Acute Pain Service
STICU/CTICU Epidural Infusion Guide

Background

- Epidural catheters are commonly placed preoperatively for major abdominal and thoracic surgery.
- Research shows that epidural analgesia decreases morbidity in this patient population when compared to intravenous opioid therapy.
- Most epidurals are placed in the thoracic region (typically T6-T10) and are targeted to the expected surgical incision site.
- Epidural infusions consist of both a local anesthetic and an opioid that are administered at a certain rate to achieve neuraxial spread sufficient to cover the surgical/incisional area.
- The opioid binds directly to the mu receptors in the spinal cord to provide analgesia.
- The local anesthetic creates a dermatomal band of numbness covering the incision site to provide analgesia. Concentrations of bupivacaine below 0.1% may not be sufficient to produce a dermatomal band.
- Nerves most sensitive to local anesthetics, autonomic and nociceptive (C-type and A-Delta fibers), are blocked with the widest dermatomal distribution.
- Nerves most resistant to local anesthetics, motor (A-alpha), are blocked with the narrowest dermatomal distribution.

Infusion Medications

- Standard infusion is bupivacaine 0.1% + Opioid. Reduced dose of bupivacaine (0.05-0.08%) may be needed in lower thoracic or lumbar placed epidurals to minimize motor block or to minimize effects on blood pressure in hypovolemia.
- Standard opioid choices are: Fentanyl 2-5 mcg/ml; Hydromorphone 5-15 mcg/ml; Morphine 20-50 mcg/ml. The lower end of the dose range is used for older patients; the higher end for opioid tolerant.
- Infusions are ordered as patient controlled epidural analgesia (PCEA) with a basal rate of 4-10 ml/hr, and patient initiated bolus of 2-5 ml every 10-15 minutes.
- If IV PCA is added to epidural infusion, the PCEA is changed to a basal infusion only (no demand dose).
- RNs may bolus from the infusion and bag and adjust the basal rate with appropriate orders from the APS as needed for pain, blood pressure, or dermatomal spread.

Common Side Effects and Treatment

- Hypotension: usually multifactorial in the postoperative patient
  - Thoracic epidurals often contribute due to blocking of the thoraco-lumbar sympathetic chain.
  - If hypotension of epidural etiology occurs, the basal infusion can be reduced by 1-2 ml/hr
  - If the basal is reduced to 4 ml/hr and hypotension is still present, contact APS to discuss reducing bupivacaine concentration.
  - If rate and bupivacaine reduction insufficient, consider starting pressors or contacting APS to discuss temporarily stopping epidural infusion until blood pressure can be normalized.
  - If there is inadequate pain control at a lowered basal rate or the epidural infusion is stopped, alternative analgesia will be needed. Contact the APS to discuss options: IVPCA, IVP opioids prn, Toradol, PO opioids.
  - When BP normalizes, the epidural settings should be adjusted to optimize pain control and eliminate the need for alternative analgesia.
Pruritus: listed in order of treatment preference
  o Nalbuphine 2.5-5 mg IVP q4h PRN. This is a combination agonist-antagonist drug when given in the specified low doses can reverse the side effects of neuraxial opioids without reversing or significantly adding to analgesia.
  o If nalbuphine not effective, consider reducing/eliminating the opioid concentration or changing to a different opioid.
  o Standard antipruritics: diphenhydramine and hydroxyzine

Nausea/vomiting: usually multifactorial
  o Treat hypotension
  o Standard antiemetics: ondansetron, promethazine, scopolamine

Anticoagulation
  o The highest risk of epidural space bleeding occurs during placement (needling) and removal/movement of the epidural catheter.
  o Signs and symptoms of epidural hematoma include local or radicular back pain, numbness, LE weakness, incontinence.
  o Accidental dislodgement of the epidural catheter while anticoagulated or use of a heparin gtt with an epidural catheter may require frequent LE neuro checks (e.g., q2 or q1 hour)
  o Contact the APS for questions regarding anticoagulation and epidural catheters. The list of medications and recommendations is too comprehensive to detail here.
  o Brief list of recommendations for common clinical anticoagulation scenarios with epidural catheters
    o Heparin 5000u SC BID: allowed; holding a dose not required to remove catheter.
    o Heparin 5000u SC TID: allowed; hold one dose to remove catheter.
    o Heparin infusion for DVT prophylaxis (PTT goal 35-45): allowed; hold infusion (e.g. 4 hrs) until PTT < 40 to remove catheter.
    o Heparin infusion for therapeutic indication (PTT goal 60-90): contact APS prior to starting to discuss continuation vs removal of catheter. If acceptable to administer with catheter, will need PTT < 40 to remove catheter.
    o Enoxaparin/Dalteparin prophylactic dosing: allowed; will need to wait 12 hrs after last dose to remove catheter.
    o Enoxaparin/Dalteparin therapeutic dosing: contraindicated.
    o Warfarin: contraindicated.
    o Elevated INR due to due to disease or surgery: will generally need INR < 1.5 to remove catheter.

Trouble Shooting
  o The epidural space is physiologically non-uniform and distribution of the infusion can vary widely across patients leading to patchy, high, low, or one-sided dermatomal blocks. The ultimate location of the catheter tip within the space can also be a factor in infusion distribution and effectiveness of therapy. These issues can sometimes be remedied by the APS withdrawing the catheter a few centimeters. Replacement of the catheter may be required to achieve optimal pain control.
  o Dislodgement of the epidural catheter from the epidural space can usually be noticed by a change in position of the catheter at the skin (based on subq depth of catheter and assessed via centimeter length markings). However, the catheter can also become dislodged subq and not show a change in position externally.
  o Accidental disconnects of the epidural catheter from the transition to the pump tubing can occur (at the yellow “alligator” style clamp connector). This problem as well as external catheter breakage can sometimes be remedied by the APS sterilizing the catheter, cutting a new clean end, and using a new clamp connector. The APS must be notified if a disconnect occurs.