Lower Back Pain: Getting to the Root and Avoiding the Problem

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Objectives:

• Participants will be able to:
  1. Review and discuss the medications used and their potential complications.
  2. Discuss spinal injection procedures; indications and results.
  3. Outline the complications of different spinal injections and discuss their etiology and avoidance.

Spine: Injections

• Injections
  - Selective Nerve Root Block
  - Facet Joint Block
  - Epidural Steroid Injection
  - Synovial Cyst Injection

• Goals
  - Determine source and level of pain
  - Relieve pain symptoms
  - Tailor management/guide therapy

Injectates:

• Local Anesthetics
  – mainstay

• Steroids

Local Anesthetics:

• Amino-Ester Group
  – higher allergic reaction rate
  • linked to the metabolite para-aminobenzoic acid (PABA)
• Amide-Linked anesthetics do not produce this metabolite
• Majority of allergic reactions → related to the preservatives or stabilizers
  – preservative Methylparaben → metabolize to PABA
• Amide-Linked anesthetics that are preservative free are most favorable

<table>
<thead>
<tr>
<th>Amino-Ester</th>
<th>Onset (Minutes)</th>
<th>Duration (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroprocaine</td>
<td>6 to 12</td>
<td>30 to 60</td>
</tr>
<tr>
<td>Procaine (Novocain)</td>
<td>15</td>
<td>30 to 60</td>
</tr>
<tr>
<td>Tetracaine (Pontocain)</td>
<td>15</td>
<td>175</td>
</tr>
<tr>
<td>Amide-Linked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lidocaine (Marcaine, Sensorcaine)</td>
<td>5</td>
<td>120 to 240</td>
</tr>
<tr>
<td>Lidocaine (Xylocaine, Xylocaine)</td>
<td>0.5 to 1</td>
<td>100</td>
</tr>
<tr>
<td>Ropivacaine</td>
<td>5</td>
<td>120 to 240</td>
</tr>
<tr>
<td>Eidoacaine (Duranacine)</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Mepivacaine</td>
<td>1 to 5</td>
<td>100</td>
</tr>
<tr>
<td>Prilocaine (Citanest)</td>
<td>1 to 2</td>
<td>100</td>
</tr>
</tbody>
</table>
Injectates:

- Steroids
  - Controversy remains:
    - safety profile of particulate and non-particulate
      - Dreyfuss et al. did not show a difference between particulate and non-particulate steroids in cervical transforminal injections.

Steroids:

<table>
<thead>
<tr>
<th>Corticosteroid</th>
<th>Brand Name</th>
<th>Description</th>
<th>Common Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methylprednisolone acetate</td>
<td>Depo-Medrol</td>
<td>Particles densely packed, may not completely dissolve</td>
<td>20–80 mg</td>
</tr>
<tr>
<td>Triamcinolone acetonide</td>
<td>Kenalog</td>
<td>Particles vary greatly in size; form aggregations</td>
<td>40–120 mg</td>
</tr>
<tr>
<td>Triamcinolone hexacetonide</td>
<td>Aristospan</td>
<td>Similar to triamcinolone acetonide, more sustained action</td>
<td>20–40 mg</td>
</tr>
<tr>
<td>Betamethasone acetate/phosphate mixture</td>
<td>Celestone Soluspan Betaject</td>
<td>Particles vary greatly in size; form aggregations but is soluble</td>
<td>12–18 mg (ESI)</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Decadron</td>
<td>Can aggregate</td>
<td>variable</td>
</tr>
</tbody>
</table>

Injections: Complications

- Systemic Steroid Effects
  - transient adrenal suppression
  - adrenocorticotropic hormone and cortisol
    - significantly suppressed at 7 days
    - normal at 2 to 3 weeks
  - Suggestion:
    - frequency with which steroid medications are taken should take this into account

Facet Injections/Blocks:

- Goal
  - Determine pain source and level
  - Pain relief
- Indications
  - Facet syndrome
    - Para-articular pain
    - No radicular pain
    - ↑ extension/rotation

Facet Blocks: Anatomy

- Synovial articulations
- Curved, oblique joint surface
- Facet Innervation:
  - Medial branch, dorsal ramus
**Facet Injections/Blocks:**

- Superior facet
  - concave with a posteromedial orientation
- Inferior facet
  - directed anterolateral
- Target for intra-articular
  - posterior margin
  - inferior recess
- Small volume joint
  - Total volume 1.5 mL.

**Facet Injections/Blocks:**

- Left L3/4 and L4/5 medial branch block
  - Medial branch arises from dorsal ramus

**Facet Injections/Blocks:**

- Injectate
  - 20 mg Depo-Medrol
  - Or 3 mg Celestone
  - 1 mL 0.5% bupivacaine
  - Some use up to
    - 5 mL of 0.5% lidocaine
    - 2 mL of bupivacaine
      (peri-articular injection or dorsal ramus block)

**Selective Nerve Root Blocks:**

- Rationale for nerve root blocks
  - Address this inflammatory component
  - Test that the target nerve root is the source of pain
Sacral SNB Approach:

Selective Nerve Root Blocks:

- Location of injection
  - 3 types of injections
    - Intraneural (tubular, feathery centrally)
    - Extraepineural (tubular, filling defect centrally)
    - Inferior to pedicle (cloud-like, amorphous)
  - 75% pain relief 15 minutes post injection
  - 86% pain relief 14 days post injection
  - Type 1 injection – more painful
  - No need to inject into nerve root sleeve

- radicular pain can also occur without disc herniation
- nerve root inflammation has become the central unifying concept behind spinal radicular pain
- numerous proinflammatory cytokines → chemical irritation
  - phospholipase A2
  - Metalloproteinases
  - interleukin-6
  - prostaglandin E2
  - tumor necrosis factor

SNR Block: Needle Position

- Retrospective chart review
  - 1202 met the study criteria (single-level injection in an adult)
  - average pain reduction of 4.14 U, as graded on a 0–10 ordinate scale
  - degree of pain reduction was not associated with the needle tip position
  - study did not evaluate the long-term effects of various needle tip positions

SNR Block: Efficacy

- Retrospective chart review
  - Efficacy of selective nerve root blocks is dependent on the type of pathology causing spinal radicular pain
  - resultant foraminal nerve root compromise had better pain relief than those with superimposed spinal stenosis (A)
  - patients with moderate to severe lateral recess stenosis responded less favorably to selective nerve root injections and were more likely to require subsequent surgery (B)

SNR Block: CT vs. Fluoro

- Fluoro
  - Radiation exposure
    - 1 minute continuous fluoro 0.43 mSv
    - Pulsed fluoro (3 pulses/sec) 0.1 mSv
  - Availability
  - Speed of procedure
SNR Block: CT vs. Fluoro

• CT
  – Excellent visualization of the target
  – Precise placement of the needle tip

CT - Disadvantages
  – Increased physician time
  – Increased radiation exposure
    • May control with minimizing mAs and limited scanning
    • Able to achieve 0.22 to 0.43 mSv for 4 to 10 scans


SNR Block: CT vs. Fluoro

• CT fluoroscopy (CTF)
  – Main advantage
    • precise localization possible in CT with improvements in speed offered through its fluoroscopic component
    – shortens procedure time in comparison with standard CT guidance

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Pfirrmann et. al. Radiology 2001; 221:704-711

Injections: Complications

• Risk profile is not the same for all spinal procedures
• Likelihood of complications is also related to the use and quality of imaging being used

Injections: Complications

• Bleeding – rare
  • Use small gauge – 22
  • Epidural hematomas after ESI - reported
  • Facet injections or non-cervical nerve root injections are exceedingly rare

• Suggestion
  – Stop anti-platelet and anti-coagulation meds for 5 days prior to ESI
• Infection – rare
  – Review of literature
  • 27 case reports
    » 11 cases of epidural abscess
    » 2 epidural abscess with meningitis
    » 1 meningitis
    – epidural corticosteroid injections
    – Many were immunocompromised
    – dominant organism being S. aureus
• Suggestion
  – antibiotic prophylaxis consider for immunocompromised

• Selective lumbar nerve blocks
  – overall minor complication rate 5%
  – No stat. diff. between needle-tip position
    » within or adjacent to the lumbar neural foramen
  • Medial branch block and intra-articular facet block
    – Rare minor complication rate

• FACT:
  – No consensus among interventional pain management specialists regarding:
    • Type
    • Dosage
    • Frequency of injections
    • Efficacy of combining different injections or medications

• Steroid Effect
  – transient adrenal suppression
    » 1 to 2 weeks between injections
  – potent suppression of insulin action
    • Diabetic patient
• Bleeding
  – stop anti-platelet and anti-coagulation meds for 5 days prior to ESI

• Infection
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• Good understanding
  – medications
    • mandatory
    • local and systemic concerns
• Spinal injection procedures
  – remain safe
  – minimally invasive way to diagnose and treat

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