use a lateral fluoroscopic view to align the needle tip with the anterior epidural space.
2. **Needle Insertion:**
    - Insert the needle at an oblique angle and direct it toward the anterior epidural space.
3. **Catheter Insertion:**
    - Pass the neuroplasty catheter through the needle, targeting the area of adhesions around the nerve roots or dura.
4. **Confirmation of Catheter Placement:**
    - Inject contrast medium and ensure proper epidural spread without intrathecal or intravascular injection.

Complications:

- Dural puncture leading to spinal headache or cerebrospinal fluid (CSF) leak.
- Epidural hematoma or infection.
- Nerve injury causing new or worsened radicular pain.

- Vascular injury or intravascular injection.
- Adhesion-related complications, including scar formation.

VII. Superior Hypogastric Plexus Block – Posterolateral Approach, Coaxial View (Non-transdiscal Approach)

Indications:

- Pelvic pain due to cancer or other chronic pain syndromes.
- Endometriosis or pelvic inflammatory disease-related pain.
- Pain secondary to radiation or surgery in the pelvic area.

Equipment & Monitoring:

- Standard ASA monitoring.
- Fluoroscopy machine.
- Sterile preparation and draping.
- 18-22G spinal needle (90-150mm), longer needle required based on patient anatomy.
- Nonionic contrast medium.
- Local anesthetic and neurolytic agents (e.g., phenol or alcohol).
- CPR equipment available.

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Position the patient prone with a pillow under the lower abdomen to reduce lumbar lordosis and open the intervertebral spaces for needle placement.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Start by identifying the L5-S1 level and sacral promontory using the anteroposterior (AP) view.

- **Oblique View:**
  - Rotate the C-arm ipsilaterally (toward the side of the needle insertion) by 30° to obtain an oblique view of the L5 vertebral body.
  - The target point will be at the anterolateral aspect of the L5 vertebral body just cephalad to the iliac crest.
- **Cephalad Tilt:**
  - Cephalad tilt of the C-arm may be necessary to avoid the obstruction of the iliac crest.

3. **Needle Insertion:**
   - Insert the needle lateral to the lower part of the L5 vertebral body, just above the iliac crest.
   - **Coaxial Approach:**
     - Advance the needle under fluoroscopic guidance to the lower portion of the L5 vertebral body or the L5-S1 disc.
     - Ensure the needle touches the vertebral body at the correct depth.
4. **Confirmation of Needle Placement:**
   - **Lateral View:**
     - Once the needle is positioned, use the lateral view to confirm its location. Wiggle the needle slightly (0.5cm) anterior to the L5 vertebral body or, L5-S1 disc.
   - **AP View:**
     - In the AP view, the needle should be at the midpoint or at the junction of the lateral and mid-third of the vertebral body.
     - Inject 1-2 ml of contrast medium to confirm the spread of contrast anterior to the L5-S1 disc.
5. **Injection of Medication:**
   - If contrast shows a bilateral spread on the AP view, inject 15 ml of 0.25% Bupivacaine or 6% Phenol.
   - If contrast only spreads unilaterally, repeat the procedure on the opposite side and inject 10 ml on each side.

Complications:

- Intravascular injection, leading to systemic effects.
- Injury to adjacent structures such as the iliac vessels or ureters.
- Inadequate pain relief due to poor contrast spread.

- Infection at the injection site.
- Post-procedure pain or neuritis.
- Allergic reactions to medications or contrast agents.

VIII. Sacral Transforaminal Epidural Injection (Selective Nerve Root Block)

Indications:

- Lumbar radiculopathy
- Sciatica or leg pain due to nerve root compression
- Herniated disc
- Spinal stenosis
- Failed back surgery syndrome (FBSS)

Equipment & Monitoring:

- Standard ASA monitoring
- Fluoroscopy machine
- Sterile preparation and draping
- 22-25G spinal needle
- Nonionic contrast medium
- Local anesthetic and corticosteroid (optional)

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Place the patient in a prone position with a pillow under the lower abdomen to reduce lumbar lordosis and open up the intervertebral foramen.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Begin with the anteroposterior (AP) view of the lumbar spine to identify the ventral and dorsal sacral foramina.

- **Cranio-Caudal tilt:** C-arm to be tilted till ventral and dorsal foramina are aligned together. Needle to be inserted at the aligned part of foramen in coaxial view.
- **Lateral View:**
  - Switch to the lateral view to confirm the depth of the sacrum and the foraminal entry point.

3. **Needle Insertion:**
   - Insert the needle at the level of the sacral foramen where the targeted nerve root exits.
   - Use fluoroscopic guidance to advance the needle into the foramen, keeping the trajectory aligned with the exiting nerve root.
4. **Confirmation of Needle Placement:**
   - **Lateral View:**
     - Use the lateral fluoroscopic view to ensure that the needle is positioned just posterior to anterior border of sacral vertebral body.
   - **AP View:**
     - Inject 0.5–1 ml of nonionic contrast to verify the spread of contrast around the nerve root. Ensure no intravascular uptake.
5. **Injection of Medication:**
   - After confirming the needle placement with fluoroscopy, inject the mixture of local anesthetic (e.g., lidocaine) and corticosteroid into the foraminal space.

Complications:

- Intravascular injection leading to systemic steroid absorption or local anesthetic toxicity.
- Nerve root injury, causing prolonged radicular pain.
- Infection at the injection site.
- Epidural hematoma formation, especially in anticoagulated patients.
- Post-dural puncture headache (PDPH) due to dural puncture.
- Vasovagal response.

IX. Sacroiliac Joint Injection

Indications:

- Chronic sacroiliac joint (SIJ) pain.
- Pain due to sacroiliac joint dysfunction, arthritis, or trauma.
- Diagnostic tool to confirm the SIJ as a pain generator.
- Therapeutic injection to reduce inflammation.

Equipment & Monitoring:

- Standard ASA monitoring.
- Fluoroscopy machine.
- Sterile preparation and draping.
- 22–25G, 3.5 inch (90 mm) needle.
- Nonionic contrast medium.
- Local anesthetic and corticosteroid.
- CPR equipment available.

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Place the patient in a prone position.
    - Ensure the lumbar lordosis is reduced by placing a pillow under the abdomen for better needle access.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Start by identifying the sacroiliac joint in the anteroposterior (AP) view.
        - Identify both the anterior and posterior border of synovial part of the joint. The anterior border is typically more lateral than the posterior border and more prominent than posterior border.
    - **Oblique View:**
        - Rotate the C-arm into a contralateral oblique view to align anterior and posterior border.
        - Visualize the inferior portion of the SI joint inferior to PSIS for needle insertion.

3. **Needle Insertion:**
    - Insert the needle at the inferior aspect of the joint in a coaxial view.
    - Use fluoroscopic guidance to advance the needle toward the inferior joint space. Ensure the needle remains within the joint without penetrating too deep into the bone or surrounding structures.
4. **Confirmation of Needle Placement:**
    - Inject 0.5–1 ml of nonionic contrast medium to confirm needle placement within the joint. Look for uniform spread without extravasation into nearby structures.
    - Use fluoroscopy to verify the contrast spread along the joint margin.
5. **Injection of Medication:**
    - Once the needle placement is confirmed, inject 1–2 ml of local anesthetic mixed with corticosteroid into the joint space.
    - Avoid excessive pressure during injection to prevent joint capsule rupture.

Complications:

- Injury to the sciatic nerve, leading to weakness or sensory loss in the leg.
- Intraosseous injection resulting in increased post-procedure pain or infection.
- Infection at the injection site.
- Epidural space injection causing anesthesia or nerve root irritation.
- Vasovagal response during or after the procedure.
- Bleeding or hematoma formation in patients with coagulopathy.

X. Sacroiliac Joint Radiofrequency Ablation (Bipolar Palisade Technique)

Indications:

- Chronic sacroiliac joint pain unresponsive to conservative therapies.
- Positive response to diagnostic SIJ block.
- SIJ dysfunction or degeneration.

Equipment & Monitoring:

- Standard ASA monitoring.
- Fluoroscopy machine.
- 18–20G RF cannulas with 10 mm or 5 mm active tips.
- Radiofrequency generator.
- Nonionic contrast medium.
- Local anesthetic (e.g., 1% Lidocaine).
- Grounding pad and RF electrodes.

Step-by-Step Procedure:

1. **Patient Positioning:**
    - Position the patient prone with a pillow under the abdomen to reduce lumbar lordosis.
2. **C-Arm and Fluoroscopy Setup:**
    - **AP View:**
        - Start with the anteroposterior (AP) view to identify the L5 dorsal ramus and the lateral branches of S1–S3.
    - **Oblique View:**
        - Rotate the C-arm ipsilaterally to the side of the injection for identifying junction of SAP and sacral ala for medial branch of dorsal rami of L5 root.
        - Rotate the C-arm contralaterally to find the space between lateral edge of S1, S1, S3 foramen and medial border of sacroiliac joint.
        - This view helps with proper needle placement.
3. **Needle Insertion:**
    - Insert multiple RF cannulas in a parallel fashion from L5 to S3 along the sacral ala using a coaxial view.
    - Ensure each cannula targets the L5 dorsal ramus and the lateral branches of S1–S3. Use the fluoroscopic image to ensure the needles are positioned parallel to each other, forming the "palisade" pattern.
4. **Confirmation of Needle Placement:**
    - Inject 0.5 ml of nonionic contrast medium through each cannula to confirm appropriate placement. Ensure no vascular uptake and visualize a clear spread around the nerves.

5. **Radiofrequency Ablation:**
    - Perform bipolar RF lesioning by driving electric current between adjacent cannulas. Each lesion should be created at 80°C for 90 seconds.
    - Rotate the cannulas slightly during the lesioning to increase lesion size.

Complications:

- Injury to the sacral nerve roots, resulting in motor or sensory deficits.
- Vascular injury or inadvertent intravascular injection.
- Infection or abscess formation at the RF site.
- Persistent pain or new radicular pain.
- Post-procedure discomfort or neuritis.