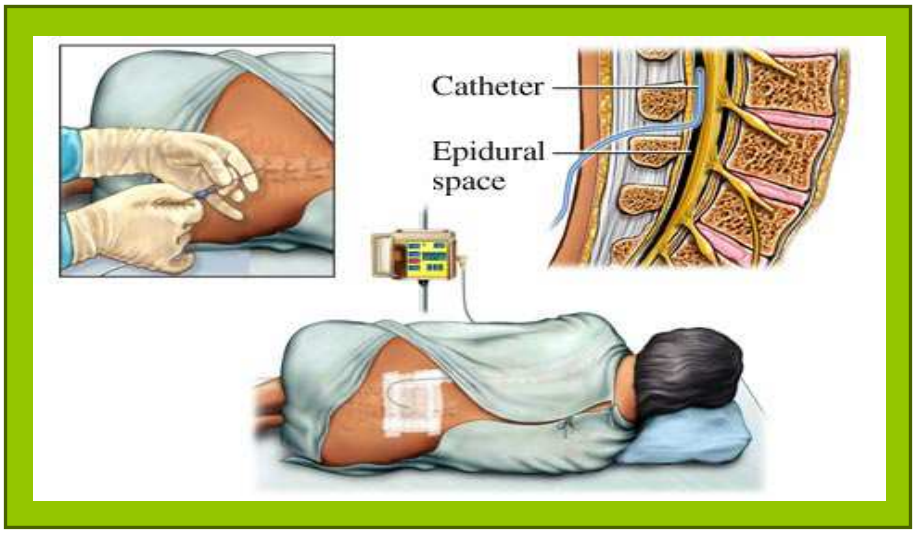
Epidural Analgesia Self-Study

Independent Learning Module for Registered Nurses



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Authored by: Clinical Learning

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Description/Purpose

Designed for nurses and allied surgical staff that must safely care for patients receiving epidural analgesia as a method of pain control in a variety of settings, including post-anesthesia, critical care, oncology, neurology, orthopedics, and obstetrics.

OBJECTIVES

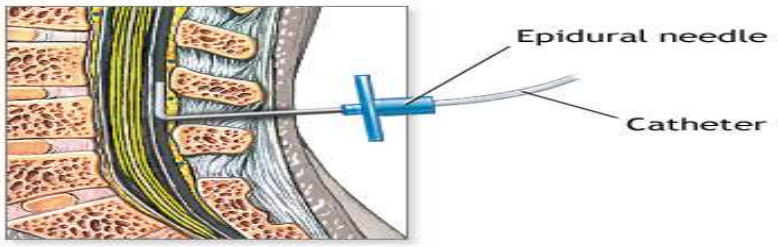
1. Differentiate epidural analgesia from intrathecal (spinal) anesthesia.
2. Review the benefits, indications and contraindications for epidural analgesia.
3. Identify spine anatomy as related to the placement of the epidural catheter.
4. Explain the transmission and modulation of pain stimuli as related to epidural analgesia.
5. Examine the common medications used for epidural analgesia and their effects.
6. Describe required nursing assessment, monitoring, and documentation as related to epidural analgesia.
7. Determine the narcotic- and catheter-related side effects/complications of epidural analgesia and appropriate nursing interventions.
8. Summarize the appropriate patient/family teaching for those patients receiving epidural analgesia.

INTRODUCTION

Over the last 40 years, the use of epidural opioids has become a standard for pain management in labor and delivery, for the management of chronic pain, and to manage post-operative pain. Currently, epidural analgesia is an alternative to traditional pain medication administration in a vast array of clinical settings.

Pain management today has earned recognition as a significant contributor to quality clinical outcomes. Since the goal of analgesia is to provide the most effective pain relief with the least amount of side effects, epidural analgesia is an excellent method of pain relief because it provides true segmental, targeted analgesia with little or no need for systemic levels of opioids, leading to minimal side effects. Evidence has shown that epidural analgesia is more effective than intravenous narcotics in the management of acute post-operative pain and during labor and delivery.

Caring for patients who receive epidural analgesia requires specialized knowledge regarding the placement of the epidural catheter, management of the medication, and monitoring for potential side effects or complications. This self-directed learning module contains essential information for the nurse who cares for patients receiving epidural analgesia.



Nursing Scope of Practice

Epidural narcotics may be administered by routes that include intermittent bolus injection, continuous infusion, patient controlled analgesia (PCA), or implantable ports and infusion pumps for long-term use. Per the Position Statement on the Role of the Registered Nurse (RN) in the Management of Analgesia by Catheter Techniques (Epidural, Intrathecal, Intrapleural or Peripheral Nerve Catheters) and endorsed by the American Nurses Association (ANA) as well as the National Federation of Specialty Nursing Organizations (NFSNO), RNs may manage analgesia, including reinjection of medication following establishment of an appropriate therapeutic range and adjustment of the drug infusion rate in compliance with the anesthesia provider's or physician's patient-specific written orders.

Let's begin with a quick overview…….

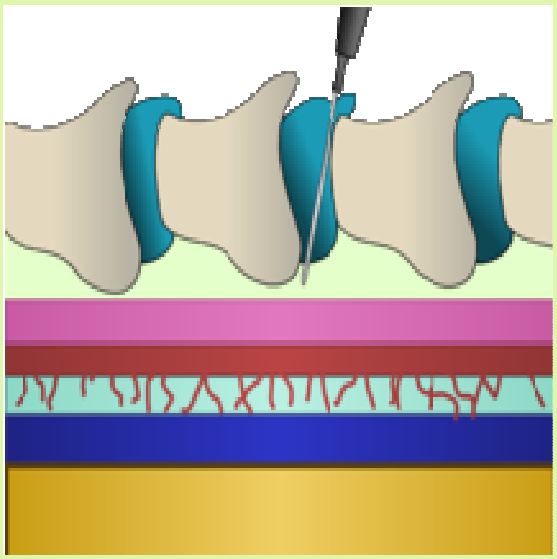
Fast Facts and Concepts

Epidural analgesia with local anesthetics, opioids, and/or alpha-agonists can provide superior regional analgesia over conventional systemic routes (IV or PO). In contrast to drugs administered systemically, drugs administered in the epidural space are extremely potent since the drug is delivered close to the site of action (opioid and alpha receptors in the spinal dorsal horn or local anesthetic blockade of nerve roots). Because of this, systemic side effects such as nausea, sedation, and constipation, are minimized. In palliative care, epidural analgesia may be appropriate for patients with regional pain (e.g. pelvic pain from cervical cancer) and/or patients who do not tolerate or obtain relief from oral/parenteral drugs and non-drug therapies.

Drugs administered epidurally are distributed by three main pathways:

- Into the *cerebrospinal fluid* by diffusion through the dura, then spinal cord or nerve roots.
- Vascular uptake by the vessels in the epidural space into *systemic circulation*.
- Uptake *by the fat* in the epidural space; creating a drug depot from which the drug can eventually enter the CSF or the systemic circulation.

Visualizing Epidural Analgesia



Vertebral Bones

Interspinous Ligaments = Attaches vertebral bones to each other.

Epidural Space = Exists between the dura and the internal surfaces of the vertebral bones and their supporting ligaments.

Dura Mater = Not attached, but are kept firmly pressed against one another because of pressure exerted by the CSF.

Arachnoid = Attached to the pia mater by many spider-like trabeculae.

Subarachnoid Space = Filled with CSF.

Pia Mater

Spinal Cord

Patient Controlled Epidural Analgesia

Patient Controlled Epidural Analgesia (PCEA) Epidural analgesia can be administered by intermittent boluses (by a clinician or by patient controlled epidural analgesia using an appropriate pump); continuous infusion; or a combination of both. PCEA is used to supplement a basal rate, to allow a patient to manage breakthrough pain in order to meet their individual analgesic requirements. Like intravenous PCA, PCEA can provide more timely pain relief, more control for the patient, and convenience for both the patient and nurse to reduce the time required to obtain and administer required supplemental boluses. Unlike IV PCA, the lockout interval of PCEA varies widely based on the lipid solubility of the opioid administered, from 10 minutes with fentanyl to 60-90 minutes when morphine is used. If local anesthetic is used, the lockout interval should be at least 15 minutes to allow for peak effect of the supplemental local anesthetic dose.

Nursing Management

Due to the proximity of drug delivery to its site of action, frequent assessment of pain relief, side effects, and signs or symptoms of technical complications (catheter dislodgement, epidural hematoma or abscess, pump malfunction, etc.) are necessary. This should be done every hour for the first 24 hours, then every 4 hours.

Assess and document on the pain management flow sheet:

- Pain rating using patient-specific pain scale (e.g. 0-10), both at rest and with activity.
- Level of sedation & respiratory rate, preferably by the same nurse during each shift.
- Side effects: pruritus, nausea, urinary retention, orthostatic hypotension, motor block.
- Sign of catheter insertion site infection or epidural abscess such as back pain, tenderness, erythema, swelling, drainage, fever, malaise, neck stiffness, progressive numbness, or motor block.
- Changes in sensory/motor function that may indicate an epidural hematoma including unexplained back pain, leg pain, bowel or bladder dysfunction, motor block.

Noteworthy: Epidural narcotics and local anesthetics are absorbed into the cerebrospinal fluid (CSF), but not through direct injection into the subarachnoid space, but rather through diffusion from the epidural space through the dura mater.

Epidural Analgesia is Not Intrathecal/Spinal Anesthesia……

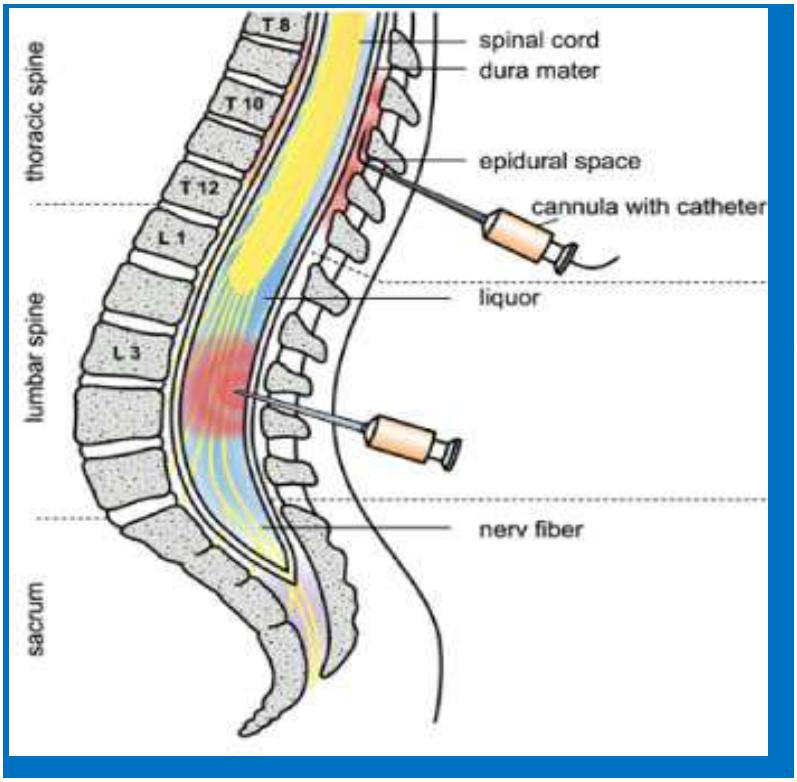
Analgesia by Catheter Techniques

Epidural Analgesia: Administration of analgesic(s) (e.g., opioids and local anesthetics) into the epidural space by single or intermittent bolus injection, continuous infusion, and patient-controlled epidural analgesia with or without continuous infusion. Short-term epidural analgesia is administered through a temporary catheter and external infusion device. Long-term administration is provided by either a tunneled catheter and external infusion device or implanted catheter and implanted refillable infusion device. Indications for use:

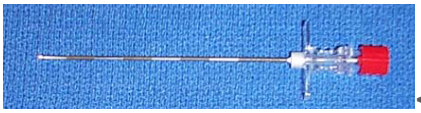
- Short-term use includes postoperative, procedural, trauma, labor, and some types of nonsurgical pain (e.g., sickle cell-related lower extremity pain), cancer, and chronic nonmalignant pain.
- Long-term use of epidural analgesia includes chronic (persistent) cancer pain and chronic nonmalignant pain.

Intrathecal (Spinal) Analgesia: Administration of analgesic(s) (e.g., opioids) into the subarachnoid space (called the intrathecal space in the caudal area of the spine) by single injection for relatively brief pain control or by infusion for extended pain control. Long-term administration is provided most often by an implanted intrathecal catheter and implanted refillable infusion device. Indications:

- Short-term use = postoperative pain, procedural pain, and labor pain.
- Long-term use = chronic cancer pain and chronic nonmalignant pain.



Injection Site for Deep Thoracic Epidural Catheter



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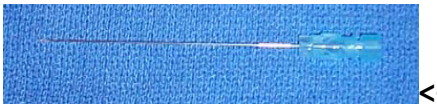
Injection Site for Spinal Analgesia/Anesthesia



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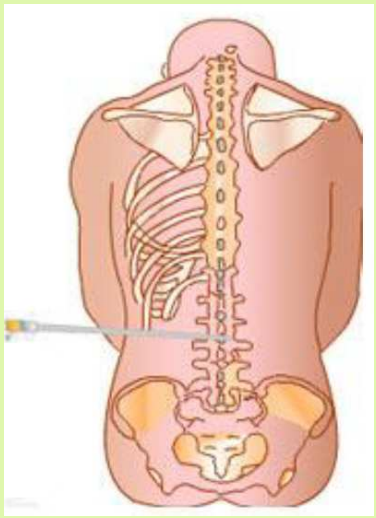
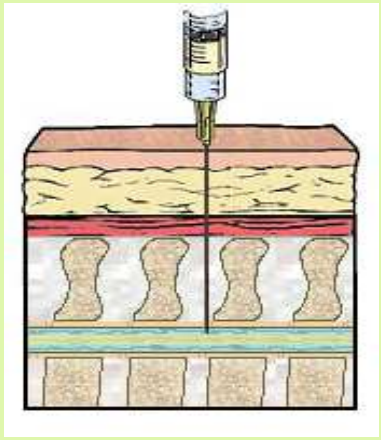
From the American Society for Pain Management Nursing

POSITION STATEMENT: Registered Nurse Management and Monitoring of Analgesia By Catheter Techniques

What is an Intrathecal?

An “intrathecal” refers to the placement of medications into the cerebral spinal fluid surrounding the spinal cord (the *intrathecal* space) for the purpose of analgesia or anesthesia. The term is interchangeable with having “a spinal”. It also means it is given between L4–L5 because the spinal cord terminates above this area.





The intrathecal route is used most often in anesthesia practice for patients who require short term pain relief, and is usually accessed for a one-time narcotic bolus. This route is fast and reliable, but limited in the fact that additional doses cannot be given. ***The intrathecal narcotic doses are approximately one-tenth of those used with the epidural route***; because of this the catheter is removed immediately after administration to prevent accidental overdose or infection since it is no longer useful. Therefore higher doses of opioids are indicated when using the epidural route for pain management. There are some other disadvantages to an intrathecal. The placement of medications into the intrathecal space requires placement of a needle through the dura, which surrounds the CSF in the space. After this puncture, these is a chance of a post-dural or spinal headache.

Another drawback is that once the medication is injected, the effect is time-limited. This is unlike an epidural where a catheter is placed in the body to allow continuous infusion or bolusing of the narcotic pain medication. Of course, an intrathecal could always be repeated but this involves another needle stick for the patient.

Intrathecal Pros:

- Easier to accurately place than an epidural
- Meds take effect faster than with an epidural
- Small amount of med = less side effects
- Absence of or small amount of local anesthetic means reduced muscle weakness
- Less chance of low blood pressure than with other methods
- Can be combined with an epidural to gain advantages of both - the "walking epidural"

Intrathecal Cons:

- Potential spinal headache, nausea, vomiting, pruritus, and urinary retention
- Very rare but serious: Epidural hematoma and respiratory depression
- Time limited technique - the medication will wear off and may need to be repeated

BENEFITS, INDICATIONS, & CONTRAINDICATIONS

While epidural analgesia is used to manage pain, epidural anesthesia is used to provide anesthesia during labor, delivery, and surgical procedures. Both epidural analgesia and epidural anesthesia are administered by inserting a needle in the epidural space or by threading a catheter through the needle and using it for medication administration. What makes epidural anesthesia different is that it involves the administration of local anesthetics and/or opioids at a notably larger dose than what's given to achieve analgesia. Epidural anesthesia is beyond the scope of this self-study.

Anesthesia, as used in medicine, is defined as general or local insensibility *to pain, heat, cold, touch and other sensation*, induced by certain interventions or drugs to permit the performance of surgery or other painful procedures.

Analgesia, as used in medicine, is the loss of the ability *to feel pain* while retaining consciousness.

BENEFITS

Epidural analgesia provides very effective, prolonged segmental analgesia. Smaller doses of opioids can be used in the epidural route than systemic routes (parenteral or oral) since the opioid is administered more directly to the spinal opioid receptors. The smaller epidural dose of opioids decreases the potential for opioid-related side effects. In addition to opioids, local anesthetics can be administered via the epidural route in order to produce a neural blockade that provides analgesia. Local anesthetics and opioids can be used in combination, and are believed to act synergistically. This combination allows the concentration of local anesthetics and dose of opioids to be decreased. The following benefits have been found with epidural analgesia

1. Excellent analgesia
2. Less sedation
3. Earlier ambulation
4. Decreased stress response
5. Earlier return of bowel function
6. Decreased incidence of venous thrombosis
7. Decreased incidence of pulmonary complications

INDICATIONS

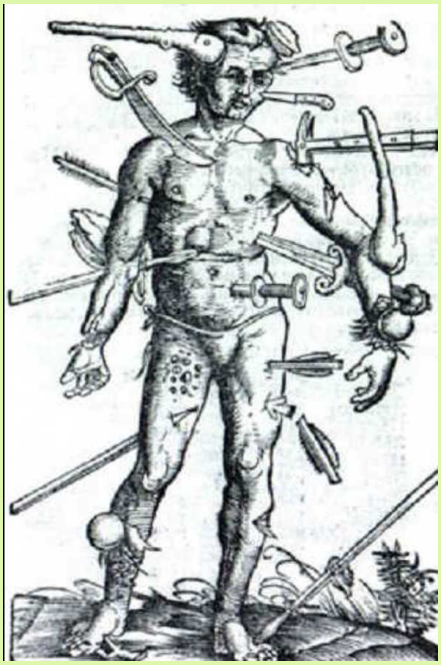
Epidural analgesia is indicated for managing both acute and chronic pain. Acute postoperative patients that may benefit from epidural analgesia include:

1. Thoracic procedures (thoracotomy)
2. Upper abdominal procedures (esophagogastrectomy)
3. Orthopedic procedures (laminectomy, hip replacement)
4. Peripheral vascular procedures
5. Obstetric, gynecologic, and urologic procedures

Epidural analgesia is indicated in patients with intractable pain when pain medications given by conventional routes such as IV, oral, IM, rectal, and/or transdermal is ineffective or cannot be given in adequate doses because of debilitating side effects.

Multiple Trauma

Trauma patients, such as those with rib fractures or multiple orthopedic injuries, also benefit especially if predisposed to respiratory complications such as chronic obstructive pulmonary disease. It is interesting to note that patients undergoing amputation have been found to benefit from epidural analgesia as well. The use of epidural analgesia preoperatively has been shown to decrease phantom limb pain.



Chronic pain

Patients with chronic malignant and non-malignant colorectal and gynecological pain successfully achieve pain relief, especially those with regionalized pain below T1 that has been poorly controlled by systemic narcotics due to over-sedation and respiratory depression.

Epidural analgesia may also be indicated in patients with chronic lower back conditions, multiple sclerosis, and severe osteoporosis because it alleviates the chronic drowsiness associated with systemic narcotics.

One drawback however is that tolerance may develop quickly, which is one limiting factor to more widespread use of epidural analgesia in patients with chronic pain. A phenomenon not clearly understood is that there appears to be cross-tolerance between narcotics administered via the epidurally and those given systemically. Because of this, patients who need high doses of systemic narcotics will gradually require high epidural doses for optimal pain relief.

CONTRAINDICATIONS

Two absolute contraindications for epidural analgesia are non-consent by the patient and a history of true allergic reaction to a specific narcotic. True allergies are very rare. In the case of allergy, another opioid class may be substituted. Patients who have thrombotic or bleeding disorders (thrombocytopenia, abnormal prothrombin time/partial thromboplastin time values) or who are receiving anticoagulants are also contraindicated due to the ***increased risk of developing an epidural hematoma at the catheter insertion site.*** Also contraindicated are patients who have a systemic infection or an infection at the puncture site due to the increased risk of developing an epidural abscess or meningitis.

Contraindications for epidural analgesia can be related to neurologic status, such as patients have increased intracranial pressure. In the event the dura is inadvertently punctured the loss of cerebral spinal fluid (CSF) could cause cerebellar or tentorial herniation. Epidural anesthesia is also contraindicated in patients who have undergone a recent laminectomy with an opening into the dura. These patients risk catheter migration into the subarachnoid space and accidental overdose.

Summary of Contraindications for Epidural Analgesia

Coagulopathies / Anticoagulation Therapy

- Increased risk for an epidural hematoma

Decreased Level of Consciousness

- Epidural analgesia may be implicated in any progression of CNS dysfunction
- Pain management by epidural analgesia requires patient to accurately report pain level

Systemic Infection

- Systemic infection or sepsis may lead to an infection in the epidural space

Localized infection at the insertion site of the epidural catheter

- May lead also to an infection in the epidural space.

Increased Intracranial Pressure

- Inadvertent dural puncture in a patient with increased intracranial pressure increases the chance of cerebellar or tentorial herniation due to the loss of CSF.

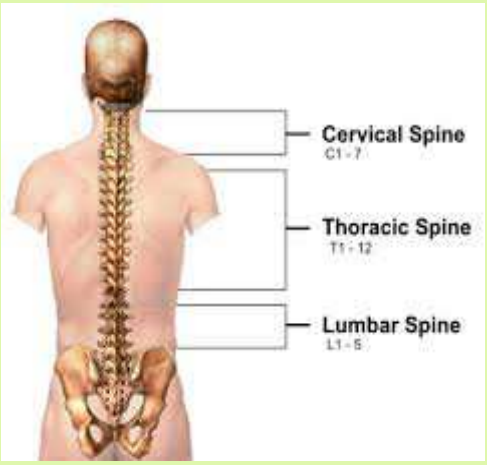
Lack of Qualified Staff to Monitor Patients

- Epidural analgesia should only be used in hospital units where the staff has received adequate training. Staff should be knowledgeable concerning epidural catheter placement, epidural medications, and the possible side effects and complications from epidural analgesia.

SPINAL ANATOMY

The vertebral column is the central supporting pillar of the body and extends from the base of the skull to the tip of the coccyx bone. Its function is to support the weight of the head and trunk - which is then transferred to the hips and lower limbs - and to protect the delicate spinal cord. The vertebral column is made up of individual bones called vertebrae, separated by the intervertebral discs. The vertebrae are arranged in five distinct groups:

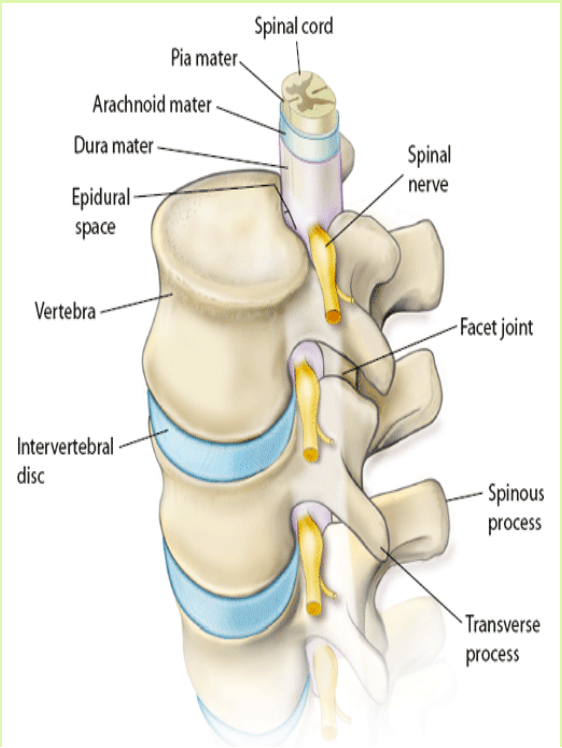
- Cervical vertebrae (7 in total)
- Thoracic vertebrae (12 in total)
- Lumbar vertebrae (5 in total) Sacral vertebrae (5 - fused to form the sacrum)

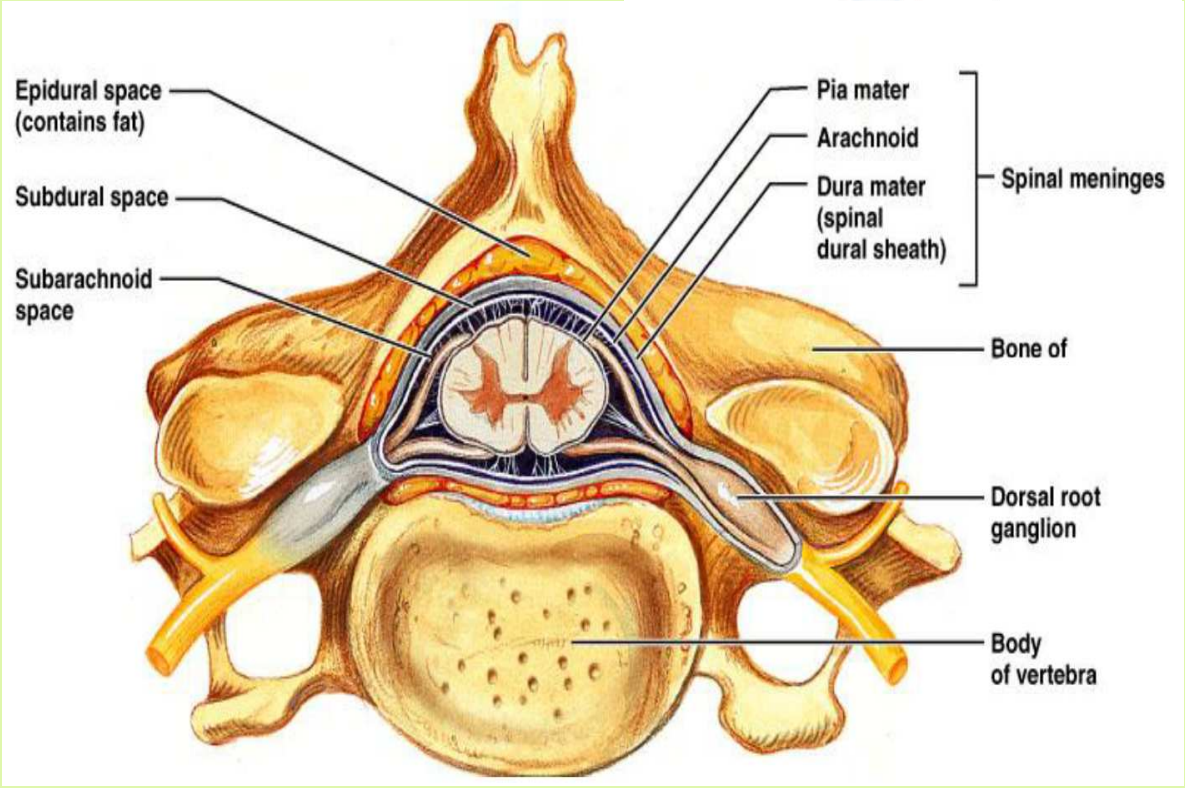


The spinal cord extends from the foramen magnum at the base of the skull to the superior border of the second lumber vertebra (L2). The spinal cord is composed of both white and gray matter with pain receptors located within the gray matter. The cord is covered with layers of connective tissue called meninges and the innermost layer, the pia mater, is closest to the spinal cord. As a smooth, vascular membrane, the pia mater contains many blood vessels that nourish cells of the spinal cord.

The **arachnoid mater**, the middle layer, is a thin and transparent covering. Located between the arachnoid and pia mater is the subarachnoid or intrathecal space. The subarachnoid space extends from the cranium to the sacrum and contains cerebrospinal fluid (CSF) and nerve roots.

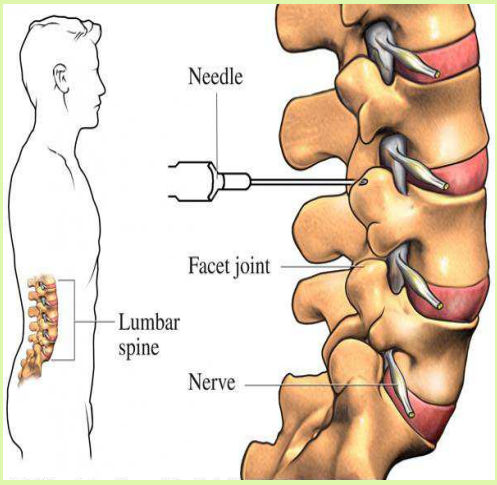
The **dura mater** is the outermost meningeal layer. Between the dura mater and the vertebrae is a ligament called the ligamentum flavum, which lines the vertebral canal. ***Between the dura mater and the ligamentum flavum is the epidural space***. As a *potential space*, it also extends from the base of the skull to the coccyx. It contains fatty and connective tissue, lymph and blood vessels, and spinal nerve roots. The epidural space functions as a fatty pad that surrounds the spinal cord and is a potential depot for lipid-soluble narcotics.

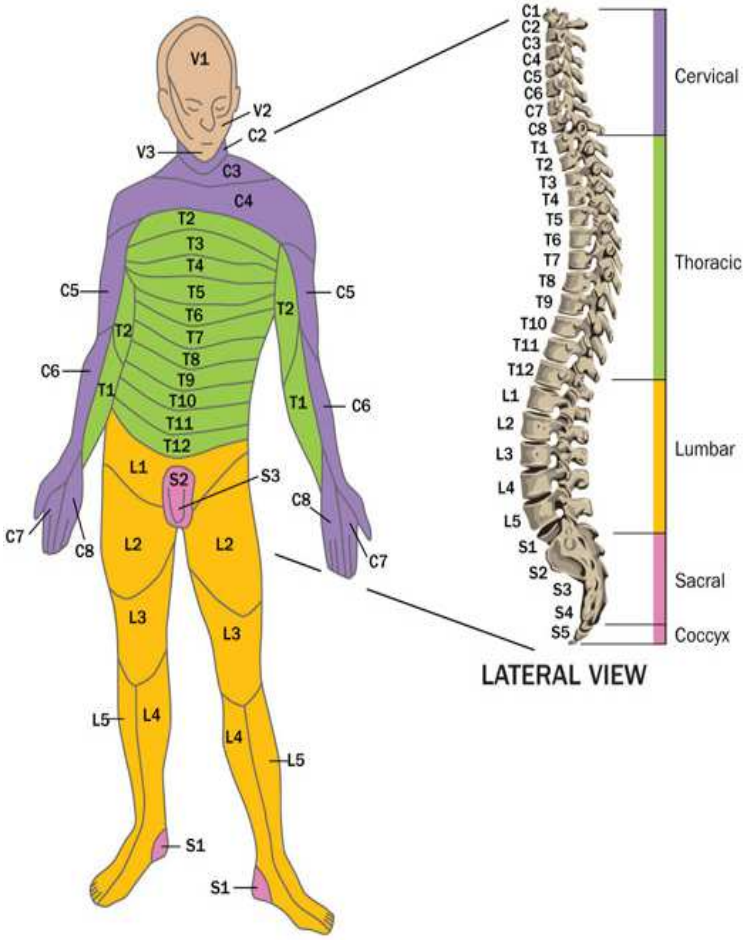




CATHETER PLACEMENT SITES

With the advent of epidural analgesia, many catheters were placed in the lower lumbar region, between L4–L5 because the spinal cord terminates above this area. However an increased demand for epidural analgesia has shown that pain may be best relieved by placing the catheter at different sites depending on the location of the patient's pain and/or surgical incision. This is because of dermatomes, which denote the area of skin and soft tissue that is innervated by a single spinal nerve root. The epidural catheter is placed in a centrally located interspace so that all of the affected dermatomes would receive the benefits of the infusion.





Cervical Segments

C5- Anterolateral shoulder
C6- Thumb
C7- Middle finger
C8- Little finger

Thoracic Segments

T1- Medial arm
T3- 3rd, 4th Interspace
T4- Nipple line, 4th, 5th Interspace
T6- Xiphoid process
T10- Navel
T12- Pubis

Lumbar Segments

L2- Medial thigh
L3- Medial knee
L4- Medial ankle, Great toe
L5- Dorsum of foot

Sacral Segments

S1- Lateral foot
S2- Posteromedial thigh
S3,4,5- Perianal area

Patient Preparation

Regardless of the reason for epidural analgesia, patients and family must be informed about this type of pain control in a manner they can understand. Prior to placement of the catheter, the patient/family should be allowed to voice any concerns and ask questions. Explanations should be simple, using everyday language and avoiding medical jargon. Patients should be informed of how epidural analgesia works and of any potential adverse effects. It should be emphasized that side effects are temporary and can be readily treated. Provide reassurance that although epidurals do not induce sleep, the medications will control their perception of pain. Patients should know how long the epidural will be in place, what the expected outcomes are, and what alternative pain control plan will be implemented when the epidural is discontinued.

Placement Techniques

Epidural catheters may be placed in the operating room or as a sterile procedure at the patient's bedside. Using aseptic technique, the qualified physician or nurse anesthetist inserts the epidural catheter with the patient in the sitting or lateral fetal position. Proper placement of the catheter is verified through aspiration of the catheter and a small test dose of a local anesthetic.

Once correct placement of the catheter is confirmed, the catheter is immobilized with tape and an occlusive, transparent dressing. The extra length of the catheter is then brought up over the shoulder, and secured with tape along its length. A .22 micron filter is attached between the catheter and the infusion tubing. The catheter and tubing should be clearly labeled as 'EPIDURAL CATHETER'.

The actual site for catheter placement is determined by the dermatome innervating the area of pain. With thoracic procedures, the catheter is placed between T2–T8, depending upon whether the upper or lower lobes of the lung are affected. In the same manner, patients with upper abdominal procedures have catheters are placed between T4–L1, those with orthopedic procedures between T10–L3, and those with peripheral vascular procedures between L4–L5. In the case of trauma, the epidural catheter is placed directly at the site of injury. Choosing the right dermatome level is even more important when the patient will receive epidural local anesthetics (as opposed to analgesia) as these anesthetics block both afferent and efferent nerve fibers.

Strict aseptic technique must be used during the insertion, as well as with any contact with the solution, infusion, dressing, or site, to prevent contamination.

Nursing Responsibilities

Nursing responsibilities focus on ensuring proper positioning, maintaining aseptic technique, and assisting with the procedure. The lateral position is used for catheter insertion, with the patient's hips and head flexed because this position allows for maximal separation of the vertebral bones. The site is then prepared using topical antiseptic and sterile drapes.

A local anesthetic, such as lidocaine, is injected into the insertion site. A sterile syringe with air or preservative-free, sterile normal saline is attached to a blunt spinal needle, inserted into the interspace, and advanced using gentle pressure. This is the most dependable placement technique as the three tough ligaments that surround the spinal cord do not permit injection unless the needle has entered the epidural space. It is called 'loss of resistance' technique.

After the needle has entered the epidural space, normal saline or air may then be easily injected. The potential for accidental intrathecal placement into the subarachnoid space or nicking the dura is decreased by the fact that the flow from the needle pushes the dura mater layer away. As an additional safety measure, some institutions insert epidural catheters under guided fluoroscopy or ultrasound.

Next, a flexible catheter is threaded through the epidural needle and advanced 2 to 3 cm into the epidural space. The epidural needle is then carefully removed and a slide-lock adapter is attached to the end of the catheter. This adapter permits attachment of the catheter to an injection port or infusion tubing. A filter is also attached to the infusion tubing to prevent introduction of micro-particles or bacteria into the epidural space. The filter may also be used with intermittent administration setups.

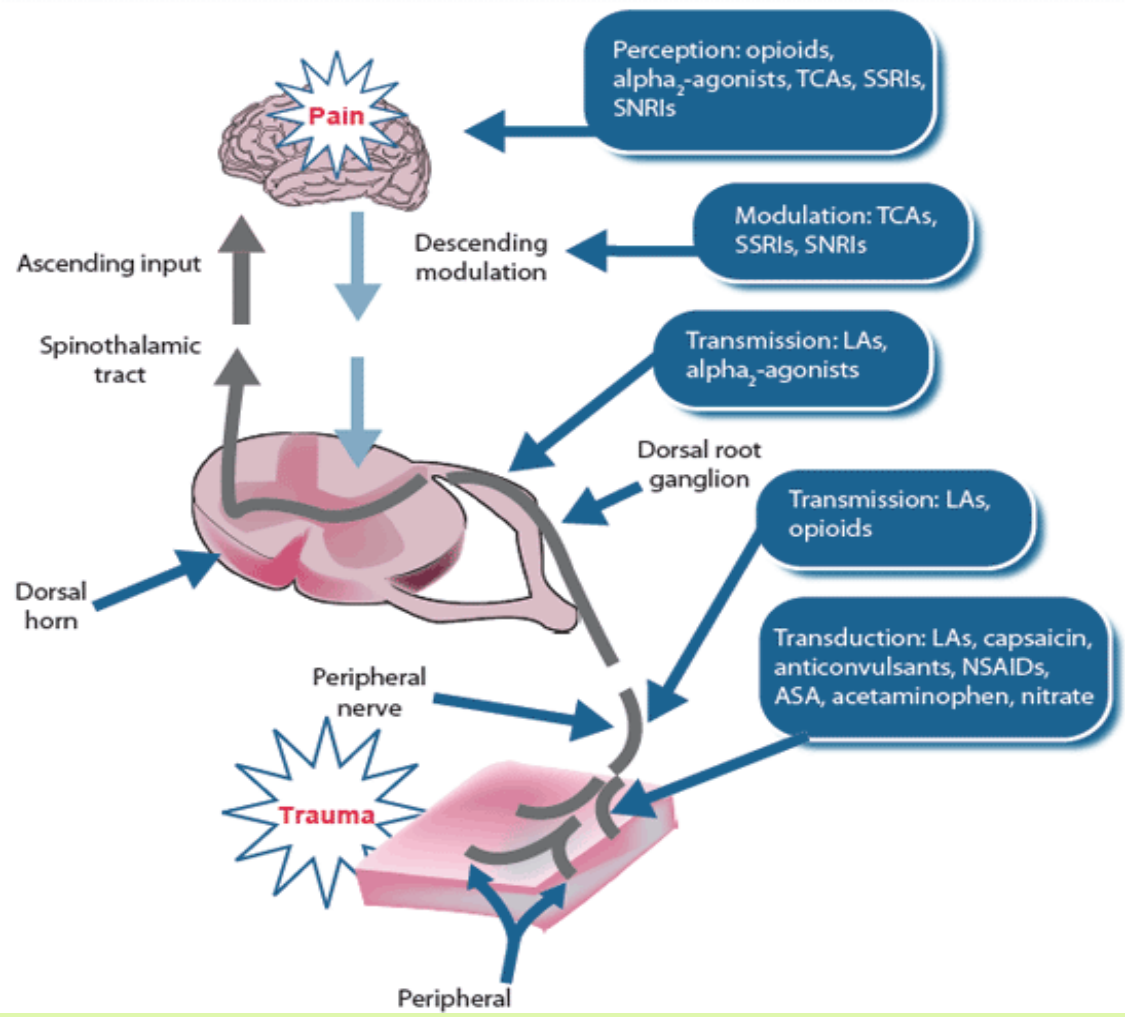
After catheter placement is verified, the final step involves dressing the site and securing the catheter. A sterile transparent occlusive dressing is applied to permit easy inspection of the site, and the catheter should be taped securely up the patient's back and positioned at the head. In most cases the dressing or tape should never be changed, only reinforced as needed to prevent accidental removal. If the epidural catheter is in place more than 96 hours, consult hospital policy and change the dressing accordingly.

Safety First

Catheter placement must be verified to avoid injection of the narcotic into the intrathecal space. The two techniques used to verify catheter placement are aspiration and the use of a test dose. Bear in mind that the inability to aspirate or the presence of a negative test dose does not guarantee correct catheter placement.

Epidural catheters should be marked clearly to prevent accidental injection of medications.

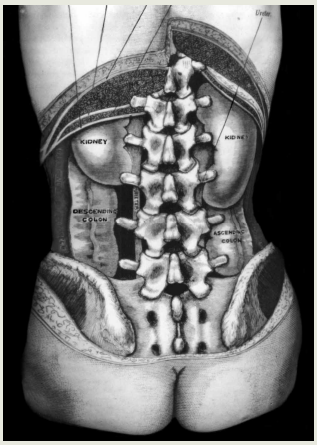
Pain Transmission and Modulation of Pain



Definition of Terms:

Pain	Unpleasant sensory & emotional experience associated w/ tissue damage.
Afferent Nerve	Transmits impulses from the periphery toward the central nervous system.
Analgesia	A deadening or absence of the sense of pain without loss of consciousness.
Noxious stimulus	A stimulus that is damaging or potentially damaging to body tissue.
Nociceptor	A nerve receptor that is preferentially sensitive to noxious stimuli.
Nociception	The process of encoding a painful sensation.
Modulation	A reversible change in cells and tissue structure due to physiological factors

TYPES OF PAIN



Pain can be classified as somatic, visceral, or neurological, with each being associated with a specific etiology. Somatic pain results from activation of nociceptors by thermal, mechanical, or chemical stimuli in either the superficial or deep tissues. When peripheral receptors are activated, the pain perception is transmitted to the spinal cord and higher cerebral cortex, where pain is perceived. Usually continuous and localized, somatic pain is most often described as aching, sharp, or throbbing. Visceral pain differs in that it is the result of internal organ damage, disease, or dysfunction. Depending upon the exact cause, visceral pain may be described in a variety of ways such as deep, dull, aching, boring, or pressure-like. Lastly, neuropathic pain, originating in the nervous system, is often described as a burning, tingling, or numbing sensation.

Pain sensations traveling from peripheral nerve ends to the spinal cord are mediated by three types of specialized fibers: large myelinated A fibers (A-beta); small myelinated A fibers (A-delta); and unmyelinated C fibers. Each type of nerve fiber carries a different type of sensation. Stimulating the A-beta fibers can block pain signals and close the pain "gate." A-delta fibers transmit fast-traveling pain sensations that are prickly and highly differentiated, as in acute surgical pain. This type of pain is not well relieved by epidural analgesia. (It is well alleviated by epidural anesthesia.) However the majority of pain stimuli are carried more slowly by unmyelinated C fibers. These pain sensations, characterized as continuous, dull and aching from deep structures within the body, respond best to epidural analgesia. Unfortunately, intermittent dull pain is poorly relieved and central pain does not respond at all to epidural narcotics.

What is Central Pain?

Central pain syndrome is a neurological condition caused by a dysfunction that specifically affects the central nervous system, which includes the brain, brainstem, and spinal cord. The disorder occurs in people who have had strokes, multiple sclerosis, Parkinson's, brain tumors, limb amputations, brain injuries, or spinal cord injuries. It may develop months or years after injury or damage to the CNS.

The Physiology of Pain

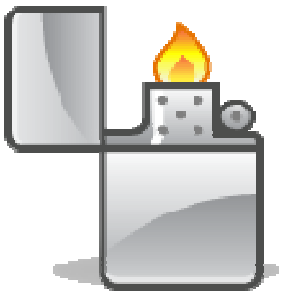
Pain is a warning signal to which the body responds in order to protect itself from further damage. When the body experiences tissue damage from exposure to noxious substances, it initiates the nociceptive process. Afferent nerve fibers respond to the nociceptive stimuli peripherally, and relay this information to the spinal cord. Most of the nociceptive input enters the spinal cord through the dorsal horn.

In the dorsal horn, nociceptive neurotransmittors are released, which activates the second-order dorsal horn neurons. The activation of the second order neurons results in:

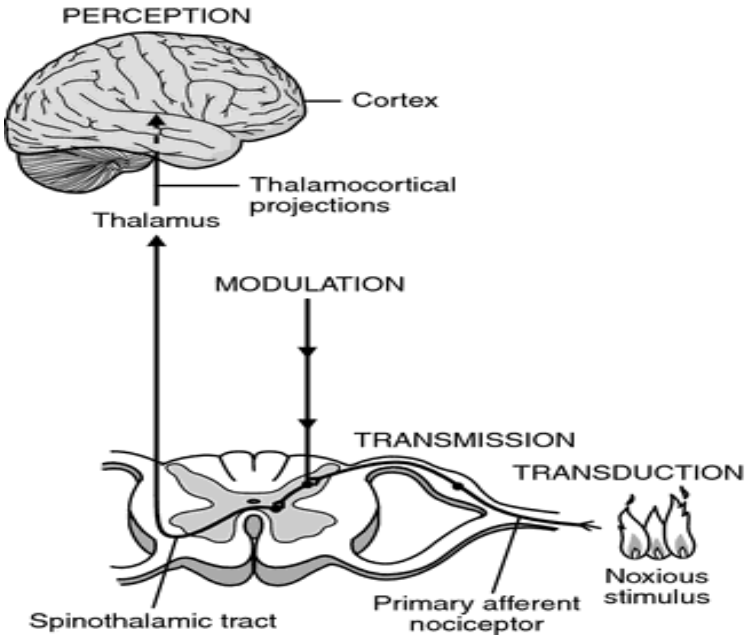
- Spinal reflex responses such as acute vasoconstriction, muscle spasms, and increased sensitization of nociceptors.
- Activation of the ascending tracts which transmits the nociceptive input to several regions within the brain. This is where several responses to pain occur, including the perception of pain and the emotional and behavioral reactions to it.

Categories of Noxious Stimuli

- Mechanical: Pressure, swelling, abscess, incision, tumor growth
- Thermal: Burns from heat or cold sources
- Chemicals: Toxic substances or the chemistry from ischemia or infection



Steps in Normal Pain Pathway



Step 1 Transduction

Damage to tissues from thermal, chemical or mechanical forces releases substances such as prostaglandins, bradykinin, histamine, & substance P, that activate nociceptors to begin the process of alerting the brain that something is causing harm to the body.

Step 2 Transmission (occurs in three stages)

- The pain impulse is transmitted from the site of transduction along the nociceptor fibers (A beta, A delta or C fibers) to the dorsal horn in the spinal cord;
- Release of substance P and other neurotransmitters carry the action potential across the cleft to the dorsal horn of the spinal cord to ascend the spinothalamic tract to the thalamus and midbrain;
- From the thalamus, fibers send the nociceptive message to the somatosensory cortex, parietal lobe, frontal lobe, and the limbic system, where the third nociceptive process -- perception -- occurs.

Step 3 Perception

- Perception is a conscious multidimensional experience. It is the organization, identification, and interpretation of **sensory information** in order to represent and understand the environment. All perception involves signals in the **nervous system**, which in turn result from physical or chemical stimulation of the sense organs.
- Affected by multiple factors: level of consciousness, meaning of pain, environment, physical, emotional and social factors.
- The multidimensional experience of pain has affective-motivational, sensory-discriminative, emotional and behavioral components.

Step 4 Modulation

- Modulation involves inhibiting (or changing) the transmission of pain impulses in the descending pathways of the spinal cord.
- Modulation leads to either an increase in the transmission of pain impulses (excitatory) or a decrease in transmission (inhibition).
- Inhibitory neurotransmitters block or partially block the transmission of pain impulses, and therefore produce analgesia.
- Inhibitory neurotransmitters involved with the modulation of pain include those listed in sidebar.
- These neurons stimulate the release of additional neurotransmitters, which ultimately trigger the release of endogenous opioids and inhibit transmission of the pain impulse at the dorsal horn.

Inhibitory Neurotransmitters

- *Acetylcholine*
- *Enkephalins*
- *Gamma-aminobutyric acid (GABA)*
- *Neurotensin*
- *Norepinephirine (noradrenalin)*
- *Oxytocin*
- *Serotonin (5-ht)*

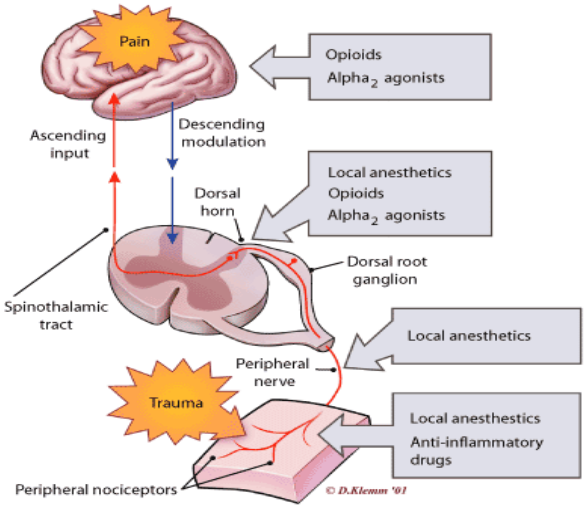
How Does Epidural Anesthesia Work?

By diffusing across the dura and subarachnoid space, narcotics given via the epidural route inhibit the transmission of pain by diffusing across the dura and subarachnoid space and binding to receptors in the spinal cord. Benefits of epidural administration include improved analgesia with longer lasting relief and the use of fewer doses and less sedation. The outcome is earlier return and improvement in respiratory function with a decreased metabolic-stress response and earlier ambulation.

Morphine (preservative-free) and fentanyl are the most common narcotics given either intermittently or through continuous epidural routes. The onset of analgesia ranges from 15 minutes to one hour, with a duration of 4 to 24 hours. Local anesthetics such as bupivacaine can also be used, especially in patients who have developed opioid tolerance.

Nursing responsibilities include:

- Monitoring administration of the narcotic
- Monitoring effectiveness of pain relief
- Assessing pulmonary, neurologic, and catheter status
- Monitoring for and managing narcotic-related side effects and catheter-related complications
- Assisting with catheter removal
- Evaluating physical and emotional aspects post-procedure



EPIDURAL DRUGS

Only preservative-free drugs are infused into the epidural space because preservatives are neurotoxic and may cause injury to the spinal cord. The two most commonly used narcotics are morphine and fentanyl. Common dosing, as well as the peak and duration of these drugs, are listed below. Please note it is important that the epidural dose depends on the patient's height, age, and type of surgery. With any of these agents, the larger the volume of drug infused, the greater the chance for migration to the brainstem, which is responsible for central side effects.

Drug	Initial Dose	Infusion	Peak	Duration
Morphine	**1–10 mg**	**0.1–1.0 mg/hr**	**30 to 60 minutes**	**6 to 24 hours**
Hydromorphone*	**0.4-1.5 mg**	**0.2 – 2.0 mg/hr**	**15-30 min**	**6 to 7 hours**
Fentanyl	**25–100 mcg/dose in 10 cc normal saline**	**25–100 mcg/hr**	**10 to 15 minutes**	**4 to 8 hours**

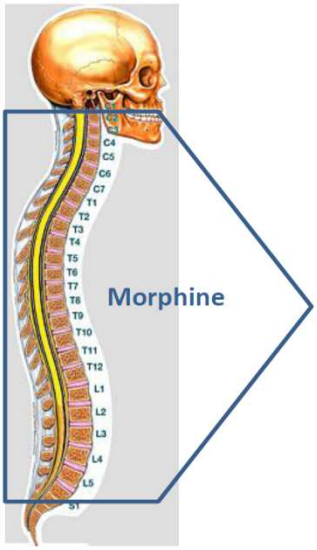
**Hydromorphone is approximately 8 times more potent than morphine*

Action

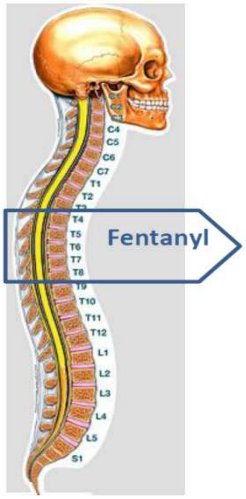
During the administration of epidural analgesia, the process of diffusion allows narcotics to travel across the dura and subarachnoid space and bind to mu receptors located in the substantia gelatinosa of the dorsal horn of the spinal cord. After these narcotics bind to opioid receptors, they block the release of substance P, a neurotransmitter. When substance P is decreased or absent, nociceptive impulses (pain sensations) do not travel the ascending fibers to the higher brain centers. As a result, the patient does not perceive pain.

The rate of narcotic diffusion across the epidural space is affected by lipid solubility. In other words, the more lipid-soluble the drug, the more rapidly it diffuses across the epidural space to the opioid receptors in the spinal cord.

Morphine has a longer duration and is thus used when analgesia is required over several days. Due to the potential for respiratory depression, monitoring is required for at least 24 hours after the first dose is given. Morphine is also highly water-soluble and is prone to being retained in the CSF and systemic circulation, making more of the drug is available to migrate toward higher brain centers. Because of this side effects are more frequent in patients receiving morphine than those receiving fentanyl. The maximum dose is 10 mg/day for opioid-naïve patients and 20 mg/day for opioid-tolerant patients. Morphine preparations specifically prepared for epidural use are preferred over generic preparations due to sterility and quality control issues.



In contrast to Morphine, **Fentanyl** (**Sublimaze**) is a synthetic narcotic that is 100 times more potent than morphine. As a highly lipid-soluble drug, it diffuses quickly to opioid receptors, with an onset of 10 to 15 minutes. Another main advantage is that it leaves less drug available for spreading to the brain stem, which results in fewer narcotic-related side effects. Fentanyl has a relatively short duration (4 to 8 hours) and is used when analgesia is needed for a short time. Monitoring is required because respiratory depression occurs in 10% of patients, and more so in elderly patients.



Other drugs that may be administered via the epidural route include alfentanil, ketamine, meperidine, methadone, clonidine, hydromorphone, and sufentanil, but most are used off-label. Of these, meperidine and methadone are both highly lipid soluble which means that each drug has a quick analgesic onset but a short duration when given by bolus. These drugs do not offer advantages over either morphine or fentanyl.

Commonly Used Epidural Solutions

Local Anesthetics

Local anesthetics may also be administered via the epidural route. Bupivacaine, a long-acting local anesthetic, is the most often used agent. It may be administered either alone or in combination with epidural opioids, such as morphine or fentanyl, for a synergistic effect and reduction of side effects. Local anesthetics are especially useful for patients who have developed a tolerance to opioids because analgesic action is not dependent only on opioids. Some fast facts:

- Mechanism of action is as Sodium Channel Blockers, which block action potential and nerve conduction.
- In sub-anesthetic doses, acts as an analgesic. High concentrations provide anesthesia.
- Only used in combination with opioids postoperatively.

Has been shown to suppress the stress response, improve GI function, and reduce CV, pulmonary and infectious complications in postoperative patients.

Common epidural solutions for continuous infusion combine local anesthetics with narcotics.

- 0.1% or 0.0625 % with Fentanyl 2mcg/ml in Normal Saline
- Bupivicaine 0.08 % with HYDROmorphone 20 mcg/mL in Normal Saline
- Ropivicaine 2mg/ml (0.2%) in Normal Saline (local anaesthetic only)

When epidural infusion is stopped, the local anesthetic effects last approximately:

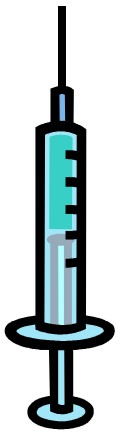
- Bupivicaine 0.1% (1mg/ml) 3.5 - 5 hours
- Ropivicaine 0.2% (2mg/ml) 4 - 6.5 hours

High-Alert Medications: 13 Strategies For Infusion Safety

Follow policies, procedures, and protocols.	Use a labeling system.
Ask for a pharmacist's review.	Obtain an independent double-check.
Confirm the order.	Decide if you should give the drug.
Use standard equipment & drug concentrations.	Titrate the dosage.
Control the environment.	Check for adverse reactions.
Know and use the right equipment.	Report significant changes.
Identify the patient in at least two ways.	

Potential Complications of Epidural Analgesia

Post Dural Puncture Headache

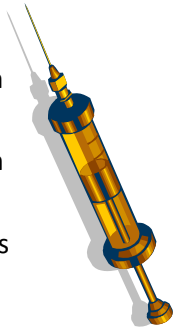


This happens when the dura has been punctured and is caused by CSF leaking out of the subarachnoid space. It occurs in 1-2% of epidural blocks. The headache is typically frontal, made worse with movement or sitting up right, and it can occur 24 – 48 hours post puncture. The treatment is supine bed rest, analgesics, and IV fluids. If you suspect a post-dural puncture headache, notify the anesthesiologist. The leak usually resolves on its own. If it does not resolve on its own, the anesthesiologist can perform a blood patch which involves using approximately 5-15mls of the patients own blood injected in the epidural space to form a 'patch' (clot) to stop the leak of CSF. The clot will then dissolve on its own.

Infection

This is extremely rare, but it can happen. An infection can lead to an epidural abscess which can compress the spinal cord or compromise the blood supply to the spinal cord. Early detection is crucial. Monitor temperature every 4 hours; observe the insertion site for redness, swelling, tenderness or discharge and report any abnormal findings.

Epidural Hematoma



This is a very serious, but extremely rare, complication caused by damage or perforation to small blood vessels in the epidural space. Bleeding into the epidural space can compress the spinal cord. This needs to be treated immediately with surgical evacuation of the hematoma. Compression of the spinal cord can cause permanent damage within 6-8 hours. Make sure to assess and report any onset of progressive weakness, numbness and/or paralysis, which may be accompanied by moderate to severe back pain, to the anesthesiologist immediately.

Catheter Occlusion or Dislodgment

A locked, designated infusion pump must be used for all continuous epidural infusions. If the epidural is capped, the catheter does NOT require flushing like an IV line. If the infusion pump alarms occlusion, inspect system for integrity and kinks. Additionally repositioning the patient may resolve the occlusion alarm. If, despite troubleshooting efforts, it continues to alarm, suspect catheter occlusion and inform anesthesia. If the catheter has been inadvertently removed, inspect catheter tip to ensure tip did not break off in the epidural space and let anesthesia know.

Continue to monitor the patient's hip/dorsi/planter flexion and extension, for changes in sensation to abdomen and legs and for back pain q4h for 24 hours post accidental removal and report.

Accidental Disconnection

An epidural catheter should be removed as soon as possible following an unwitnessed disconnection. If the catheter becomes disconnected from the infusion *do not reconnect it*. If the hub remains in-place, cap it with a non-vented cap. If apart at the catheter connector, wrap the epidural catheter in sterile gauze and call anesthesia immediately. Anticipate removing the catheter as soon as it is safe to do, so depending on the timing of the last dose of anticoagulant.

Local Anesthetic Systemic Reaction

This is a very rare but potentially fatal complication. The first symptoms of local anesthetic toxicity will be perioral numbness and tingling with a metallic taste; other early symptoms include dizziness, tinnitus and a sense of impending doom. Stop the epidural infusion immediately. If not, the symptoms can progress to muscle twitching, blurred vision, shaking, excitement, seizures, bradycardia or heart block, hypotension, confusion, sedation, loss of consciousness and ultimately cardiac arrest.

Treatment of Local Anesthetic Systemic Toxicity (LAST) Guy L. Weinberg, MD

Initial Focus

- Airway management: ventilate with 100% oxygen
- Seizure suppression: benzodiazepines are preferred; AVOID propofol in patients having signs of cardiovascular instability
- Alert the nearest facility having cardiopulmonary bypass capability

Management of Cardiac Arrhythmias

- BLS / ACLS requires adjustment of meds & perhaps prolonged effort
- AVOID vasopressin, calcium channel blockers, beta blockers, or local anesthetic
- REDUCE individual epinephrine doses to <1 mcg/kg

Lipid Emulsion (20%) Therapy (values in parenthesis are for 70kg patient)

- Bolus 1.5 mL/kg (lean body mass) intravenously over 1 minute (~100mL)
- Continuous infusion 0.25 mL/kg/min (~18 mL/min; adjust by roller clamp)
- Repeat bolus once or twice for persistent cardiovascular collapse
- Double the infusion rate to 0.5 mL/kg/min if blood pressure remains low
- Continue infusion for at least10 minutes after attaining circulatory stability
- Recommended upper limit: Approximately 10 mL/kg lipid emulsion over the first 30 mins

Post LAST events at www.lipidrescue.org and report use of lipid to www.lipidregistry.org

From The American Society of Regional Anesthesia and Pain Medicine

Code Rescue Code Blue Code Rescue Code Blue

NURSING DIAGNOSES AND INTERVENTIONS

Patient/family will understand purpose of epidural analgesia, including risks and benefits.

Nursing Interventions

- Inform the patient/family about the procedure used to insert the epidural catheter.
- Teach the patient how to use the pain rating scale and to inform the nurse of decreased levels of analgesia.
- Explain the onset and duration of analgesia that may be expected.
- Teach the patient/family that epidural analgesia will control pain and not totally eliminate pain (unless epidural anesthetics are used).
- Inform the patient to tell the nurse if side effects are experienced at the onset (e.g., nausea/vomiting, pruritus, bladder distention).
- If the epidural catheter is intended for long-term use, teach the patient/family about home care.

Alteration in pulmonary function related to epidural narcotic or anesthetic administration.

Expected Outcomes

- Respiratory rate will be greater than 10 breaths per minute.
- Depth of respirations will be adequate.
- Arterial blood gases will remain at baseline.
- LOC will remain at baseline.

Nursing Interventions

- Monitor rate/depth of respirations and oxygen sat. per pulse oximeter and/or apnea monitor.
- Assess for neurologic signs of CO2 retention (decreased LOC).
- Maintain patent IV or saline lock.
- Avoid concurrent administration of additional narcotics or sedatives without consulting MD.
- If respiratory rate falls below 10 breaths per minute, contact a physician.
- Administer supplemental oxygen and obtain arterial blood gases to verify elevated CO2 levels.
- Administer naloxone per protocol.
- Withhold additional epidural narcotic doses and review alternative pain management strategies with patient/family.

RESPIRATORY DEPRESSION: RISK FACTORS

Elderly patients (> 70 years of age)	Use of other concurrent systemic sedatives, opioids, or antiemetics
Impaired respiratory function	
Poor medical condition	Thoracic placement of epidural catheter (greater proximity to 4th ventricle)
Higher epidural doses	
Intrathecal technique	Marked changes in thoracic-abdominal pressure (e.g., mechanical ventilation)
Water-soluble narcotics (e.g., morphine)	
Residual systemic opioids	Opioid-naïve or nontolerant patients

MANAGING INEFFECTIVE ANALGESIA

- Provide breakthrough analgesia as indicated predetermined protocols and orders.
- The spread of the epidural solution can be gravity influenced. You may want to try to reposition your patient to assist in the spread of solution.
- Assess the insertion site and catheter to ensure integrity of the system. Check that equipment is functioning correctly and that all connections are intact.
- Increase infusion rate as identified on the predetermined protocols and orders.
- Optimize additional medications as ordered (such as acetaminophen or ibuprofen). Include nonpharmacological interventions such as positioning, distraction and relaxation.
- Notify anesthesia for inadequate pain management or for further orders once you have reached the maximum parameters allowed on predetermined protocols and orders.

Notify Physician Immediately for Any of the Following:

- **Decreased respiratory rate/effort**
- **Hypotension (20% decline in otherwise stable, baseline BP)**
- **Decreased level of consciousness, excessive sedation/somnolence**
- **Increased motor blockade (unexpected leg weakness, numbness)**
- **Signs of CNS toxicity (tinnitus, tremors, dizziness)**
- **Inadequate pain relief (pain score > 4 after interventions)**
- **Positional headache (especially upright), stiff neck, photophobia**
- **Drainage, pain, inflammation at epidural insertion site**
- **Temperature > 101° oral (for > 4 hrs)**
- **Persistent nausea and vomiting or pruritus**

Look for Clues of Patient Deterioration or Compromise

Safety Considerations for Epidural Infusions

INITIAL PROGRAMMING and ANY CHANGES to THE PUMP PROGRAMMING such as changes to the infusion or infusion rate are required to be independently checked by two RNs.

Most adverse events related to infusions occur due to errors in programming.

- Use non-ported, yellow tubing and a locked dedicated infusion pump. Make sure the infusion is labeled for epidural administration. Check the expiration date of the solution prior to administering.
- Assess integrity of system every shift. (Catheter clearly labeled 'Epidural', non-ported tubing, luer connection secure, anchored securely to anterior chest wall, and tape intact).
- Ensure patient is 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/or drainage.
- Do not change the dressing. This can result in inadvertent removal of the epidural catheter. Reinforce site and tubing with tape and/or transparent dressing as necessary.
- Do not give any other opioids or sedatives that have not been approved by the anesthesiologist (as identified in your area).
- Contact anesthesiologist if any anticoagulant ordered other than low molecular weight heparin (e.g. dalteparin or enoxaparin) once daily (prophylactic dosing only), or unfractionated heparin twice daily while epidural is in place.
- Maintain IV access with saline lock or continuous drip during entire epidural infusion and for:
  - ✓ 24 hours after any epidural infusion with hydromorphone or epimorphine
  - ✓ 2 hours after any epidural infusion with fentanyl
- Ensure resuscitation equipment is readily available and in working order.

Warning: Do not administer any anti-coagulants, anti-platelet medications, or aspirin products without prior approval of the Anesthesiologist.

General Guidelines; Follow Your Institutional Policies, Procedures, and Protocols

Reminder: Only acceptable DVT/PE (Deep Vein Thrombosis/Pulmonary Embolus) prophylaxis with Epidural Therapy:

- Unfractionated Heparin twice a day OR
- Once a day LMWH (Low Molecular Weight Heparin) Example: Dalteparin (5000 units or less per 24 hours) or Enoxaparin (40mg or less/24 hours) prophylactic dosing only

Discontinuing Epidural Therapy

- Patients should not be started on any anticoagulation medication such as Coumadin, IV heparin or LMWH when they have an epidural catheter without consulting an anesthesiologist. If they have received anticoagulation while an epidural is in place, notify an anesthesiologist and DO NOT REMOVE. Removal must be carefully coordinated and often includes holding a dose and/or administering Vitamin K and ensuring PTT/INR (Prothrombin Time/ International Normalized Ratio) are within normal prior to removal.
- Epidural infusions can be discontinued when the infusion has been weaned down and the patient has adequate pain control on oral analgesics.
- If recent PTT/INR available make sure INR is equal to or below 1.2 and PTT less than 40. If elevated contact an anesthesiologist, DO NOT REMOVE catheter. If no recent INR/PTT available consult with an anesthesiologist prior to removal.
- Remove epidural catheter 2 hours prior to next dose of unfractionated subcutaneous heparin.
- If patient on once a day LMWH such as Dalteparin or Enoxaparin, removal must be 22 hours after last dose (2 hours prior to the next dose of Dalteparin or Enoxaparin).

Removal of Epidural Catheter:

1. Position patient on side with knees, head and shoulders flexed (fetal position).
2. Using procedural gloves, remove dressing and tape.
3. Gently pull epidural catheter close to the insertion site, if resistance met, try repositioning patient either increasing the flexed position, or sitting up as when catheter inserted. If resistance persists, stop procedure, tape catheter in place and notify anesthesiologist.
4. Assess whether black tip of catheter is smooth, round, and intact.
5. Apply band aid to site for 24 hours.
6. Document removal.

Post Removal:

Monitor and document every 4 hrs for 24 hrs:

- Hip/dorsi/planter flexion ability
- Changes in sensation to abdomen and legs
- Presence of back pain

Report abnormal findings immediately

Patient Assessment

The goals for patients receiving epidural analgesia for pain control focus on promoting comfort and minimizing side effects related to the opioids and/or catheter placement. The assessment must include an ongoing evaluation of the patient's level of pain, vital signs, neurologic status, and catheter site.

Assessment	Data	Frequency
Pain	0–10 scale, objective indicators (e.g., increased heart rate, respiratory rate, blood pressure; pallor; nausea/vomiting)	Every 2 to 4 hours
Vital signs	Heart rate, blood pressure, respiratory rate and depth, and oxygen saturation Arterial blood gases to validate elevated CO2 levels	Hourly for duration of analgesia to validate elevated CO2 levels
Neurologic status	Level of consciousness, sensory level, motor strength, paresthesias	Hourly for duration of analgesia
Epidural catheter site	Catheter site, dressing, complications (e.g., pain on injection, post-dural headache, epidural abscess / hematoma, catheter occlusion / migration / shearing)	Every 4 hours
Narcotic-related side effects	Respiratory depression, hypotension, nausea/vomiting, pruritus, urinary retention	Every 4 hours

Pain Assessment

Begin by assessing the patient's level of pain. The most commonly used tool is the numerical pain intensity scale 0 - 10. However, pain is a subjective experience, and a rating of 7 for one patient may not be the same in another patient. The following questions will help further evaluate the effectiveness of the epidural: *What number on a 0–10 scale would you give your pain when it is the worst that it gets? When it is the least painful? At what number is the pain at an acceptable level for you?*

Pain ratings should initially be obtained every hour until the onset of analgesia and then every 2 to 4 hours throughout duration of the analgesic effect. Pain reassessment is generally recommended at 60 minutes, but with the faster onset of the epidural route, an earlier reassessment interval after dose changes may be needed. The goal for pain is a rating of less than 3 on the 10-point scale (or the patient's goal for pain relief).

Vital Sign Assessment

Monitoring of vital signs is critical. Heart rate, blood pressure, and respiratory rate should be monitored hourly for the duration of epidural analgesia. Vital signs should be monitored for 8 hours in patients receiving fentanyl/Sublimaze and for 24 hours in patients receiving morphine or epimorphine.

Also, pulse oximetry should be used to assess oxygen saturation but should not replace routine respiratory assessment because increased CO_2 levels can occur despite normal oxygen saturation numbers—especially for patients receiving supplemental oxygen. Respiratory status should be assessed every hour for the maximum duration of the first dose and then every 4 hours. Notify the MD if the respiratory rate falls below baseline or to less than 10 breaths per minute. Obtain an arterial blood gas analysis if the patient shows signs of hypoventilation to confirm elevated CO_2 levels (e.g. greater than 50 mm Hg or a gradual rise from baseline).These are considered signs of respiratory depression.

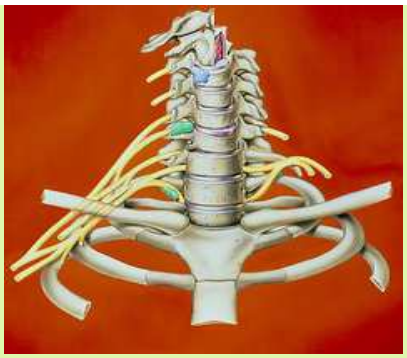
Neurologic Assessment

Neurologic assessment is the third component to monitor in the patient receiving epidural analgesia. Assessment of the patient's level of consciousness (LOC) is important because respiratory depression, a rare but life-threatening complication associated with epidural agents, ***may not be accompanied by a decrease in respiratory rate***. Vital signs and neurologic assessment should be monitored longer than the duration of analgesia if the patient experiences a change in LOC or displays other signs of respiratory depression.

SEDATION SCALE IN ASSESSING FOR SIGNS OF RESPIRATORY DEPRESSION

Sedation Level	Description
0 = No sedation	Awake and alert
1 = Mild sedation	Occasionally drowsy, easy to arouse
2 = Moderate sedation	Frequently drowsy, easy to arouse
3 = Severe sedation	Somnolent, difficult to arouse
S = Sleep	Normal sleep, easy to arouse

The second part of the neurologic assessment focuses on paresthesias. Paresthesias may be due to the contact of the epidural catheter with neural tissue. Inform the patient that the loss of sensation is expected during catheter placement and will only last a short time. If numbness or tingling persists, contact the physician for verification of catheter placement. The administration of drugs with preservatives may also cause paresthesias. If local anesthetics have been administered, assessment of motor function is important. This assessment can be monitored on a 0–4 scale:



0 = No movement

1 = Moves legs on bed

2 = Lifts legs and falls back

3 = Lifts legs and holds

4 = Normal movement

Catheter Assessment

The catheter site should be checked at least every 4 hours to verify that it is intact and there is not leakage. The site should also be assessed for signs of infection every 4 hours. Mild erythema and tenderness are considered normal because of the bruising and hopefully mild trauma during catheter insertion. Notify the MD if drainage, increasing redness or warmth, or fever is present so the catheter may be removed. In addition, assess for other neurologic signs that may indicate increased intracranial pressure or the development of meningitis, such as headache, persistently high fevers, and nuchal rigidity.

In Summary

The next page contains a summary of the potential complications. Caring for patients who receive epidural analgesia requires specialized knowledge regarding the placement of the epidural catheter, management of the therapy, and monitoring for potential side effects/complications. Thank you for completing this educational module. Healthcare professionals who actively care about safety will implement practices and coach peers and colleagues to promote quality patient care.

Management of Complications

Complication	Rationale	Intervention	Comments
Respiratory Depression	▪ Increased SEDATION is an indicator of impending respiratory compromise ▪ Increased sedation proceeds respiratory depression ▪ Use a sedation scale	▪ Assess and record sedation scale ▪ Assess rate, rhythm, and quality of respirations ▪ Ensure safety equipment at bedside ▪ If RR less than 10 and/or sedation scale greater than 2 - STOP Epidural infusion; Administer O2 ▪ If apneic, call code blue ▪ Give NALOXONE STAT ▪ Call anesthesia STAT and ▪ Continue to monitor	▪ Note: the duration of the opioid is GREATER than NALOXONE ▪ The onset of naloxone is 30 sec – 2 min and wears off in 30 min ▪ Close monitoring is essential due to the risk of re-sedation ▪ Try small, incremental doses of naloxone to reverse respiratory depression & prevent rebound pain
Nausea and Vomiting	▪ Very common side effect and most disturbing to patients	▪ Provide antiemetic promptly and regularly ▪ If attempts to control N/V are unresolved, contact anesthesia	▪ Less N/V with epidural administration ▪ Nausea can be as distressing as pain
Pruritus	▪ Local or generalized itching due to opioids release of mast cell histamine	▪ Orders to initiate treatment are found on order sets	▪ Assess your patient for itching and if it is disturbing, initiate treatment
Urinary Retention	▪ Opioids increase smooth muscle tone	▪ Assess for urinary retention ▪ Perform straight catheter PRN	
Decreased gastric Motility (constipation)	▪ Opioids delay gastric emptying, slow bowel emptying and decrease peristalsis	▪ Assess and record bowel movements ▪ Assess for bowel sounds ▪ Provide bowel protocol	▪ Most common opioid side effect ▪ Can progress to severe GI dysfunction (ileus, fecal impaction, obstruction

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