

# Spinal & Epidural Anesthesia

Updated: October 23, 2009

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 SACRAL (CAUDAL) EPIDURAL BLOCK → see p. Op1 >>  
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## SPINAL ANSTHESIA (S. SUBARACHNOID BLOCK)

- excellent **sensory & motor blockade** below level of block.
- injection of **local anesthetic** and/or **opiates** into **SUBARACHNOID SPACE**.
- relatively rapid and predictable onset.

Indications - lower abdominal, perineal, and lower extremity surgery.

Advantages:

- 1) no manipulation of airway
- 2) no side effects of general anesthetics (nausea, vomiting, prolonged drowsiness).
- 3) awake patient provides valuable monitor.

Methods:

A) **single bolus** injection - limited duration (not for prolonged procedures).

B) **continuous** spinal anesthesia:

- a) using **small-bore catheters** - frequent **neurologic complications** (local anesthetic toxicity); e.g. cauda equina syndrome.
- b) using **large-bore epidural catheters** - high likelihood of **postdural puncture headache**.

Local anesthetics used for spinal anesthesia:

| Drug        | Concentration (%) | Volume (ml) | Total Dose (mg) | Baricity   | Glucose (%) | Duration (min) |
|-------------|-------------------|-------------|-----------------|------------|-------------|----------------|
| LIDOCAINE   | 1.5, 5            | 1-2         | 30-100          | Hyperbaric | 7.5         | 30-60          |
| TETRACAINE  | 0.25-1.0          | 1-4         | 5-20            | Hyperbaric | 5.0         | 75-200         |
|             | 0.25              | 2-6         | 5-20            | Hypobaric  | 0           |                |
|             | 1                 | 1-2         | 5-20            | Isobaric   | 0           |                |
| BUPIVACAINE | 0.5               | 3-4         | 15-20           | Isobaric   | 0           | 75-200         |
|             | 0.75              | 2-3         | 15-22.5         | Hyperbaric | 8.25        |                |

Factors that determine ONSET SPEED, LEVEL, and DURATION of spinal block:

1. **Local anesthetic agent** (lipid solubility, protein binding, pK<sub>a</sub>). see p. 2229 >>
2. **Volume & dose** of local anesthetic; increased dose → increased cephalad spread and duration. N.B. rapid injection leads to turbulent flow and unpredictable spread!
3. **Patient position\*** and local anesthetic **baricity**.  
 \*at time of injection and until local anesthetic firmly binds to nervous tissue
  - CSF specific gravity ≈ water.
  - plain local anesthetic solutions are **ISOBARIC**.
  - local anesthetic solutions prepared in water are **HYPOBARIC** - ascend within CSF.
  - local anesthetics mixed in 5% dextrose are **HYPERBARIC**.
4. **Vasoconstrictors** (epinephrine) → prolonged duration.
5. **Opioids** → prolonged analgesia → high-quality postoperative analgesia.
6. **Anatomic and physiologic factors**
  - anatomic factors that decrease relative volume of subarachnoid space (obesity, pregnancy, increased intra-abdominal pressure, prior spine surgery, abnormal spinal curvature) → higher than expected level of block.
  - elderly patients are more sensitive.

Contraindications – as for LP + severe hypovolemia.

### COMPLICATIONS

1. **Hypotension** (sometimes refractory) - consequence of sympathectomy; H: responds readily to **fluids** and small doses of **pressors** (EPHEDRINE).
2. Excessive cephalad spread → **cardiorespiratory compromise**; CPR is notoriously difficult - poor survival; H: high doses of EPINEPHRINE.
3. **Postdural puncture headache**, backache
4. **Transient radiculopathy** (esp. with use of **LIDOCAINE!**) - painful but usually self-limited.
5. Urinary retention
6. Infection
7. Epidural hematoma

## EPIDURAL ANESTHESIA

- neuraxial regional block in thoracic, abdominal, and lower extremity procedures.
- injection of **local anesthetic** and/or **opiates** into **LUMBAR / THORACIC EPIDURAL SPACE**.
- catheter is inserted after epidural space has been located with needle.
- catheter enables repeated boluses – suitable for lengthy procedures, postoperative analgesia.

Complications and contraindications ≈ spinal anesthesia.

N.B. maintain high index of suspicion of **epidural hematoma** (esp. in patients on low-molecular-weight heparin [LMWH]) - back pain, lower extremity sensory and motor dysfunction, bladder and bowel abnormalities.

Epidural catheters should be placed & withdrawn at least 10-12 hours after last dose of LMWH!

BIBLIOGRAPHY for ch. “CSF sampling, Spinal-Epidural Anesthesia” → follow this [LINK](#) >>