Commonly Used OB Anesthesia Techniques

The following "recipes" are provided as a guide to techniques. The goal of these suggestions is to keep women comfortable with the lightest block possible. These suggestions should be viewed as a guide only, not as an algorithm. For example, the majority of women having an epidural before 3 cm can be made comfortable with a small dose of local anesthetic. However, sometimes women ask for epidurals when labor is beginning to progress or labor is dysfunctional in some way and they may need more than the recommended dose of drug. The guidelines do not preclude use of other drugs, doses or approaches. They provide a baseline from which to practice and then adjust as needed for the clinical situation. The important thing is to not leave the room until the woman is comfortable and satisfied with her block.

Epidural Block for Labor Analgesia

Epidural blocks are performed at any stage of labor in our unit. The technique varies, depending upon the stage of labor, the parity of the patient, and the speed of progress of labor. Newer techniques using infusions of very dilute solutions of local anesthetics combined with opioids provide excellent analgesia while maintaining motor power. The spontaneous delivery rate with these techniques is high, as patients can usually push well during the second stage of labor. Dense surgical perineal analgesia is often not present for delivery with these techniques, but mild discomfort is usually well tolerated by patients who desire a normal vaginal birth. Obviously, some patients require denser analgesia and treatment must be individualized.

1. Block initiated at < 3 cm cervical dilatation

- **Test dose:** Always aspirate prior to test dose. Aspiration of a multi-orifice catheter is very sensitive for intravascular placement.
  - 3 mL lidocaine 1.5% + epi 1:200,000 test dose given unless blood seen in catheter.
  - Observe for HR and BP changes. HR will rise >10-30 beats/min within 20-45 seconds if intravascular. If patient is beta-blocked, systolic BP will rise >20 mmHg.
  - Be sure to time your test dose after the patient’s contraction or you will risk a false positive result. Observe for dense motor block from possible intrathecal injection.

- **Bolus:** Initial boluses are usually not needed during this stage of labor.

- **Continuous infusion:** 0.125% bupivacaine + fentanyl 2 µg/mL at 10-15 mL/hr. [Higher infusion rates provide much better sacral analgesia.]

- **PCEA:** Now used routinely. Solution of 0.125% bupiv + opioid (see above). Current settings used:
  - Continuous infusion: 10 mL/hr (may also use 8-12 mL/hr)
  - Bolus: 5 mL
  - Lockout: 20 min
  - Air sensitivity: OFF
  - 1 hour maximum: 25 cc/hr
• **Rescue meds/ inadequate analgesia:** Assess patient, catheter, and block height. Different attendings use different rescue meds. 2 commonly used solutions: 3.5 cc of 0.25% bupivacaine with 3.5 cc sterile saline and 1 cc 50 mcg fentanyl. Aspirate, inject 4 cc, observe for 20 minutes and give second dose if patient still complains of pain. You may also bolus 10 cc through pump. Please notify attending if these measures do not work.

2. **Block started at 3-8 cm cervical dilatation in primiparity or multiparity with slow labor**

   • **Test dose:** See above in (1).
   
   • **Bolus:** 10 mL 0.125% bupivacaine + fentanyl 2 mcg/mL can be given as a bolus. You can obtain this solution by withdrawing 10 cc from the epidural bag prior to spiking bag with tubing. If the patient is extremely uncomfortable consider intrathecal fentanyl as part of a CSE (combined spinal/epidural) technique as in (5).
   
   • **Continuous infusion:** Solution as above in (1) at 10-12 mL/hr
   
   • **PCEA:** as in (1)
   
   • **Rescue meds:** As in (1)

3. **Block started at ≥ 8 cm dilatation with rapid labor progress**

   • **Bolus:** 2 options: 10 mL of 0.125% bupivacaine with 2 mcg/mL fentanyl from epidural bag. Or, 0.125% bupivacaine + fentanyl 50 µg. Administer bolus incrementally.
   
   • **Infusion:** as in (1) at 12 mL/hr
   
   • **PCEA:** As in (1).
   
   • **Rescue meds:** As in (1&2). If patient is extremely uncomfortable or almost completely dilated, CSE is often the best choice for these patients [see (5)].

4. **Combined Spinal/Epidural (CSE)**

   • Alternative technique to epidural analgesia. It is ideal:
     
     o When rapid onset of intense analgesia is required, (eg, in the multiparous or primiparous woman in rapidly progressing labor, complete dilation)
     
     o When no motor block is desired (ie, in very early labor, when the patient wishes to ambulate, or when effective expulsive efforts are important)
     
     o For routine labor analgesia as an alternative to epidural
     
     o When loss-of-resistance is uncertain; spinal needle confirms correct placement
     
     o In the technically difficult or uncooperative patient in whom a single shot spinal dose can be followed by placement of an epidural catheter when the patient is comfortable.
     
     o Consider when redoing a failed epidural

**CSE Technique**
An initial dose of opioid + bupivacaine is administered via a long 27 gauge pencil-point needle introduced through the epidural needle. Rapid (within 6 min) profound analgesia results, lasting 90-120 minutes.

- **Initial labor dose:** Intrathecal fentanyl 20 µg + bupivacaine 2 mg (0.8 mL of 0.25% plain) [dose range: IT fentanyl 10-20 µg and bupivacaine 1.25 - 2.5 mg. Use smaller doses in very early labor and larger doses close to delivery.] Or, 20-50 mcg fentanyl only.

- **Infusion/PCEA:** Started as in (1) unless delivery is expected within 60-90 min

- **Monitoring:** FHR, BP as for epidural, SaO₂ for first 30 min.

**Fetal Bradycardia**

Fetal bradycardia may occur somewhat more frequently after CSE than after epidural, most often in patients with preexisting fetal stress and those in tumultuous labor. This technique is therefore best avoided when there are preexisting fetal heart rate (FHR) abnormalities or a non-reassuring FHR. Alternatively, one should expect fetal bradycardia any time after adequate analgesia is delivered to the patient, no matter which technique is used.

The bradycardia may be due, in part, to uterine hytonus resulting from loss of beta-sympathetic tocolytic effect as epinephrine concentrations rapidly decline with the onset of analgesia.

Immediately **discontinue oxytocin, administer oxygen** and additional IV fluids, give nitroglycerin (located in the block cart) either as the sublingual spray (2 puffs, repeated as necessary) or IV as intermittent 100 µg boluses until uterine tone diminishes or blood pressure decreases. If uterine hypertonus persists, terbutaline 0.25 mg SC may be necessary. Administer phenylephrine if hypotension is present.

**Useful Tips for Labor Analgesia**

1) Bupivacaine in subanesthetic concentrations (1/12-1/16%) does not provide adequate analgesia without the addition of opioids. If opioids cannot be used, then 0.25% bupivacaine or levobupivacaine or (0.2% ropivacaine) should be used for the bolus and 0.125% for the infusion. Infusions more concentrated than 0.125% bupivacaine should not be used unless the anesthesiologist is in constant attendance throughout, as the consequences of unrecognized intravascular or intrathecal infusion of higher doses could be disastrous. Lidocaine and chloroprocaine are ineffective when given as dilute infusions for labor analgesia.

2) The total appropriate dose of opioid in labor has not been established. Doses of opioid as described do not result in neonatal depression. Conservative doses should probably be used with preterm fetuses.

3) If there is no major improvement in analgesia, the catheter is probably in the wrong place and should be retracted slightly. If pain control is still absent or inadequate after retraction, consider replacing catheter at different interspace.

**Types of Anesthesia**

- Most C/S here are performed with regional anesthesia.
• General anesthesia is usually reserved for emergency cesareans where there is acute fetal distress or maternal hemorrhage, or when regional block is contraindicated.

• Spinal anesthesia is used for elective cesareans, and emergent or non-elective cesareans where a rapid onset of block is desirable or acceptable.

• Epidural anesthesia is used for elective cesareans when a slower onset of block is preferred and for patients in whom a functioning catheter is already in situ.

• CSE should be considered if the duration of surgery is expected to last beyond that provided by spinal anesthesia (eg, 4 previous CS).

Avoidance of Aortocaval Compression

All patients must be tilted to the left as soon as they are placed on the OR table to minimize the adverse effects of the supine position, ie, a decrease in cardiac output of 30-50%. This is usually accomplished by placing a rolled blanket under the right hip, tilting the table, or a combination of the two methods. Left uterine displacement is essential regardless of whether the patient is having a regional or a general anesthetic. If intraoperative hypotension occurs, check the adequacy of left uterine tilt.

Prophylaxis Against Aspiration Pneumonitis

IV famotidine 20 mg and metoclopramide 10 mg may be given prior to surgery. Metoclopramide increases lower esophageal sphincter tone and, in the case of spinal anesthesia, decreases nausea. The famotidine will lower gastric pH in about 60 minutes. This will help should the woman need intubation and famotidine will also decrease any reflux symptoms.

Patients receiving general and neuraxial anesthesia should be given Bicitra 30 mL p.o. 2 to 5 min before anesthesia. This drug has a short duration of action (20 min), so don’t give it too early.

Spinal Anesthesia for Cesarean Section

Hypotension is the major risk with this technique. Prophylaxis and treatment include:

• 500-1000 mL crystalloid in the 30 min or so before the block, or crystalloid infused rapidly (with pressure bag) concurrent with and immediately after the block. Concurrent rapid infusion of crystalloid is more effective than pre-loading with crystalloid, but less effective than colloid given as a preload or post-load.

• Phenylephrine 50-100 µg boluses at the first sign of hypotension (ie, tachycardia), repeated p.r.n.

• Use enough phenylephrine to maintain blood pressure as close to baseline as possible (without exceeding the baseline the patient had just before the block).

• If there is some mild bradycardia and hypotension, ephedrine 10 mg will increase the blood pressure and the heart rate. However, limit the total dose of ephedrine because large doses are associated with neonatal acidosis.

• Glycopyrrolate or Atropine can be used if significant bradycardia develops. Be vigilant for possible symptoms of a high-block or emergent total spinal anesthetic (following an epidural top-up if the catheter is in the subarachnoid space) as a cause for the bradycardia.
Spinal Anesthetic Technique: Use 0.75% hyperbaric bupivacaine (1.6 mL) [range 11.25-12.75 mg, ie, 1.5-1.7 mL] + 0.1 to 0.25 mg preservative-free morphine. Fentanyl 5-20 µg is usually added to intensify intraoperative anesthesia. Because no correlation has been demonstrated between patient height and weight and the level of block obtained, the dose of local anesthetic is not adjusted for patients in the normal range (5' - 6'). Remember that intubation because of failed blocks is much more common than intubation for high blocks! A CSE is usually done if there is uncertainty about appropriate dosage or duration of the case.

Epidural Anesthesia for Cesarean Section

Ideal for patients in whom gradual onset of the block is desirable, or for routine cases. Fluid loading with 500-1000 mL crystalloid. Management of hypotension as above for epidural block. Metoclopramide 10 mg and famotidine 20 mg i.v. are also given.

Technique for Elective Cesarean Section

- 2% lidocaine + epinephrine 1:200,000 + bicarbonate 1 mEq per 10 mL of lidocaine. Alkalinization with bicarbonate speeds onset and intensifies the block. Bicarbonate should not be added if a slow onset of blockade with the least possible risk of hypotension is the goal.
- Test dose, plus incremental injections to total initial dose of 20 mL
- Average dose: 20-25 mL, but some patients will need up to 30 mL
- Addition of fentanyl 50 to 100 mcg improves intraoperative anesthesia, decreases intraoperative nausea and shivering, and is safe for the fetus.
- Morphine 2-4 mg can be administered after delivery of the baby for postoperative analgesia
- Alternative techniques employ similar doses of 3% 2-chloroprocaine (more rapid onset, but short duration and potential antagonism of epidural opioids) Plain lidocaine is much less effective than lidocaine with epinephrine and may need to be supplemented with chloroprocaine (to avoid potentially toxic doses of amide).

Techniques for Cesarean Section with Functioning Epidural Block Placed During Labor

In real emergencies, 20 mL of 3% chloroprocaine can be injected rapidly into a catheter known to be functioning satisfactorily (therefore, presumed not to be intravascular or intrathecal). This should give good anesthesia to start a C/S within 5 min. Bold and prompt action is necessary in these cases to avoid having to induce general anesthesia. It may be necessary to start injecting the drug as soon as it is clear that surgery is needed, doing so en route to the OR if necessary. In less urgent cases, lidocaine with epinephrine(alkalinized with bicarbonate 1 mEq/10 mL if desired) is usually administered, as above in (1).

**NOTE:** Many patients with an existing labor block will have a level of analgesia to pinprick that is quite high (often T6 or so). This does not mean that the patient has this level of anesthesia. The level of surgical anesthesia is best assessed with a nerve stimulator, light touch, or an Allis clamp. It is rare to obtain satisfactory surgical anesthesia in this circumstance without injecting an additional 15-20 mL of a surgical concentration of local anesthetic.
CSE for Cesarean Section

Used when dose requirements or duration of surgery uncertain

- **Technique:** As for labor CSE

- **Dosage:**
  - The hyperbaric bupivacaine used for spinal anesthesia works well in the CSE technique. Although the patient sits up a little longer after the injection compared to the single shot spinal technique, the block will usually not settle lower in the time it takes to pass the epidural catheter. If this occurs and cannot be corrected by position change, epidural injection of 5-10 mL of saline will often move the block level cephalad.
  - Normally, the same doses of IT bupivacaine and opioids as for the single shot spinal technique are used. However, if a smaller spinal dose is clinically indicated, (5 to 7.5 mg + IT opioids), then augmentation of the block may be required with 2% lidocaine with epinephrine via the epidural to raise the block to T4.) When dosing the epidural catheter, remember that the mechanical effect of an epidural bolus may cause the block level to extend more than usual. Expect to supplement with epidural drug if the case is prolonged or a low spinal dose is used.

General Anesthesia for Cesarean Section

Ensure that the attending is alerted as soon as a crash C/S has been decided. If possible, try to gain as much relevant information from the patient prior to anesthesia if an H&P has not been completed, eg, information about previous anesthetics, medical illness, allergies, Medical problems, assessment, last meal.

Don’t forget to assess the airway!
The following standard technique is used:

- Make sure the anesthetic machine is set for monitoring a patient having a general anesthetic (ETCO₂ – this MUST be turned on and connected)
- Left uterine displacement; bicitra 30 mL PO, IV famotidine and metoclopramide.
- Preoxygenation with at least four maximal breaths.
- Cricoid pressure, suction, good head and neck position.
- Make sure the surgeon is scrubbed and ready to start before you start, and double-check that the pediatrician is present or has been alerted.
- Be prepared to deal with difficult intubation (see ASA algorithm for management of failed intubation). Ensure a gum-elastic bougie is available
- Propofol 2 to 2.5 mg/kg (or ketamine 2 mg/kg in severely hypotensive patients)
- Succinylcholine 1.5 mg/kg.
- After securing the airway, inform the surgeon that they may begin.
- Maintenance with 50:50 N₂O/O₂ + 0.75 to 1.0 MAC sevoflurane or isoflurane until delivery.
- After delivery:
  - Give fentanyl and/or morphine IV for analgesia.
Small doses of vecuronium (1 to 2 mg), rocuronium (10 to 20 mg), or cis-atracurium (2 mg) provide muscle relaxation of appropriately short duration. Administer only after recovery from sux is evident by respiratory efforts, movement, or presence of twitch with nerve stimulator. If the patient is on magnesium, they usually don’t need more muscle relaxation with non-depolarizing muscle relaxants. However, if you do give muscle relaxants to someone on magnesium, use small doses and monitor NMB carefully with nerve stimulator.

- Ensure patient is fully awake and reversed before extubation.
- IV-PCA opioids for postop analgesia (written and managed by OB team)

**Postoperative Analgesia**
A signed electronic order set must be completed for each patient receiving spinal/epidural opioids.

*Authors: Michael Drinkwater, Sachin Bahadur, Scott Medearis, Tyler Evans*
*Mentor: Dr Manuel Castresana*
*Revision date: September 30, 2015*