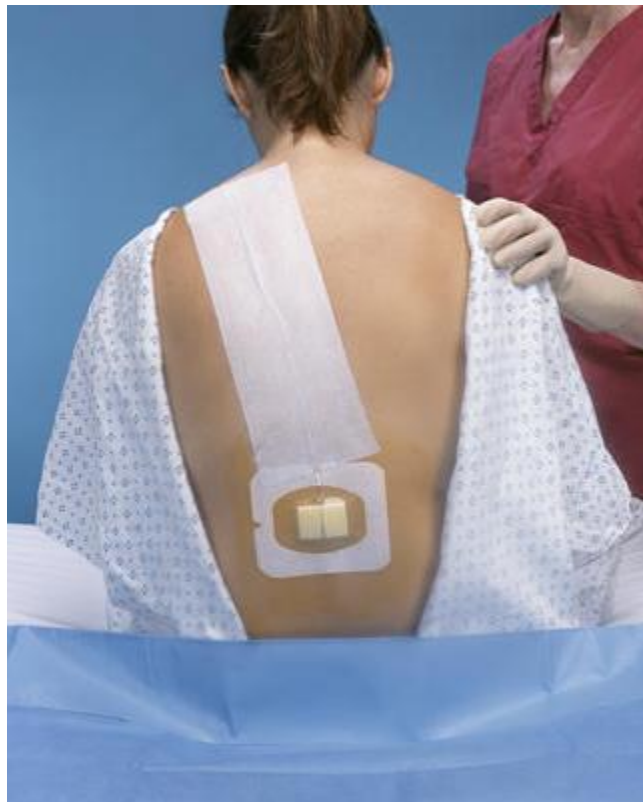




# MUSKOKA ALGONQUIN HEALTHCARE

## Acute Pain Management in the Obstetrical Patient (Epidural/ Spinal)

### Self-Learning Package



*Self-learning packages provide the nurse with information to enhance knowledge, skill and judgment in caring for patients. The information in this package does not replace Physician Orders, nor can it be considered a Physician Order.*

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***Thank you to Orillia Soldiers Memorial Hospital Maternal/ Child Program for the sharing of resources develop this package***

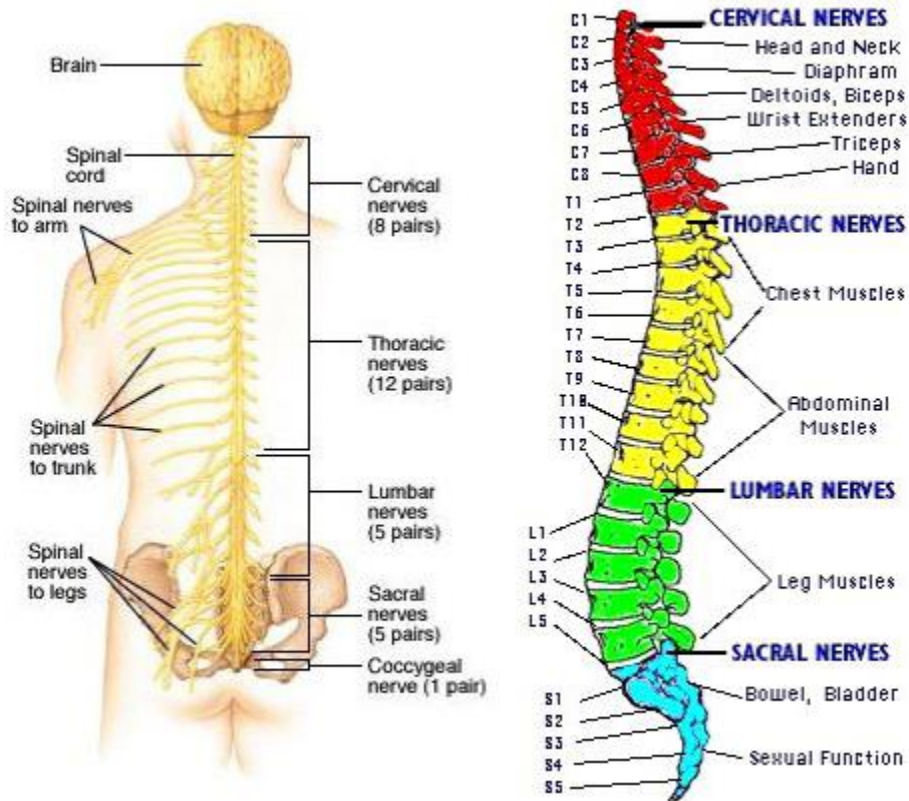
## Introduction

This education package will address various options available to women presenting in labor and delivery at MAHC. The options included are:

- Epidural analgesia in labor.
- Epidural or Spinal anesthesia in C Section and operative birth.
- Intrathecal opioid for post-operative pain management following Caesarean birth.

Upon completion of this package, the learner should understand:

- Difference between analgesia and anesthesia.
- Epidural/ Spinal/ Intrathecal opioids and side effects.
- Care provider measures and interventions for specific analgesia and anesthesia.



## Prerequisite Knowledge

*The learner should have a basic knowledge of:*

1. The central nervous system (brain and spinal cord) and its role in the mediation of anesthesia and analgesia.
2. The mechanisms of action of both spinal and epidural **anesthesia**.

*Critical Point: It is imperative that the learner clearly understands the difference between anesthesia and analgesia, particularly as the terms are used here. Take a moment to jot down a working definition of what these terms mean to you and keep them handy as you read on.*

## **Objectives**

Following completion of this self-learning package, the learner will be able to:

1. Distinguish between epidural and spinal analgesia.
2. Distinguish the differences between narcotic agents and local anaesthetic agents.
3. Identify contraindications or possible contraindications to the use of epidural or spinal narcotics.
4. Discuss :
  - a. Complications and bedside care associated with the use of epidural analgesia in labour.
  - b. Complications associated with catheter placement.
  - c. Complications and bedside care associated with spinal/intrathecal narcotics post C/Section.

## Anatomy and Physiology

### Vertebral Column

The vertebral column is the bony outer structure protecting the spinal cord. It consists of 33 vertebrae (7 cervical, 12 thoracic, 5 lumbar, 5 sacral and 3-4 coccygeal). Strong ligaments line the vertebrae to stabilize the spinal column. These ligaments help landmark the epidural space.

### Spinal Meninges

The spinal cord is surrounded by three layers of meninges, or membranous coverings (pia mater, arachnoid mater and dura mater).

#### *Pia Mater*

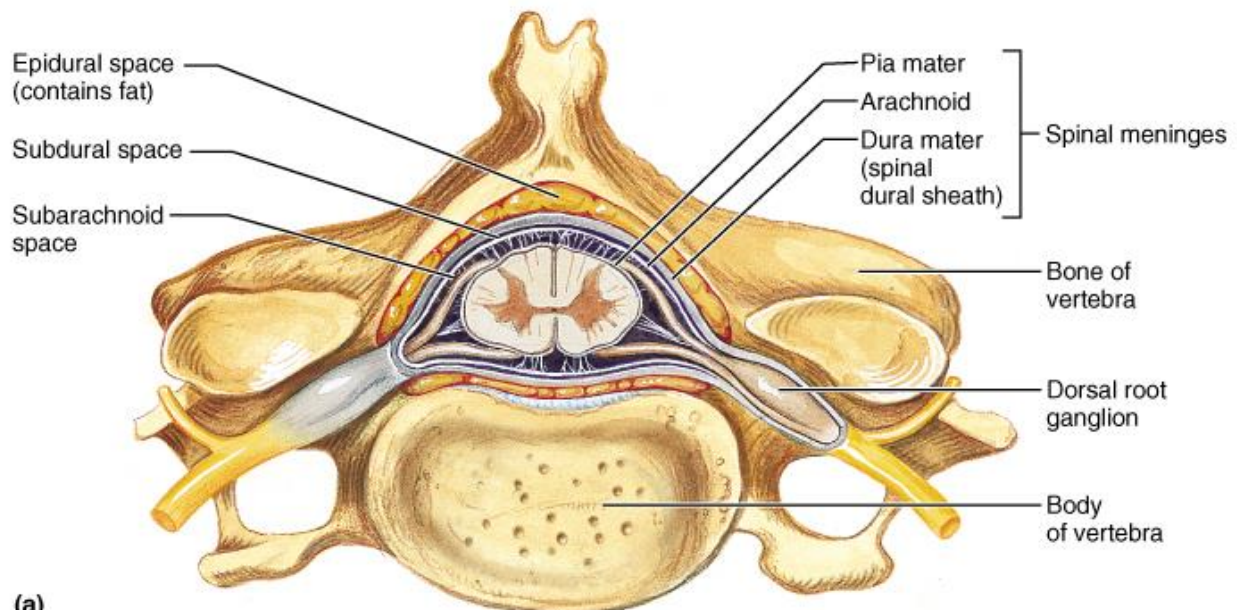
- The innermost layer, adheres directly to the spinal cord.
- Contains many blood vessels to nourish the spinal cord.

#### *Arachnoid Mater*

- Middle layer, thin and transparent
- Separated from the pia mater by the CSF filled subarachnoid space (injection of agents into the subarachnoid space constitutes spinal analgesia/anesthesia).

#### *Dura Mater:*

- Strong, tough outer layer consisting of dense fibrous connective tissue.



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## The Epidural Space

The epidural space:

- Is a potential space that lies between the dura mater (outer layer of spinal meninges) and the vertebrae, supported by the ligamentum flavum.
- Is a protective cushion for the cord.
- Contains fat, loose connective tissue, veins, arteries, lymphatics and spinal nerves as they leave the cord.

Epidural catheters in this space do not pose a mechanical threat to the spinal cord. Tiny air bubbles that may arise in the tubing are NOT considered a danger because the epidural space is a potential space.

Infusions can be stopped for hours and restarted without concern that the catheter will become occluded because the epidural space is not a blood vessel.

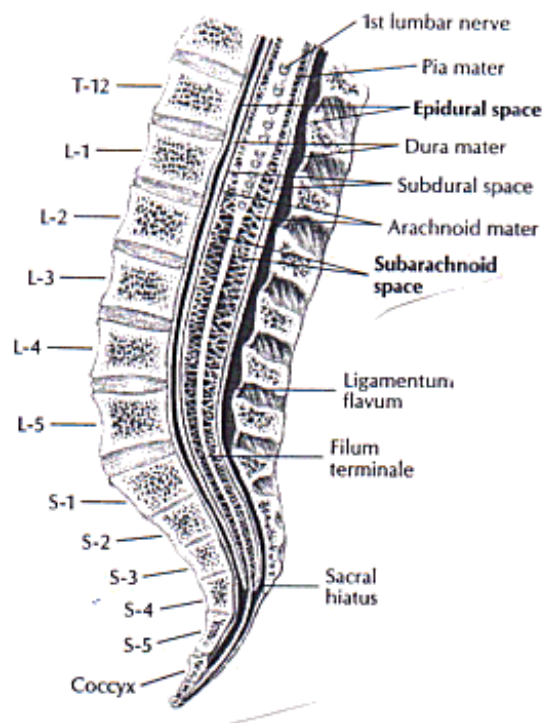
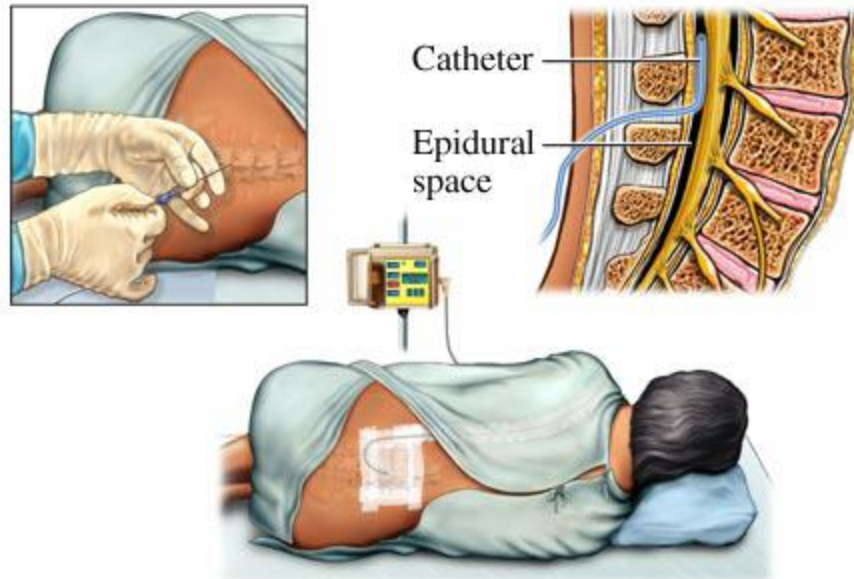


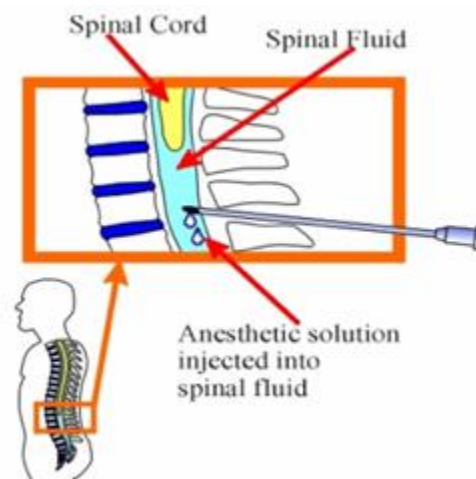
Fig. 3 Lateral section of spinal cord



### *The Subarachnoid Space*

#### *The subarachnoid space:*

- Is located between the arachnoid and pia mater.
- Contains the cerebrospinal fluid (CSF).
- CSF circulates around the cord and up into the ventricles of the brain.
- The subarachnoid analgesic dose necessary to achieve pain relief is 1/10th of that of the epidural space.
- If an epidural catheter is inserted too far or has immigrated, it may inadvertently enter the subarachnoid space. This is referred to as “going spinal” or intrathecally.
- Intrathecal injections puncture the meninges, entering CSF whereas epidural injections do not puncture the meninges.



## Spinal Cord

- Is a slender cylinder, approximately the size of the little finger.
- Runs along the spinal canal from the foramen magnum to the L2 vertebra level .
- Cross-section – has a central, butterfly-shaped grey matter and peripheral white matter.
- The grey matter has a dorsal and ventral horn on each side.
- Sensations from the body are carried into the dorsal (sensory) nerve root – information travels out from the spinal cord to the body via the ventral (motor) nerve root.
- Sensory fibers of spinal nerves transmit pain, stretch, pressure, touch and temperature sensations.

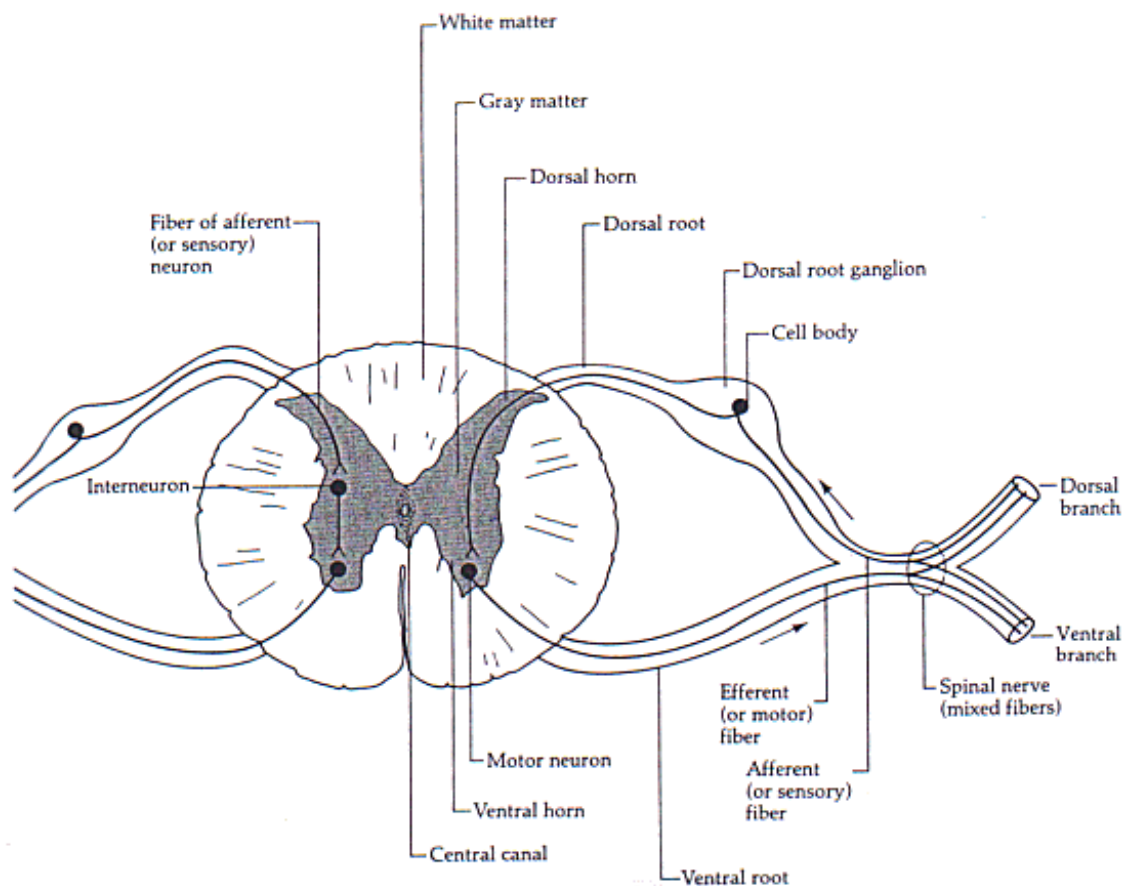


Fig. 4 Cross section of spinal cord, showing spinal nerves.



## **Objective #1:**

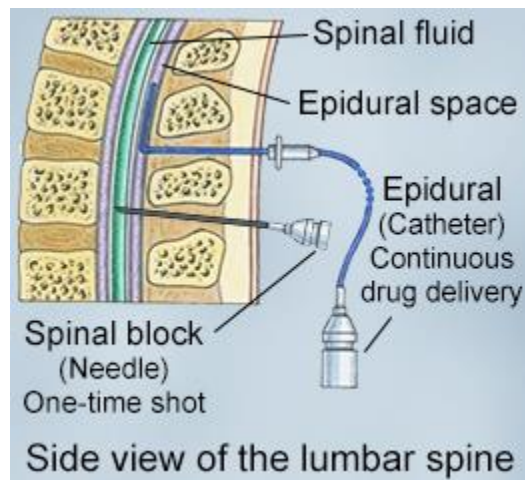
***Upon completion of this section you will be able to distinguish between epidural and spinal analgesia.***

### **Epidural Analgesia**

Epidural analgesia involves the injection of analgesic agents by the anesthetist, into the epidural (sometimes known as “peridural” or “extradural”) space. The agents used may consist of a narcotic alone (either fentanyl or morphine); a narcotic in combination with a local anesthetic agent such as lidocaine or bupivacaine; or the local anesthetic agent alone. At MAHC, the preferred method of administration is a continuous epidural infusion of local anaesthetic (bupivacaine) plus a small amount of narcotic (fentanyl) during labour.

### **Spinal Analgesia**

Spinal analgesia refers to the injection of analgesic agents, usually narcotic, directly into the subarachnoid space. This injection may also be referred to as “intrathecal”. The term “neuroaxial” may be used to refer to both methods of analgesia administration. It can be confusing at times to hear these terms, but the nurse must be aware of the type of analgesia that has been administered to the patient. Appropriate care for each patient will depend upon this differentiation. Spinal analgesia (intrathecal) is the preferred method of pain management for a c/section.



## **DEFINITION OF TERMS**

**Analgesia** refers to the reduction or relief of pain. This is what commonly happens for example when you take Tylenol for a headache or when patients are given morphine after an operation for pain. Analgesia implies pain relief - but does not imply that all sensation is taken away. In other words, analgesia does not mean numbness.

**Anesthesia** refers to lack of sensation. This can be accomplished with local anesthetics, for example the injection that anaesthesia gives in an epidural. Almost always this results in a lack of pain - therefore analgesia usually accompanies anesthesia. Note that when local anaesthetics are used to provide anesthesia they also frequently cause muscle weakness or muscle relaxation. As you can see, there is a clear difference between analgesia (pain relief, sensation and muscle ability normal) and anesthesia (lack of sensation, might be accompanied by muscle weakness or relaxation).

## **Mechanisms of Pain**

The process of pain can be divided into the following steps:

1. Reception
2. Transmission
3. Sensation (perception)
4. Appreciation

Receptor mechanisms in the periphery receive the painful stimuli and transmit the signal into the spinal cord. When pain impulses enter the spinal cord, nerve fibers are stimulated to relay the message to the appropriate sensation area of the brain. The patient becomes aware of the pain and responds to it. Inhibitory pathways exist to modulate the sensory input.

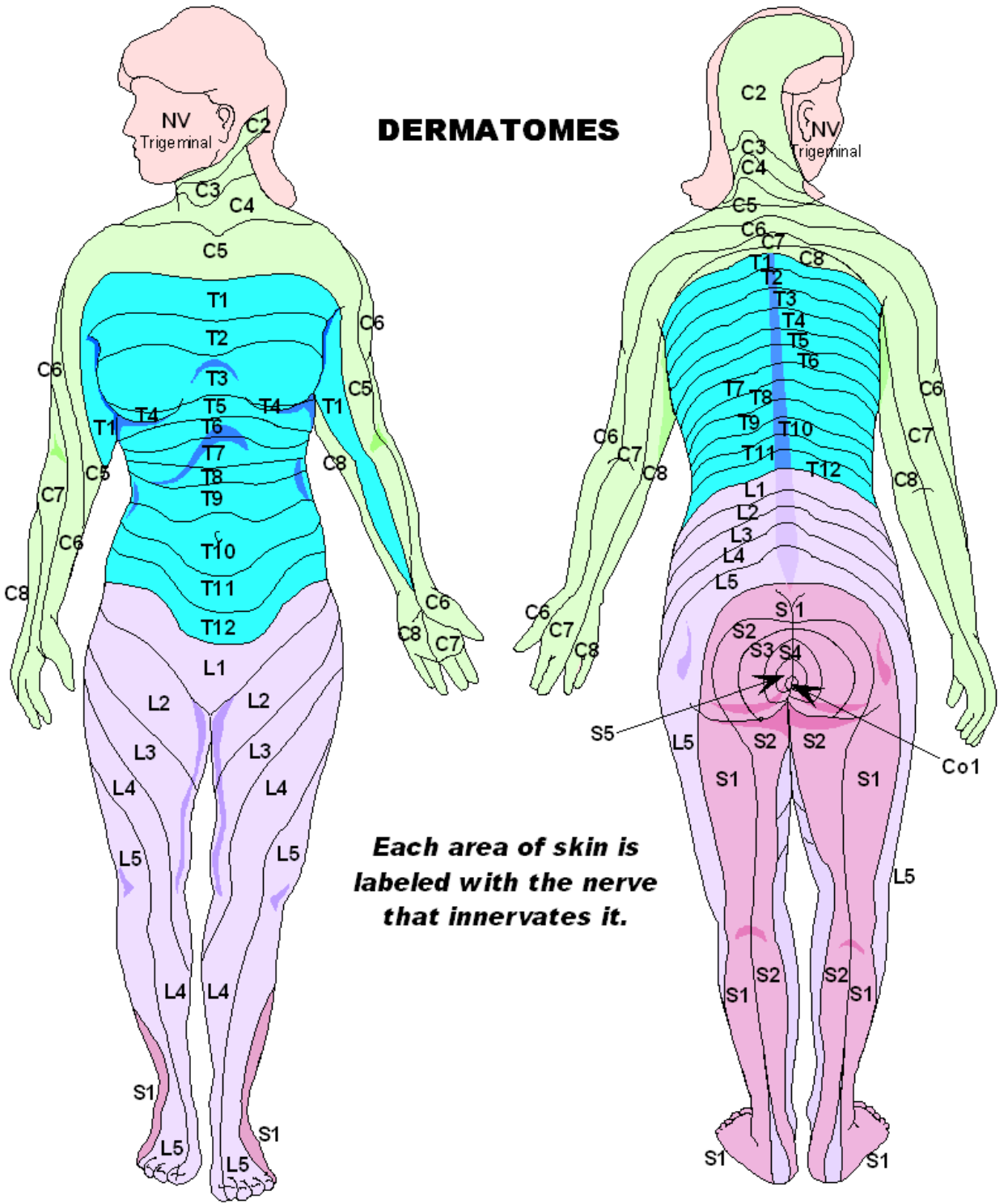
Epidural analgesia was first utilized to provide pain relief during labour and delivery. Today, epidural analgesia has been applied effectively to control post-operative pain in thoracic, abdominal, vascular, urological and orthopedic surgery as well as palliative management of cancer pain.

In the past, the care of patients requiring epidural analgesia was limited to the intensive care unit or other critical care areas. Today postoperative pain can be safely and effectively treated with epidural analgesia or intrathecal analgesia on any clinical area, not only critical care.

## Advantages of Epidural/Intrathecal Analgesia

1. More effective analgesia than with parenteral routes; longer duration of action.
2. Produces segmental analgesia (site specific pain relief) versus general analgesia.
3. Less sedation and respiratory depression than with parenteral narcotic controls pain without a "sleepy/sedated" mother. Allows mother to participate in her infant's care with more ease.
4. Decreased incidence of DVT and thrombo embolism due to early mobilization and ambulation and a decrease in the stress response to surgery.
5. Local anesthetics
  - may delay development of tolerance to narcotic agents.
  - may contribute to pain relief by eliminating secondary muscle spasm and vasoconstriction.
6. Narcotic agents
  - produce decreased systemic effects compared to parenteral narcotics.
  - are not associated with sympathetic nervous system blockade.
  - facilitate deep breathing and coughing post-operatively by managing pain effectively.

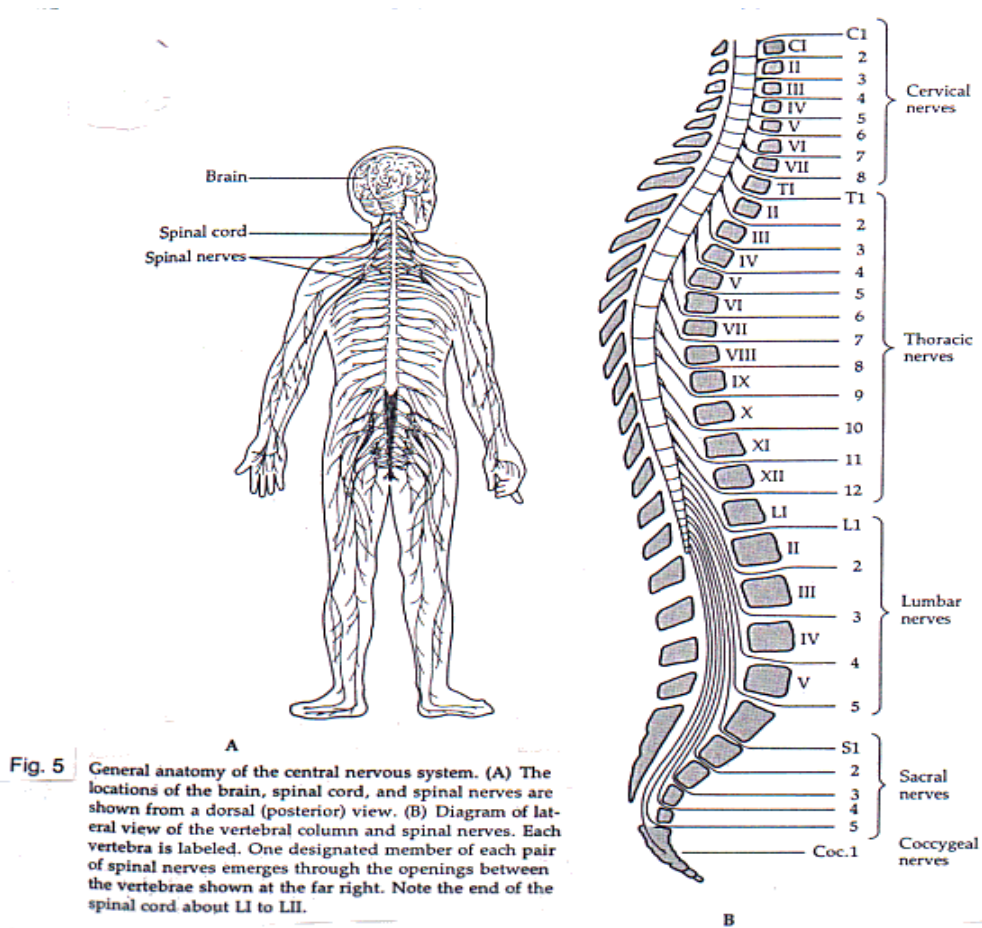
# DERMATOMES



## Spinal Nerve Distribution

There are about 31 pairs of spinal nerves, containing motor, sensory and sympathetic nerve fibers from the spinal cord. They exit between the vertebrae bilaterally and segmentally. The skin surface of the body can be divided into areas, or dermatomes which are supplied by a spinal nerve corresponding to a spinal cord segment, e.g. the L3 dermatome overlies the knee and the inner aspect of the thigh, T4 over the nipple line and T10 over the umbilical area. Spinal nerve origins and their related dermatome become significant when assessing the patient for effect of epidural anaesthetic agents. Utilizing the concept of dermatomes, epidural insertion can be performed at the level, which corresponds to the area to be relieved of pain. For example:

Surgery	Catheter Placement	Cutaneous Innervation
Knee	L 3-40	Above/ below knee
Hip	L 1-2	Hip/pelvis
Abdominal	T 8-10	Abdomen
Thoracic	T 6-8	Nipple line to abdomen



## Objective # 2:

***Upon completion of this section, you will be able to identify the differences between narcotic agents and local anaesthetic agents used in epidural and spinal analgesia and anesthesia.***

### **Pharmacology – Mechanism of Action of Epidural Medications**

*Analgesics injected into the epidural space can be:*

1. Taken up by the epidural fat and slowly released.
2. Absorbed by the epidural veins and transported in the systemic circulation.
3. Absorbed across the dura and ultimately penetrating the cord.
4. Act directly on the nerve roots as they exit the dura.

Analgesic agents can be classified as local anesthetics or narcotics. They may be given individually or in combination. Administration of epidural analgesia may be by bolus injection (given by Anesthetist), or by continuous infusion via pump (monitored by a certified provider). The continuous infusion is used for management of labour pain.

*Narcotics, which may be given into the epidural space, include:*

- a) Preservative free morphine (Epimorph)
- b) Fentanyl
- c) Dilaudid (hydromorphone)

Epidural narcotics diffuse across the dura to bind to opiate receptors within the dorsal horn of the spinal cord. Incoming pain messages are blocked from being relayed up to the brain.

*Local anaesthetic agents, which may be given via the epidural space, include:*

- a) Bupivacaine (Marcaine)
- b) Lidocaine (Xylocaine)

Local anaesthetic agents block pain signals in the dorsal nerve root before they enter the spinal cord. They can also have an effect on the spinal cord, as well as higher brain centers.

### **Narcotic Agents**

Epidural narcotics diffuse across the spinal meninges, through the subarachnoid space and CSF, and into the neural tissue of the spinal cord where they act directly on narcotic receptors in the dorsal horn to block incoming pain messages. They do not directly block spinal nerve transmission.

The narcotics can be classified by their degree of lipid solubility. The more lipid soluble the drug, the more rapidly and completely it passes through the meninges and tissue layers of the cord. The slower absorbing narcotics (less lipid soluble/more water soluble) may linger outside the cord and be absorbed by the epidural veins, or travel in the CSF, eventually ascending to the brain, causing central depressant effects (depressed respiratory efforts, decreased level of consciousness). Incidence of respiratory depression related to epidural narcotics is extremely low, and less likely to occur than with parenteral narcotics (Ready, 1990).

The use of a less lipid soluble narcotic, such as Preservative Free Morphine, may be an advantage when providing post-op c/section pain management. The drug will linger in the CSF, spread to the brain and provide pain control at spinal levels higher than the level of insertion. Highly lipid soluble drugs work segmentally, or within 2 or 3 dermatome levels due to the rapid diffusion of drug across the spinal meninges, into the dorsal horn of the spinal cord. There is less caudal spread due to the rapid diffusion of drug.

<b>Drug</b>	<b>Peaks</b>	<b>Onset of Action</b>	<b>Duration of Action</b>
Fentanyl (High lipid solubility)	10-20 minutes	5-15 minutes	2-4 hours
Hydromorphone (Dilaudid) (Intermediate lipid solubility)	45-60 minutes	15-30 minutes	12-18 hours
Morphine (Epimorph) (Low lipid solubility)	60 minutes	30-60 minutes	12-24 hours



## Safety Considerations for Epidural Infusions

INITIAL PROGRAMMING and ANY CHANGES to the Pump Programming such as changes to the infusion or infusion rate MUST BE independently double checked with a 2<sup>nd</sup> care provider.

- Use non ported, yellow tubing and a locked dedicated infusion pump. Ensure solution labeled for epidural administration. Check the expiry date on the solution prior to administering.
- Assess integrity of system as per hospital policy. (Catheter clearly labeled “Epidural”, non ported tubing, luer connection secure, anchored well to the back and shoulder of the patient, and tape intact).
- Trace all lines back to their source to ensure correct infusion.
- Ensure patient repositioned and free of pressure areas.
- Ensure patient has full lower limb MOTOR control prior to ambulation.
- Inspect and assess epidural insertion site every shift and report any abnormal findings such as bleeding, hematoma and drainage.
- Do not change dressing. Reinforce site and tubing with tape and/or transparent film dressing as necessary.
- Do not give any other opioids or sedatives that have not been approved by Anaesthesia.
- Maintain IV access, saline lock or continuous infusion throughout epidural infusion and for 24 hours after any epidural infusion with epimorphine and 2 hours after any epidural infusion with fentanyl.
- Ensure resuscitation equipment is readily available and in working order.



## Side Effects of Epidural Narcotics

Side Effects	Etiology	Nursing Actions
Puritus	Tends to develop on face and trunk May be related to histamine release	Assess and record on flow sheet Give diphenhydramine (Benadryl) IV as ordered
Nausea and Vomiting	May occur secondary to venous uptake of narcotic Can begin 4-6 hours after a bolus of Epimorp (time for drug to reach chemoreceptor trigger zone (CTZ))	Assess and record Give IV/IM antiemetic as ordered
Urinary Retention	More common when epidural narcotics are administered in the lumbar area	Intermittent in and out catheterization, assess need for foley catheter if not in situ.
Level of Consciousness	Due to venous uptake or upward migration of the drug via the CSF	Assess sedation score as per protocol If patient sedation is difficult to rouse, attempt to arouse patient, assess resp rate, hold continuous infusion, notify Anesthetist Anticipate need for IV narcan
Respiratory Depression <ul style="list-style-type: none"> <li>change in level of sedation</li> <li>depth becomes shallower with little change in rate</li> </ul>	Most serious but less frequent (<1%) Narcotic overdose or toxicity (coma, pinpoint pupils) due to vascular uptake, CSF spread or subarachnoid injection <b>Early</b> Within first hour, due to venous uptake <b>Late</b> Up to 24 hours post injection Lingers in the CSF, migrates caudally to depress the respiratory center More common with morphine and dilaudid than fentanyl	See level of consciousness above Support airway, give oxygen and ventilate as necessary, notify anesthetist Prepare and administer Narcan as per Physician order Call CODE BLUE for respiratory arrest

Hypotension	Opioids do not block sympathetic nerve fibers Low BP usually results from a reduction in level of circulating catecholamine's that have been elevated in response to pain May also be related to underlying fluid volume deficit	Ask the patient how she is feeling Consider baseline BP Assess vitals signs per policy, check for postural BP changes Assess fluid balance Adminster fluid boluses as ordered
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**\*\*\*EPIDURAL NARCOTIC TOXICITY (RARE)\*\***

- Drowsiness, mental clouding, pupillary constriction, respiratory depression
- Fentanyl- may see muscle rigidity, laryngospasm

Narcotic agents give IM or IV will have a cumulative effect on the patient receiving epidural narcotics and may cause abrupt somnolence and respiratory depression. For this reason, the patient is to receive **NO** supplemental narcotics or CNS depressants unless approved by the Anesthetist.

**Local Anesthetics**

Local anaesthetic agents given via epidural, diffuse into the spinal nerve fibers. The drug travels along the lymphatics, leaving the epidural space and blocks pain signals in the dorsal nerve roots before they enter the spinal cord. Motor nerves originate from the ventral part of the spinal cord, and are therefore farther away from the first dose of anaesthetic. The result is a sensory block and then a motor block. Sympathetic impulses may also be blocked causing arterial vasodilatation and hypotension.

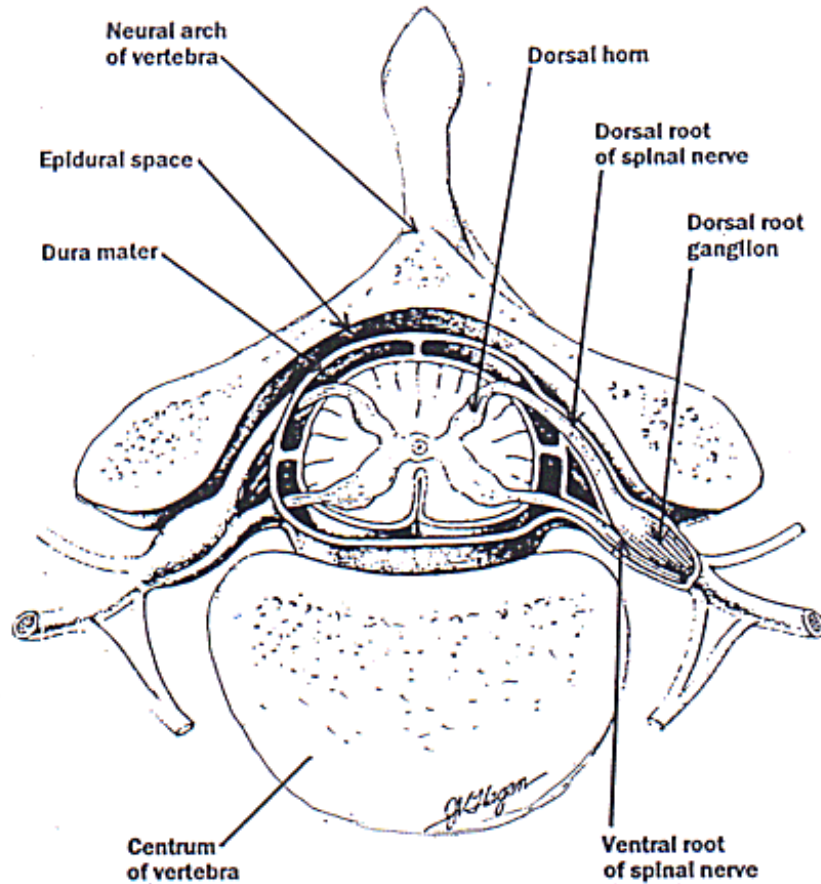


Fig. 8 Cross section of spinal cord

Local anaesthetic agents block pain signals in the dorsal nerve root before they enter the spinal cord. They can also have an effect on the spinal cord, as well as higher brain centers.

The goal is to provide analgesia without motor block. Sensory block is not unusual but should be balance with degree of pain control (ie: if the patient is pain free but experiencing sensory changes or numbness, the concentration of the local anesthetic or the rate of the infusion can be decreased). In other cases, some sensory loss will be expected in order to achieve analgesia.

Drug	Bolus Dose	Onset of Action	Duration of Action
Bupivacaine (Marcaine)	12-25mg 5-10mls (0.25%)	7-10 minutes	60-180 minutes
Lidocaine (Xylocaine)	5-10ml (2%)	2-5 minutes	45-90 minutes

## How to assess Motor and Sensory Block at the bedside

Motor Block Assessment is performed by assessing "movement" using a Motor Scale. Ask the patient to

- wiggle her toes
- bend/flex her knees
- flex her hips (lift her buttocks off the bed)

Notify Anesthesia if patient unable to move lower limbs.

Sensory Block Assessment is performed by assessing "sensation" to loss of temperature using an ice cube. Go up one side of her leg to her abdomen, repeating the assessment on her other side. Document which level or dermatome (page 12) the patient has the "cold sensation".

Examples: T 10 is at the umbilicus  
 T 8 is at the fundus  
 T 6 is at the xiphoid

## Side Effects of Local Anesthetics

Side Effect	Etiology	Treatment
Hypotension	Due to sympathetic block (degree of blockade is dose dependent) At high concentrations or infusion rates, more sympathetic fibers become blocked and hypotension can occur accentuated with hypovolemia	Bolus patient with IV fluids prior to initiation of epidural/spinal as per Physician order Assess patient's fluid balance – HR, BP, urine output, etc. Call Anesthetist administer fluid boluses prn (as ordered) If BP drop > 20 mmHg and patient does not respond to fluid boluses, stop infusion, anticipate need for ephedrine (bedside clinician judgment to turn pump off)
Sensory Loss	Related to dose and concentration of drug Progression of sensory loss: cold sensation temp discrimination	Notify anesthetist if you detect indications of a rising and more dense level of sensory block unrelated to dose changes

	pain sensation proprioception vibration sense pressure sensation	If patient pain free but bothered by sensory loss, numbness, the infusion rate will likely be decreased Assess for and provide measures to prevent potential skin breakdown
Motor Loss	More likely with higher concentration of drug (e.g. 0.25% vs. 0.1% Marcaine)	Report to the anesthetist so the infusion rate can be adjusted Goal is to control pain but not have motor loss (some sensory loss may be expected)
Nausea and Vomiting	Will usually only occur if the patient also experiences hypotension	IV anti-emetic may be needed as per physician order
Urinary Retention	Motor and sensory blockade of nerve fibers innervating the bladder Usually occurs in first 24 – 48 hours	Intermittent in and out catheterization

### Toxic Effects of Anaesthetic Agents

	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
Signs and Symptoms	Palpitations Dry mouth Metallic taste sometimes referred to as "funny taste" by patient	Severe confusion Generalized muscle twitching Convulsions	Hypotension Bradycardia Respiratory depression Cardiovascular Collapse
Treatment	Notify Anesthetist Close observation	Stop infusion Notify Anesthetist Airway support & O2 Treat convulsions	Stop infusion Notify Anesthetist Airway support & O2

### **Objective #3:**

#### ***Identify contraindications or possible contraindications to the use of epidural or spinal narcotics.***

There are very few contraindications to the use of spinal or epidural narcotics themselves, other than demonstrated allergy to the drug itself, or narcotic induced side effects. Most are related to the techniques of injection and administration.

Absolute Contraindications include:

1. Pre-existing coagulopathy, anti-coagulant therapy or clotting deficiencies because of the increased risk of hematoma formation and resulting compression of the nerve roots or spinal cord.
2. Infection at the site of needle insertion because infectious organisms may be carried into the epidural or subarachnoid space.
3. Lack of patient consent.
4. Lack of personnel to provide accurate surveillance of patients.
5. Lack of resuscitative equipment and drugs.
6. Hemorrhage, shock or hypovolemia.
7. Allergy to local anaesthetics or narcotics (rare).

Relative Contraindications:

1. Musculoskeletal/spinal abnormalities may make injection more difficult (arthritis, deformity).
2. Systemic infection which increases the risk of creating a focus for central nervous system infection, particularly in the case of a "bloody" spinal tap.
3. Previous back surgery.

## Objective #4:

### *Discuss*

- *Complications and Nursing Care associated with the use of epidural analgesia in labour*
- *Complications related to catheter placement.*
- *Complications and bedside care associated with spinal/intrathecal narcotics post C/Section*

### **Complications Associated with Epidural Analgesia**

- Hypotension: BP and cardiac output reductions are greatest under epidural. The severity and frequency of hypotension following epidural block is proportional to the extent of the block and circulating blood volume.
  - Intervention: This is reduced or avoided by ensuring the patient receives a bolus of IV fluid prior to initiation of the epidural.
- Transient fetal bradycardia may follow maternal hypotension and uterine contractions may diminish in strength or cease entirely for a brief period. Placental vasculatures are thought to lack sympathetic vasoconstrictor nerves and placental blood flow probably falls along cardiac output.
  - Intervention: Maternal BP and cardiac output are maintained by liberal administration of crystalloid solution before and during the epidural infusion. Avoid caval occlusion by keeping Mother positioned on her side. Mild hypotension responds to rapidly turning the patient on her side and rapid infusion of crystalloid - 200 - 300 mL. EPHEDRINE (vasopressor) 5 - 10 mg. IV may be required by the anesthetist. This is available on the epidural cart.
- Hypovolemia: Epidural and spinal analgesia should be avoided in patients who have bled unless blood volume has been restored and further bleeding is not anticipated.
- Respirations and Acid-base balance: The power of respiratory muscles is not seriously impaired by epidural analgesia, unless the block exceeds T8. Hyperventilation is usual in painful labour. Epidural analgesia reduces or abolishes this hyperventilation and hypocapnia is prevented or reduced. When labour is managed under continuous epidural analgesia, maternal metabolic acidosis is less severe in comparison with the acidosis which occurs when Demerol is used.

- Fetal Welfare: Mechanisms whereby epidural analgesia might affect the condition of the fetus: at birth include:
  - Alteration in placental blood flow - prevent maternal hypotension.
  - Alteration in uterine contractions and tone -may require augmentation of labour.
  - Direct action of local anesthetics on the fetus.
  - Alterations in maternal respiratory and acid-base status.
  - Relaxation of pelvic floor muscles - do not force/coach woman to push when she has no sensation or desire to do so as long as contractions have a satisfactory resting tone and the fetal heart is reassuring. Turn down the infusion rate and wait until the urge to push is there.

***Possible complications related to catheter placement include:***

- Catheter malposition, resulting in inadequate pain management
  - Solution: Anesthetist may need to come and adjust/manipulate the catheter.
- If the catheter has pierced through the **dura, intrathecal** absorption occurs
  - Patient will have rapid onset of motor/sensory loss to lower extremities which could extend to weakness and numbness in the hands and arm as the block rises.
  - There may be total paralysis of diaphragm.
  - Patient will experience profound motor and sensory block and hypotension within 5 - 10 minutes following injection.
  - For the above reasons, when the anesthetist gives the first dose of medication the caregiver will perform frequent vital sign q 5 min X 6, then q 30min duration of therapy.
  - Revert to vital sign protocol with each bolus that is given by Anesthetist.
  - Solution: Anesthetist would be notified immediately if this should arise as infusion is being stopped, patient may require bag and mask ventilation - remain at the bedside and call for help.
- **Intravascular** catheter placement (in epidural vein) resulting in systemic problems which include:
  - Patient may experience palpitations, tachycardia and blurred vision.
  - May complain of dizziness, lightheadness, experience numbness around lips, tongue and have metallic taste in mouth.
  - Solution: Follow monitoring protocol and stop the infusion, notify anesthetist.



- Dural puncture which may produce significant headache - **spinal headache**
  - Solution: Smaller needles are used, but headache is a complication that can still arise.
  - Encourage breastfeeding mothers to feed on their side rather than sitting position especially during the recovery phase .
  - Have the patient flat for management of symptoms: 24 - 48 hours depending on severity of headache and patient's response.
  - Push fluids and offer analgesics.
  - Caffeine aids cerebral vasoconstriction and enhances analgesic effect.
  - If patient does not respond to the above, an epidural blood patch may be required.
    - Anesthetist may inject 10 - 20 mL of patient's blood into epidural catheter or through needle causing formation of blood clot which should seal the Dural puncture and prevent further CSF leakage.
  
- Paresthesia's as a result of catheter migration down a nerve root
  - patient will complain if sudden pain down a leg or in the buttock area which is usually transient or Anesthetist may need to manipulate the catheter slightly.
  
- Infection
  - Solution: Good hand washing and aseptic technique with insertion.
  
- Catheter shearing or breakage, resulting in catheter particle retention
  - Solution: Always remove epidural catheter gently, do not force catheter to remove and verify black tip is present at removal.

### **Complications Associated with epidural/spinal narcotics**

- Respiratory depression
  - Early (first 30-60 minutes)  
Thought to be the result of intravascular absorption of the narcotic with its subsequent central effect.
  - Late (6-12 hours post administration)  
May occur up to 24 hours post administration.

These potential problems with respiratory depression are related to the lipid solubility of the narcotic. The more lipids soluble the agent, the less likely it is to produce respiratory depression. Morphine is the classic culprit in this regard. Due to its limited solubility, not all of a dose of morphine is taken up by the spinal cord. This leaves unbound drug available to float up the CSF to the brain. The delay in respiratory

depression is related to the time required for the narcotic to spread in the CSF to the brain.

Fentanyl, on the other hand, is highly lipophilic. It is rapidly diffused out of the CSF.

*Respiratory depression has been shown to be intensified by other factors including:*

- The administration of parenteral narcotics/sedatives in conjunction with epidural narcotics
- The age of the patient; older patients may evidence more respiratory depression than a younger patient receiving a similar dose of medication
- Pre-existing respiratory disease
- A history of drug addiction

Care and monitoring:

- Monitor respirations and sedation level as per Physician order.
- Monitor pain scale, vital signs (TPR, BP and SpO<sub>2</sub>) as per Physician order.
- Maintain IV access or saline lock at nurse's discretion for labour and 24 hours after epiMorphine.
- No other systemic opiate, sedative or benzodiazepine without approval of Anaesthesia.

- Nausea and Vomiting

Likely a result of direct stimulation of the chemoreceptor trigger zone in the fourth ventricle. As Evans et al (2013) points out, this nausea may have a distinct vestibular component, (dizziness) which is exacerbated by movement.

Care and monitoring: IV anti-emetic may be effective in treating the nausea associated with movement.

- Urinary Retention

Probably the only side effect due to direct action on the spinal cord. Inhibition of parasympathetic outflow from the sacral spinal cord may be the mechanism.

Care and monitoring: Do not remove foley catheter for first 12 - 18 hours post operatively

- Pruritis

Often equated with narcotic use (whether epidural, IV, IM, or PO), the etiology remains elusive. Many theories have been advanced one being that the ascending narcotic results in an imbalance in the sensory perception of the region, which is perceived as itchiness.

Care and monitoring: Administer medications as ordered. See Epidural/Spinal Anaesthesia order set.

***NOTIFY ANAESTHESIA if the following occur***

- Inadequate analgesia.
- Wet or moist dressing. Low BP and/or decrease pulse. (Parameters are on order set).
- Inability to bend knees and if accompanied by new onset back pain and/or rapid onset change to sensation in abdomen or legs, this could be a sign of an epidural hematoma and requires rapid intervention.
- Ascending sensory block above T4. (Requires a decrease in infusion rate or stopping completely).

If any respiratory or cardiac compromise is noted, STOP epidural infusion, provide O2 and/or resuscitative measures as necessary and notify Anaesthesia STAT.

**Additional Information**

- The “Physicians' Orders” Obstetrical/Labor Epidural Order Set and Post Op C Section were developed to assist bedside staff to provide safe, appropriate care for patients receiving medications via these routes. While providing a clinical guideline type of approach to consistent care, there is, nonetheless flexibility to the form which allows for individual patient variances. Each patient should be monitored according to the specific order form for that individual.
- While the monitoring of respiratory status must be the top priority in assessing any patient receiving epidural narcotic, recent evidence has demonstrated that the occurrence of this problem is rare indeed. This may be related to changes in the dose regimens of the narcotic medications, and/or the ability to compare larger samples of data over the past years, which have shown very little evidence of respiratory depression. In situations where the patient’s clinical status requires acute observation, oximeter monitors may be used to assist the bedside clinician in conducting respiratory assessments.

- Observing the patient for signs such as increased level of sedation (LOS), lethargy, confusion, agitation, delirium or restlessness can be as important indicators of narcotic overdose as respiratory depression, and may actually appear first. The bedside clinician must be watchful of these other signs.

### **PCEA - Patient Controlled Epidural Analgesia**

This approach to pain management in Labour allows the woman to give herself a "bolus" or "demand dose" of the epidural infusion through a PCEA pump. The bedside clinician may program the pump according to physician orders. The physician may choose to have the patient use a continuous infusion plus the "demand" feature to administer a "bolus" for breakthrough pain. The physician will order the settings for the amount of continuous infusion, the bolus dose with appropriate lock out times after a demand or bolus dose and a total 4 hours accumulation. These are all measures to prevent a patient from injecting more medication than needed.

The infusion solution is the same for epidural infusion or PCEA. Vital sign protocols do not change. The bolus or demand dose in PCEA is smaller than a "topping or bolus dose" that would be administered by an anesthetist; therefore there is no need to increase vital sign checks unless you have specific concerns regarding the patient's response.

### **Removal of Epidural Catheter**

Removal of the catheter is an Advanced Skill and it is to be performed only by certified clinicians. The catheter is removed after delivery of the placenta and completion of any suturing of the perineum.

The clinician will apply gloves, position the patient on her side, remove the tape covering the catheter, and gently pull the catheter out. The clinician will look for the black tip of the catheter and apply a bandage to the site. If resistance is met while attempting to remove the catheter, the clinician will stop, apply a dry dressing and inform the anesthetist. DO NOT ATTEMPT to continue removing the catheter.

Document removal of the catheter and visualization of the black tip of the catheter in the patient progress notes. If the tip is not seen, inform anesthetist. This would indicate the catheter has broken and a portion remains in the patient.

## Ambulating the Patient

During Labour, the patient may ambulate provided there is a physician order for ambulation and the following criteria are met:

- Reassuring fetal status.
- Engagement of fetal presenting part.
- Stable orthostatic vital signs (asymptomatic and within 10% of baseline).
- Able to perform bilateral straight leg raises in bed against resistance.
- Ability to step up on a step stool with either leg taking the first step without assistance.
- Satisfactory trial of walking accompanied by bedside clinician.
- Patient must be accompanied while walking.
- Intermittent fetal heart rate monitoring (q15min).

Ambulating the patient post delivery, the nurse would follow the specific written orders of the anesthetist i.e. Do not ambulate until motor function is assessed and patient can weight bear.

If the Physician or Anesthetist does not write specific orders; ambulate the patient as you would any post operative patient. Prior to ambulating, always assess:

- Motor Function: Ask the patient to wiggle her toes, bend her knees, and lift her bottom off the bed. If you are uncertain of her weight bearing abilities (leg muscle strength), have patient push the ball of each foot into your hand (same as you would for a muscle cramp). If you feel the muscle strength is not as strong as it should be, do not ambulate; just have patient dangle at the bedside. If strength is satisfactory, ambulate slowly.
- Sensory Function: Assess the patient's ability to feel you touching her foot, calf, thigh, and hip.

**PROVIDER ALERT!** If the patient had no sensory function, or diminished sensation, she does not have full motor function. Do not ambulate this patient.

## **Conclusion**

The primary advantage of epidural and intrathecal forms of analgesia lies in their ability to improve the quality of pain control in labour and the postoperative setting. The advent of these and other innovative forms of pain management provide opportunities for patients to achieve previously undreamed of pain control. These methods of delivery also require that nurses be aware of the medications used, their side effects and the ramifications of the procedure used to deliver the medication.

Knowledge of and competent application of the knowledge of effective pain management is a basic competency for all nurses. It is hoped that this learning program has helped you to increase or maintain your knowledge of epidural and intrathecal pain management.

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