

Spinal & Epidural Anesthesia

Last updated: September 5, 2017

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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, pKa). 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!