**Lumbar Catheter**

A. Suggested for pelvic and lower extremity surgery in some cases.

B. Medication choices (preservative-free only)- See Epidural Order Sheet
   - Fentanyl 5-10 mcg/mL- for lower abdominal or lower ext pain (pending, currently unavailable)
   - Morphine sulfate 50-100 mcg/mL- for upper abd, thoracic pain
   - Hydromorphone 5-10 mcg/mL- intermittent lipophilicity between fentanyl, morphine sulfate
   - Bupivacaine 0.065 - 0.25% (standard 0.075%-0.1%) may be added to any of these opioids if dermatomally feasible and appropriate, i.e. do not add bupivacaine to a lumbar catheter for the treatment of abdominal or thoracic area pain. You will merely add the problem of numb legs and increased fall risk to a painful belly/chest.

C. Inadequate epidural analgesia:
   1. Aspirate catheter, if:
      - (+) CSF – DC catheter. Replace catheter or provide other means of analgesia. If you elect to replace the catheter, remember that the risk of subarachnoid spread is heightened and plan accordingly, i.e. move to a different level in most cases.
      - (+) heme - Withdraw catheter 1-2 cm, recheck for negative aspiration. If negative, follow test dose algorithm below. If aspiration is again positive, D/C catheter. Replace catheter or provide other means of analgesia.
      - (-) Aspiration – Follow test dose algorithm below.

2. Test Dose
   5-10 mL 1% Lidocaine I divided doses) Check for dermatomal evidence of block with ice; e.g. if the catheter is at T6/7, the patient should have segmental hypesthesia to cold in an area encompassing approximately 1-2 dermatomes/segments per cc (refer to dermatomal map) Note that one should always start with lower doses in the upper thoracic area, e.g. 3-5cc.

<table>
<thead>
<tr>
<th>No block</th>
<th>Unilateral block</th>
<th>Appropriate block</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace catheter if less than 24 hours or if severe pain</td>
<td>Withdraw catheter 1-2 cm and re-bolus post negative aspirate</td>
<td>Increase infusion rate or consider adding local anesthetic if dermatomally feasible</td>
</tr>
<tr>
<td>Consider D/C catheter if more than 24 hours or if catheter D/C'd, write for IV PCA</td>
<td>Satisfactory analgesia post bolus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start infusion</td>
<td></td>
</tr>
</tbody>
</table>

D. Considerations for drug choice:
   In general, specific considerations for epidural administration favor drugs of intermediate lipophilicity. (See Bernard CM, Hill HF. Physical and chemical properties of drug molecules governing their diffusion through the spinal meninges. Anesth 1992; 77:750-6) The drug that best meets this condition in current practice is hydromorphone. Drugs of high lipophilicity have been extensively studied, and their epidural and IV doses are not significantly different, i.e. PCA administration of same dose would result in similar level of analgesia. (See Glass,PSA,Estok,P, Ginsburg B, et al.) Use of Patient-Controlled Analgesia to Compare the Efficacy of Epidural to Intravenous Fentanyl Administration Anesth Analg 1992;74:345-51.)

E. Bilateral block from test dose, but inadequate analgesia from infusion
   - increase infusion rate
   - add local anesthetic if dermatomally feasible

F. Add a PCEA function. This may more effectively cover multiple dermatomes that constant rate-low volume infusions are not covering
   - change to more water-soluble drug

G. Morphine sulfate epidural caveats:
   1. PCEA less effective because of slow (2hr) onset; typical PCEA dose 100 mcg q 20 min. Consider low dose IV PCA fentanyl for breakthrough pain.
   2. May need to bolus with epidural fentanyl or hydromorphone while waiting for ↑ infusion rate to
“catch up” (50-100 mcg). This may be done by giving 3-cc of the infusion drug via the bolus feature on the epidural pump.

3. Epidural morphine sulfate loading doses:

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-44</td>
<td>4-6</td>
</tr>
<tr>
<td>45-65</td>
<td>3</td>
</tr>
<tr>
<td>66-75</td>
<td>2</td>
</tr>
<tr>
<td>&gt;75</td>
<td>1</td>
</tr>
</tbody>
</table>

### Adult (age 15 or older) Epidural Opioids

<table>
<thead>
<tr>
<th>Agent</th>
<th>Loading Dose</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
<th>Infusion Concentration</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>1-6 mg</td>
<td>20 min</td>
<td>30-60 min</td>
<td>12-24 hr</td>
<td>100 mcg/mL</td>
<td>0.1-1 mg/hr</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>0.2-1 mg</td>
<td>15 min</td>
<td>20 min</td>
<td>8-12 hr</td>
<td>5-10 mcg/mL</td>
<td>30-120 mcg/hr</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>50-100 mcg</td>
<td>4-10 min</td>
<td>20 min</td>
<td>1-5 hr</td>
<td>5-10 mcg/mL</td>
<td>0.5-1 mcg/Kg/hr</td>
</tr>
</tbody>
</table>

### Recommended Level of Epidural Catheter Placement

- **Thoracotomy:** $T_4 \text{–} T_8$
- **Upper abdomen:** $T_6 \text{–} T_9$
- **Colorectal:** $T_8 \text{–} T_{10}$
- **Renal/ flank:** $T_7 \text{–} T_{10}$
- **Pelvic/ LE:** Lumbar

### Thoracic Epidurals

- Potential advantages of thoracic over lumbar catheter
  - A. Lower dose requirements for opiate and local anesthetic
  - B. Potential sparing of lumbar/ sacral roots
  - C. Segmental analgesia
  - D. Limited sympathectomy

- Dermatomal “volume” approximately 1 mL/dermatome. Assume 60-70% cephalad spread/ 30-40% caudad from site of injection.

- Reduce doses 25-30% from lumbar

- Test dose: 0.75-1% Lidocaine 4-8 mL

- Medication choices: (preservative –free only)
  - Morphine sulfate 100 mcg/mL
  - Hydromorphone 5-10 mcg/mL
  - Fentanyl 5 or 10 mcg/mL
  - Morphine sulfate 100 mcg/mL + Bupivacaine 0.1%
  - Hydromorphone 10 mcg/mL + Bupivacaine 0.1%
  - Fentanyl 5 -10 mcg/mL + Bupivacaine 0.1%

- Incidence of urinary retention may be higher in thoracic epidural catheters

- Refractory shoulder pain – after thoracotomy
  - Ketorolac (Toradol) 15mg IV q 6 hr × 4 doses if serum creatinine normal
  - TENS (P.T. consult)
  - Local heat
Patient-Controlled Epidural Analgesia (PCEA)
(For Adults)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Infusion Concentration</th>
<th>Infusion</th>
<th>PCEA Bolus Dose</th>
<th>Lockout</th>
<th>4 hr Bolus Dose Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>100 mcg/mL</td>
<td>0.1-1 mg/hr</td>
<td>*50-200 mcg</td>
<td>*30-45 min</td>
<td>*4-6 doses</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>10 mcg/mL</td>
<td>30-120 mcg/hr</td>
<td>20-40 mcg</td>
<td>15 min</td>
<td>10 doses</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>5-10 mcg/mL</td>
<td>0.5-1 mcg/Kg/hr</td>
<td>15-20 mcg</td>
<td>10 min</td>
<td>10 doses</td>
</tr>
</tbody>
</table>

*Because of slow onset, morphine PCEA generally not advised. Consider adding low dose fentanyl IV PCA.

- Ambulating with epidural local anesthetic.
  A. Local anesthetic does not always have to be discontinued prior to ambulation. Evaluate benefit of local anesthetic vs. adequacy of opioid alone, age of patient general. Cardiovascular status, other contributing factors for orthostasis (i.e., hypovolemia, vasodilators, etc.)
  B. Document normal lower extremity neuro exam to include proprioception prior to ambulation.
    - write orders for 1st ambulation with assistance
    - minimize concentration of local anesthetic if feasible
  C. Orthostasis may be more likely with thoracic catheters than lumbar.

### Epidural Side Effects

**A. Nausea/ Vomiting**
1. R/O reversible causes- (i.e. hypotension)
2. Consider anti-emetics. Choices for adults age 15 or older:
   - Droperidol 0.625 mg IV q 6 hr prn
   - Promethazine (Phenergan) 25 mg per rectum or IV or PO q 6 hr
   - Prochlorperazine (Compazine) 5 mg IV q 6 hr or 25 mg per rectum q 12 hr
   - Ondansetron (Zofran) 4 mg IV q 4 hr × 2 doses prn
   - Diphenhydramine (Benadryl) 25-50 mg IV or PO q 6 hr
   - Scopolamine (Transderm – Scōp) patch q 3 days if patient less than 50 years old- disadvantage- slow onset
3. Consider decreasing size of bolus or decreasing the infusion rate.
4. Consider changing opioids.

**B. Pruritus**
1. Choices for adults age 15 or older:
   - Nalbuphine 5 mg IV q 4 hr × 2 doses prn
   - Diphenhydramine 12.5-25 mg IV or po q 6 hr prn
   - Low dose Naloxone (see below)

**C. Urinary Retention** – every patient with and epidural does not need a urinary catheter.
If urinary retention occurs with epidural, consider bladder screening, then I/O catheterization, ↓ epidural infusion rate or bolus dose, or low dose naloxone infusion.
- For men > 65-70 or with history of prostate disease, leave urinary catheter in place until epidural removed.

**D. Numbness/ Weakness**
- Stop infusion
- Check catheter for negative aspiration
- Restart infusion at lower rate or without local anesthetic when symptoms begin to regress

**E. Naloxone (Narcan) infusion for refractory pruritus, nausea/ vomiting; urinary retention.**
- (1 mcg/mL in normal saline) to run at (20 mcg/hr IV via pump × 8 hr) Note that naloxone is short acting. Be careful of delayed respiratory depression after infusion cessation if used for neuraxial opioid overdose.
Epidural Clonidine
(For adults age 15 or older)

A. Adjunct to opiates or local anesthetic

B. Packaged as *Duraclon* 100 mcg/mL

C. Typical epidural mix 1-10 mcg/mL
   Target Dose 10-30 mcg/hr

D. Side effects of hypotension, bradycardia more profound with thoracic than lumbar catheters.

E. Epidural bolus: 100-300 mcg, if needed

F. Intrathecal bolus 50-100 mcg