Spinal and Epidural

<table>
<thead>
<tr>
<th>Assembling Equipment for RA</th>
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</thead>
<tbody>
<tr>
<td>• Emergency Drugs</td>
</tr>
<tr>
<td>• Intubation Supplies</td>
</tr>
<tr>
<td>• Block Kits</td>
</tr>
<tr>
<td>• Nerve Stimulators</td>
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<tr>
<td>• Locals/Vasoconstrictors/NaHCO₃</td>
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<td>• Prep solution</td>
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</table>

Spinal and Epidural Anesthesia

[Video link: Epidural video on YouTube]
**Spinal and Epidural Blockade**

- Order of nerve fiber blockade
  - B fibers
    - preganglionic autonomic nerve efferents
  - C & A-delta fibers
    - postganglionic autonomic
  - A-gamma fibers
  - A-beta fibers
  - A-alpha fibers

**Sequence of Clinical Anesthesia Central Neuraxial Block**

- Sympathetic block with peripheral vasodilation & skin temp elevation
- Loss of pain & temp sensation
- Loss of proprioception
- Loss of touch & pressure sensation
- Motor block

**Nerve Blockade: Central Neuroaxis**

- Zones of differential blockade
  - Sympathetic denervation - approximately 2 dermatomes above the sensory level
  - Sensory denervation - determined by loss of normal sensation to pinprick
  - Motor denervation - approximately 2 levels below sensory level
Patient Preparation and Consent

• Presenting options
  – Obtaining agreement
  – Explaining risks

• IV access: mandatory!

• Fluid management:
  – SAB & Epidural
  – ½- 1 liter or ~ 15cc/kg

• ***Sedation

Positioning for the Spinal/Epidural

• For the Block
  – Lateral vs. Sitting
  – Post-Block
     – Spinal vs. Epidural

• Lateral
  – Perpendicular plane
  – Arch like an ‘angry cat’
  – Don’t move!!
  • No manipulation during contractions....

Sitting

• No torque
• Chin on chest
• Arms resting on knees
• Footstool to support feet
  – Table
Three Approaches to Spinal/Epidural

- Midline
- Paramedian:
  - ~ 1.5 cm lateral to inferior border of spinous process
- Lumbo-sacral or ‘Taylor’ approach
  - Paramedian through L₅-S₁ interspace
Epidural Anesthesia: Volume Block

- Segmental block- dermatome by dermatome
  - Typically 1-2 cc per dermatome blocked
  - Therefore 10 cc will block ~5-10 dermatomes

- End result is a more ‘discrete’ or controllable level

Onset vs Duration

- Onset
  - Ionized: Non-ionized
  - Concentration administered

- Duration
  - Protein binding
  - Lipid soluble

Spinal / Epidural Anesthesia

- Absolute Contraindication
  - Patient refusal
  - Infection at puncture site
  - Generalized sepsis
  - Severe coagulation abnormalities
  - Raised ICP
  - Severe hypovolemia
  - Severe aortic/mitral stenosis
Spinal / Epidural Anesthesia

• **Relative Contraindication**
  – Sepsis
  – Uncooperative patient
  – Preexisting neurologic disorders (demyelinating)
  – Stenotic valvular lesions
  – Severe spinal deformity

• **Controversial**
  – Chronic back pain
  – Localized infection peripheral to the regional technique site
  – Patients taking ASA, NSAIDS, dipyridamole
    • LMWH/ Heparin/ Coumadin
  – Prior back surgery
  – Inability to communicate
  – Blocks while asleep

Spinal Anesthesia: MOA/Duration

• **Mechanism of Action**
  – LA spreads to the nerves of the cauda equina and laterally to the nerve roots

• **Determinants of duration of SA**
  – Drugs and dose (mg)
  – Vasoconstrictors

Spinal Anesthesia- Position Block

• **Determinants of level of SAB**
  – Drug dose vs. drug volume
  – Turbulence in CSF
  – Increased intra-abdominal pressure
  – Spinal curvatures/baricity
Spinal Anesthesia: Position & Baricity

- Baricity of LA
  - Hypobaric
    - LA mixed with sterile H₂O or warmed a little
    - Flows up in the CSF column
  - Isobaric
    - LA ~ = to CSF density
    - Stays at about the same spot in the CSF column
  - Hyperbaric
    - LA mixed with dextrose
    - Flows to most dependent part of the CSF column due to gravity

Baricity: A Measurement Of Relative Density

Baricity and Spinal Curvatures

- Lumbar lordosis
- Cervical lordosis
- Thoracic kyphosis
- High point: L₃-₄, Low point T₅-₆
Spinal Anesthesia: Early Complications

- Early Complications
  - **Hypotension
    - T1-4 (these are the cardio accelerators)
    - T5-L2-3 (these control blood vessels)
    - Nausea and vomiting (often comes first)
  - Paresthesia
  - Bloody tap
  - Respiratory
    - Dyspnea
    - Apnea: C3-5

Spinal Anesthesia: Later Complications

- Postoperative complications
  - **Backache
    - Most common symptom
  - Urinary retention
  - Post-dural puncture headache
    - Medical management
    - Sterile blood patch (EBP)
      - 48 hrs, ~20cc, drawn steriley from arm
    - Neurologic impairment/injury
    - Infection

Most severe complication of spinal anesthesia

- Cardiac arrest
  - Loss of pre-load
  - Blockage of cardio accelerators and blood vessel controllers
  - Treated with ACLS protocol
Epidural Anesthesia: Volume Block

- Determinants of level of epidural
  - Volume of LA
    - 1-2 cc/ dermatome
  - Age
  - Pregnancy
  - Speed of injection
  - Position
  - Spread of epidural blockade

Epidural Space is a Potential Space

Test Dose & Epidural:
3 ml 1.5% Lido + 1:200,000 Epinephrine
Epidural Anesthesia

• Early Complications
  – Backache
  – Bloody tap = epidural veins
  – Dural puncture
  – LA overdose
  – Catheter complications
    • Kinking, migrating, trapping by ‘facet’
  – Unintentional SAB = ‘Wet Tap’
  – Intravascular injection
  – Neurologic injury

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Epidural Anesthesia

• Post-op complications (later)
  – Post-dural puncture headache
    • PDPH
  – Infection
    • Epidural abscess
  – Epidural hematoma
    • True surgical emergency
    • Laminectomy

Possible Spinal/Epidural Needles
Types of Spinal Needles

- Quincke
- Pencil

Notice they are marked by cm stripes.

Types of Epidural Needles: Key Attributes

Notice size difference.

Notice they are marked by cm stripes.