

# Epidurals for the Post-Operative Neonatal Patient

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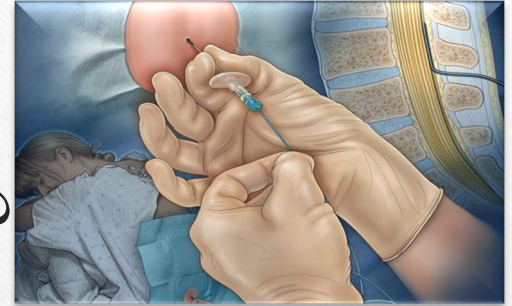
Pediatric Pain Sedation and Consult Service

# Objectives



- Epidural/caudal analgesia:
  - Benefits vs. Risks
  - What is the epidural/caudal space?
  - Common solutions and adjunct medications
  - Side effects of epidural medications
- Understand guidelines for the UNC Pediatric Pain Service
- How & when to notify the Pediatric Pain Service

# What is epidural analgesia?



- Definition- **epidural analgesia** is a form of regional anesthesia involving administration of drugs through a needle or catheter placed into the epidural space.
- Drugs administered into the epidural space can cause both:
  - **Anesthesia**- a loss of sensation
  - **Analgesia**- loss of pain
- Works by blocking the transmission of signals through nerves near the spinal cord.
- Most commonly performed regional technique for management of pain in post-operative urologic, orthopedic, and general surgical procedures below T-4.



# Benefits of Epidural Analgesia

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- Provides intraoperative and/or postoperative analgesia after thoracic, abdominal, lower extremity, or urologic surgeries.
- Facilitates earlier extubation
- Reduces general anesthesia opioid requirements (intraoperatively)
  - At times can be the sole anesthetic intraoperatively

**Reduces the need for IV (systemic) opioids**



# Contraindications to Epidural/Caudal

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- Systemic sepsis
- Local skin pathology/infection (MRSA, MSSA)
- Patient or parent refusal
- Clinically significant coagulopathy
  - Evaluated prior to pulling catheter
- Ongoing, progressive neuroaxial disease
- Abnormal anatomy (myelomeningocele)



# Risks of Epidural/Caudal Placement

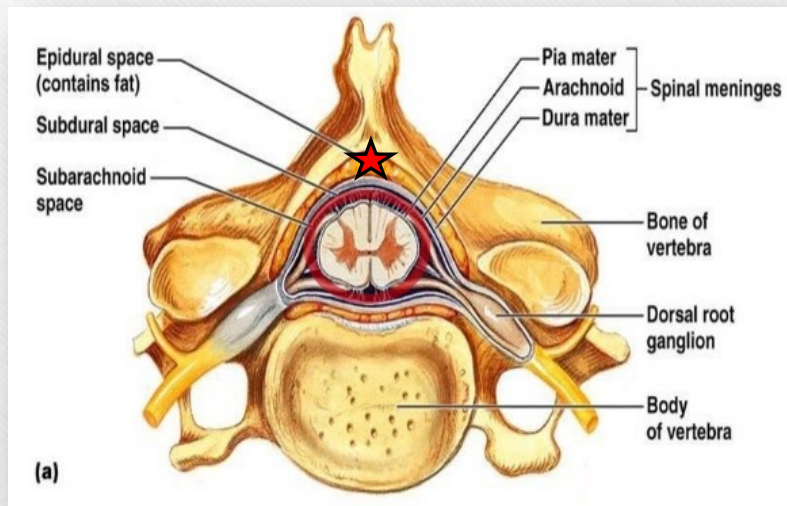
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- Infection
- Bleeding +/- hematoma
- Nerve damage
- Dural puncture (wet tap)



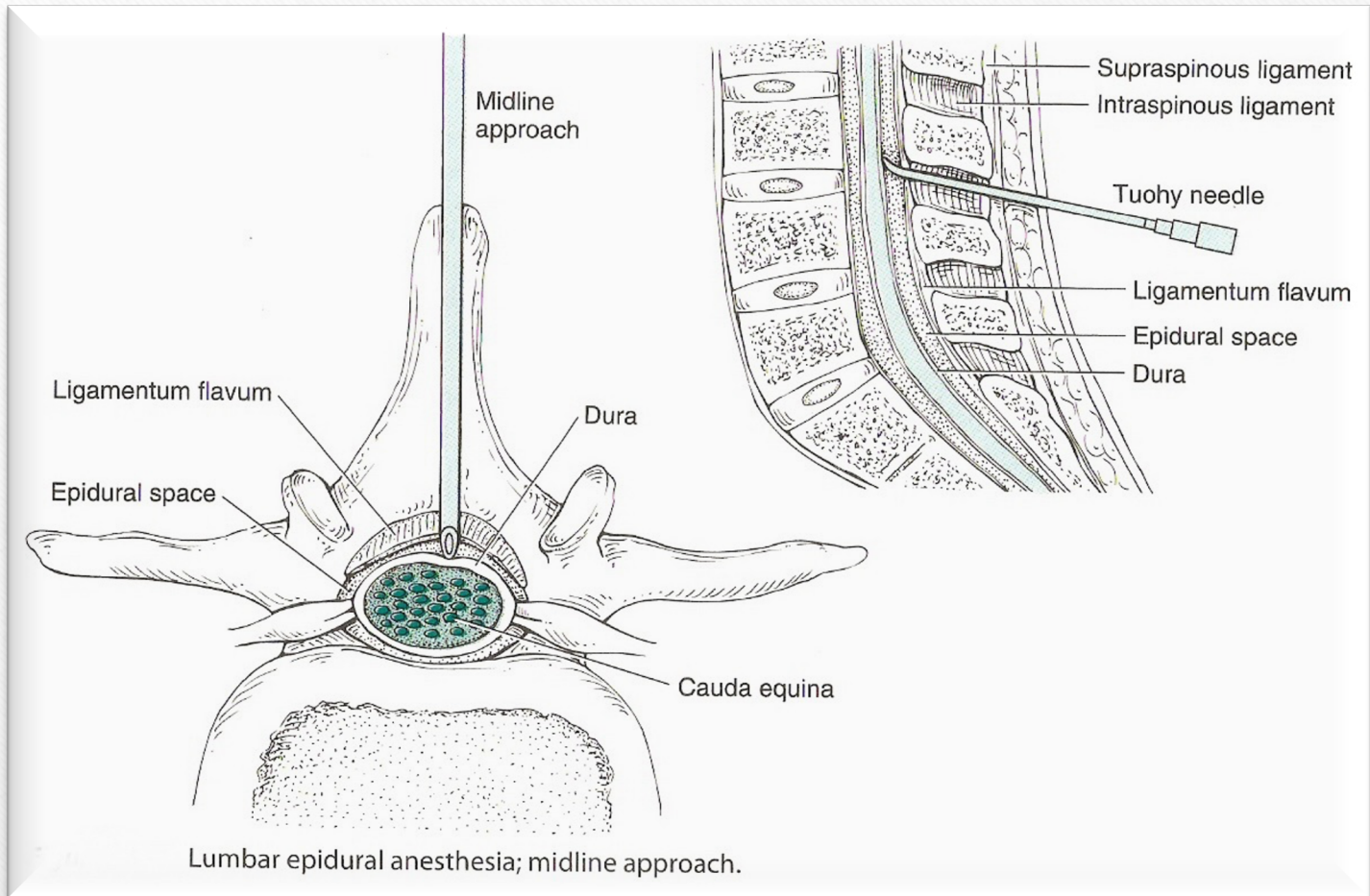
**These are all low risk !!!**

# The Epidural Space



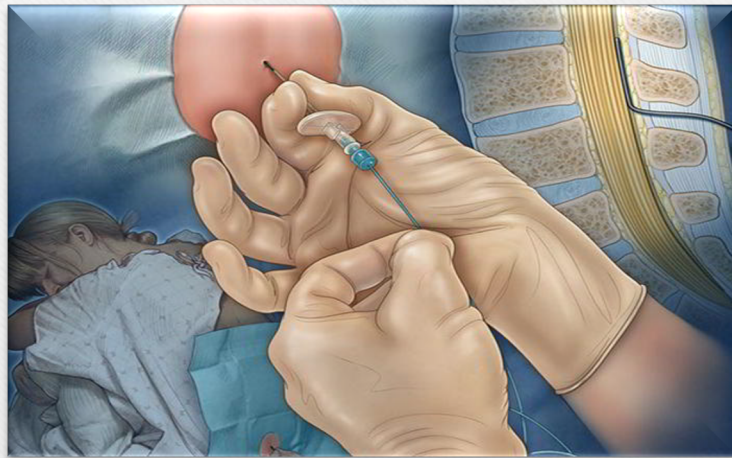
- A small space lying between the spinal meninges (layers surrounding the spinal cord) and the sides of the vertebral canal.
- Extends from the base of the skull to the sacral hiatus.
- Filled with **fat, blood vessels and nerve roots, not fluid!**





Lumbar epidural anesthesia; midline approach.

# Placing an Epidural Catheter



- The catheter is threaded through the needle into the epidural space.
- The needle is removed leaving the catheter behind.
- Usually 3–5cm of the catheter is left in the epidural space.



# Caudal Analgesia

- **Caudal**- the epidural space is entered through the sacrococcygeal membrane.
- If no catheter is placed it is referred to as a **single-shot caudal**
- If a catheter is placed, it is referred to as a **caudal catheter**
- The catheter may be threaded up the epidural space to the desired level/location (thoracic or lumbar) and a continuous infusion of drugs can be administered for pain relief.





# Drugs: The why, what, where, when

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- Typically a local anesthetic +/- an opioid are run as an infusion through the catheter
- Local anesthetics are drugs that cause **reversible loss of nociception**
- Commonly used local anesthetics include:
  - Lidocaine, bupivacaine, chloroprocaine and ropivacaine
- Commonly used opioids include:
  - Hydromorphone, morphine & fentanyl
- All drugs administered should be preservative free



# Bupivacaine

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- Interrupts nerve conduction by blocking sodium channels
- Hepatic metabolism
- Slow onset (20 minutes)
- Long duration of action (400 minutes)
- **After a clinician bolus, anticipate onset within 20 minutes**
- **Most toxic of all local anesthetics**
  - Calculations are mandatory (double check, then re-check)



# Bupivacaine

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Toxicity presents as:

- CNS excitement: tinnitus, blurred vision, dizziness, circumoral numbness, muscle twitching
- Seizures
- Cardiovascular collapse (patients must be on continuous EKG)
- Arrhythmias





# Morphine

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- Classification- opioid
- Useful when surgery is extensive and when catheter tip is positioned far from surgical dermatomes (systemic effect)
- Respiratory depression is a concern
- Side effects include pruritus, nausea, vomiting

# Hydromorphone

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- Classification- opioid
- Several times stronger (more potent) than morphine
- Similar properties to morphine
- Often see less pruritus
- Often used in older patients

# Fentanyl

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- Classification- opioid
- Mechanism of action is absorption into systemic circulation
  - More common in neonates (NICU)
- Faster onset of respiratory depression with bolus administration



# Clonidine

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- Alpha-2 agonist
- Sedative, anxiolytic, and analgesic properties
  - Opioid sparing effect
- Prolongs epidural analgesia

# Epidural Combinations

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- Bupivacaine + Clonidine
- Bupivacaine + Morphine
- Bupivacaine + Morphine + Clonidine
- Bupivacaine + Hydromorphone
- Bupivacaine + Hydromorphone + Clonidine
- Morphine + Clonidine
- Chlorprocaine
- Chlorprocaine + Fentanyl

# Side Effects of Local Anesthetics

Side Effect	Possible Treatment / Intervention
<p><u>Urinary retention</u> Rare in neonates Secondary to loss of sensory, autonomic &amp; motor input to bladder</p>	<ul style="list-style-type: none"><li>• Foley catheterization</li><li>• Monitor bladder distention/bladder scan q6h (if no foley)</li><li>• Intermittent catheterization</li></ul>
<p><u>Sympathetic blockade</u> Hypotension is common in adults but RARE in infants and small children</p>	<ul style="list-style-type: none"><li>• Provide adequate hydration</li><li>• Careful local anesthetic dosing</li><li>• Decrease infusion rate</li></ul>



# Side Effects of Local Anesthetics

Side Effect	Possible Treatment / Intervention
<u>Motor blockade</u> Dose dependent	<ul style="list-style-type: none"><li>• Decrease concentration of local anesthetic</li><li>• Change to a different local anesthetic</li></ul>
<u>Pressure ulcers</u> Secondary to sensory blockade	<ul style="list-style-type: none"><li>• Protect potential pressure points</li><li>• Reposition frequently (at least q4h)</li><li>• Avoid leaving hard/sharp objects in patient's crib/bed</li></ul>

# Side Effects of Local Anesthetics

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Side Effect	Possible Treatment / Intervention
<p data-bbox="411 634 745 679"><u>Systemic toxicity</u></p> <p data-bbox="200 704 919 915">May be the result of slow accumulation of local anesthetic or the result of inadvertent intravascular injection.</p> <p data-bbox="200 939 877 1039">May cause seizures, arrhythmias, cardiovascular collapse.</p>	<ul data-bbox="977 634 1673 1043" style="list-style-type: none"><li>• Limit dosage</li><li>• Aspiration and test dose when epidural is placed to avoid intravascular injection</li><li>• If severe reaction: supportive tx, CPR and administer 20% intralipid (1mL/kg)</li></ul>

# Side Effects of Opioids

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Side Effect	Possible treatment / intervention
<u>Itching</u>	<ul style="list-style-type: none"><li>• Naloxone infusion 0.25-1mcg/kg/hr</li><li>• Change, decrease, or remove opioid in epidural infusion</li></ul>
<u>Nausea/vomiting</u> Rare in neonates	<ul style="list-style-type: none"><li>• Ondansetron 0.1mg/kg IV</li><li>• Naloxone infusion 0.25–1mcg/kg/hr</li><li>• Remove or decrease opioid in epidural infusion</li></ul>



# Side Effects of Opioids

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Side Effect	Possible treatment / intervention
<u>Respiratory depression</u> & <u>Over sedation</u>	<ul style="list-style-type: none"><li>• Stimulate patient</li><li>• Provide ventilatory support/oxygen</li><li>• Naloxone bolus 5mcg/kg IV q1-3 minutes until spontaneous ventilation resumes</li><li>• Remove or decrease opioid in epidural infusion</li></ul>

# Clinician Bolus Doses

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- Page the Pediatric Pain team to notify us if a patient receives more than 4 clinician boluses in 8 hours
  - If multiple boluses, we may assess need to change infusion rate/epidural brew
- Bolus dose is typically less than or equal to half of the infusion rate
- Increased monitoring is required, per Pediatric Epidural Policy, after a clinician dose is given

# Transitioning to IV / PO

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- When able to tolerate PO without n/v
- When chest tube is removed
- If epidural catheter has been in for 5 days
- If any issues with integrity of catheter dressing or catheter is disconnected
- Oxycodone 0.1mg/kg PO q3-4 hours PRN or scheduled
- Tylenol 10-15 mg/kg PO q6 hours scheduled
- Morphine 0.05-0.1mg/kg IV q2-4 hours PRN breakthrough pain

**Individualized to each patient**



# Monitoring Policies at UNC

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- Pulse oximetry and cardiac monitors (ECG) are required for all patients receiving epidural analgesia
- Monitor & Document q4h:
  - Pain (using appropriate scale)
  - Sedation
  - Vital signs (RR, BP, HR & SpO<sub>2</sub>)
  - Motor strength of extremities
- All monitoring and charting per Epidural and Intrathecal Management for Pediatric and Non-Pregnant Adult Policy

**When in doubt refer to policy for up to date guidelines**

# Documentation

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- Document epidural solution, basal rate, pump bolus (if applicable), hourly max as well as any changes to the aforementioned epidural settings on the flowsheet.
- Document side effects, problems, or adverse events
- Document any additional medications relevant to the patient's pain management on the EPIC Flowsheet.

# General Guidelines:

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- If an epidural catheter becomes disconnected:
  - Cover both ends with a sterile gauze and notify Pediatric Pain Service
- If an epidural is leaking at skin insertion site:
  - Notify the Pediatric Pain Service and reinforce the dressing with clear occlusive tape (tegaderm) if necessary.
  - A pressure bandage to decrease the leak may be required.
    - VERY common in neonates



# Pediatric Pain Service

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- Acute Pain Resident +/- Pediatric Anesthesiology Fellow
- Pediatric Anesthesiologist & Pediatric Nurse Practitioner
- Pain Rounds weekdays 0800-0900
  - Epidural/caudal rounds are twice daily
  - Weekends (time variable) morning only
- If a problem occurs when the Pediatric Pain Service is not in-house and a physical exam is required, the Pediatric Pain Service alerts the G1Anesthesiology resident.

# Guidelines of the Pediatric Pain Service

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- An active order is required for epidural analgesia.
- ONLY the Pediatric Pain Service may change epidural orders.
- All previous opioid and sedative orders should be reviewed and discontinued as deemed appropriate by the Pediatric Pain Service.
- There should be NO administration of opioids or sedatives unless ordered or approved by the Pediatric Pain Service while an epidural is in place.
  - PICU / NICU are the exceptions *if patient is intubated*
- Naloxone Emergency Dose should be ordered and readily available
- Oxygen, suction, and cardio-respiratory resuscitation equipment should be immediately available.

# Guidelines of the Pediatric Pain Service

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- The epidural/caudal catheter should be clearly marked and labeled.
- The infusion device and all tubing attached to the epidural/caudal catheter should be clearly labeled.
- All epidural catheters should be disconnected and removed by the Pediatric Pain Service.
- Foley catheters may be removed 6 hours after infusion has been turned off
  - Decision defaults to Primary Team r/t other indications to retain
- IV access should be maintained while an epidural infusion is running.



# Contact Information

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- Pediatric Pain Pager 123-1220 (24 hours a day, 7 days a week)
- Pain Attending pager 123-4459
- IF no response after 15 minutes from either pager, please call the G1Anesthesiology resident phone 984-934-6199 (in-house) who will contact the Attending directly or assess patient at bedside.

# Notify The Pediatric Pain Service:

- After any RN Clinician Bolus
- Over sedation and/or inability to arouse patient
- Respiratory distress
- Change in SpO<sub>2</sub>, increase in oxygen requirements, or decreased RR
- Inadequate pain control
- Uncontrolled side effects
- New/unexplained neurologic deficit
- Catheter site leaks clear or bloody fluid
- Induration (redness) at insertion site
- Fever
- Blood is noted in epidural catheter
- Catheter is disconnected or displaced
- Catheter is contaminated
- Occlusion in the line
- Dressing becomes loose or soiled

Questions?

