Peri- Operative Pain Management: Indications for Local and Regional Anesthesia and Post-Operative Analgesia

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Pain Management
A Historical Perspective

- In the early 1990's The demand for more effective control of acute post-operative pain was driven by the demand for decreased LOS by third party insurers.
- Today we continue to have the challenges of :
  - Further Decreasing the LOS within the hospital setting
  - Performing more outpatient procedures
  - Developing improved medications and pain management procedures that fall within all the federally controlled guidelines of best practice.

Anesthesia vs Analgesia

- Anesthesia – blocks
  - A reversible condition that is induced using anesthetic drugs which create the absence of physical sensation in part or all of the body.
- Analgesia – modifies
  - The lack of sensibility to pain which can be induced using medications, not affecting consciousness.

Role of CRNA, RN, and LPN in Spinal Medication Administration and Peripheral Nerve Blockade

- **CRNA** -may insert, advance, reposition and discontinue epidural and intrathecal catheters as well as monitor and administer anesthetic and anlagesic doses of medications.

- **Staff RN-** may administer medication for analgesia per the interspinal and peripheral nerve route, as well as D/C the catheter under MD orders. This is not within the scope of practice for LPNs

- **KBN Opinion Statement – Reviewed 2/2005**

- **LPNs** may only assist with monitoring patients with an Epidural catheter
  - May be assigned to care for patients with a peripheral block catheter and/or a PCA pump

Types of Anesthesia and Analgesia

- **General** – affects sensation and consciousness
- ***Local**– affects sensation in tissue or nerve specific areas injected with anesthetic and analgesic medications.
- ***Regional** – use of local anesthetics to temporarily block pain information to the brain for large areas with some motor nerve affect.
  - Peripheral Nerve blocks
  - Central or Neuraxial Block – Spinal or Epidural

Most Common Drugs used for Peripheral, Epidural and Intrathecal Anesthesia

- Lidocaine – medium potency used as a local or topical anesthetic. Its dilatation affects makes it rapidly absorbed and affect on sensation is almost immediate. Contraindicated in cases where hypotension would be adverse.
- Bupivicaine – High potency anesthetic with long duration. Blocks sensory more than motor function of nerves
- Ropivicaine – High potency anesthetic similar to Bupivicaine but less cardio-toxic. Less motor affect than Bupivicaine.

Anesthetic and Analgesic Dosing Recommendations (doses based on age and kg.)

Anesthetic Drugs	Onset / Duration	Peripheral Dosing	Epidural
Lidocaine 0.5% w Epinephrine	(Immediate/60-120min. Analgesic duration – 2-5 hrs)	5ml –mixed with Ropivicaine	Duramorph 0.1mg/ml may be added to the below mixtures for epidural
Bupivicaine 0.5%(**5mg/1ml**) (Marcaine)	15-20 min/2-4hrs Analgesic duration-10-18 hrs	25ml. bolus Cont. Infusion-0.25% /8ml/hr.	Cont. Infusion 0.75% Bupivicaine 0.625 mg/ml (6-8ml/hr)
Ropivicaine 0.5%(5mg/1ml)	15-20min./4-5hrs Analgesic duration-12-16 hrs.	25ml. Bolus w Lidocaine (5ml) Cont. Infusion-0.25% /8ml/hr	Cont. Infusion 0.75% Bupivicaine 0.625 mg/ml (6-8ml/hr)

Benefits of Peripheral Nerve Blocks and Epidural Anesthesia

- Excellent surgical anesthesia
- Extended post-operative analgesia
- Decreased incidence of post-operative nausea and vomitting (except with epidural analgesia utilizing narcotics).
- Decreased use of narcotics and sedatives.
- Maintains optimal respiratory status in most cases
- Shortened length of stay in the Outpatient and In-patient setting
- Physical therapy can be initiated earlier with good comfort control.
- Excellent alternative for patients having multiple medical conditions where General Anesthesia is contraindicated

Peripheral Nerve Blockade

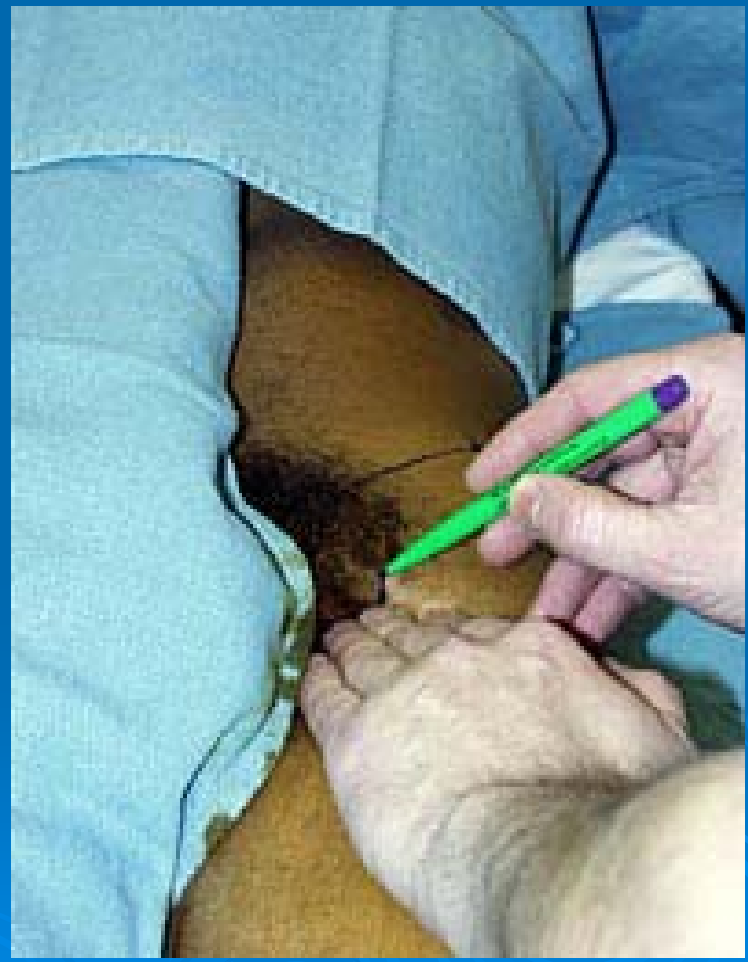
- Femoral
- Popliteal – intertendinous approach
- Interscalene – at interscalene groove

Special Considerations

- Strict aseptic technique
- Sedation for induction of regional anesthetics
- Localization of nerve with use of the nerve stimulator.
- Muscle twitches should be consistent with innervation.
- Do not use epinephrine near sciatic nerve due to its limited blood supply
- Prevention of intravascular infusion of anesthetic agents
  - Inject smaller doses of local anesthetic and aspirate for blood return during injection to confirm needle placement.
- Shock sensation denotes intraneuronal position, withdraw slightly .
- Continuous infusion
- Do not inject if resistance is met or patient complains of pain or paresthesia.

Femoral Nerve Catheter Placement

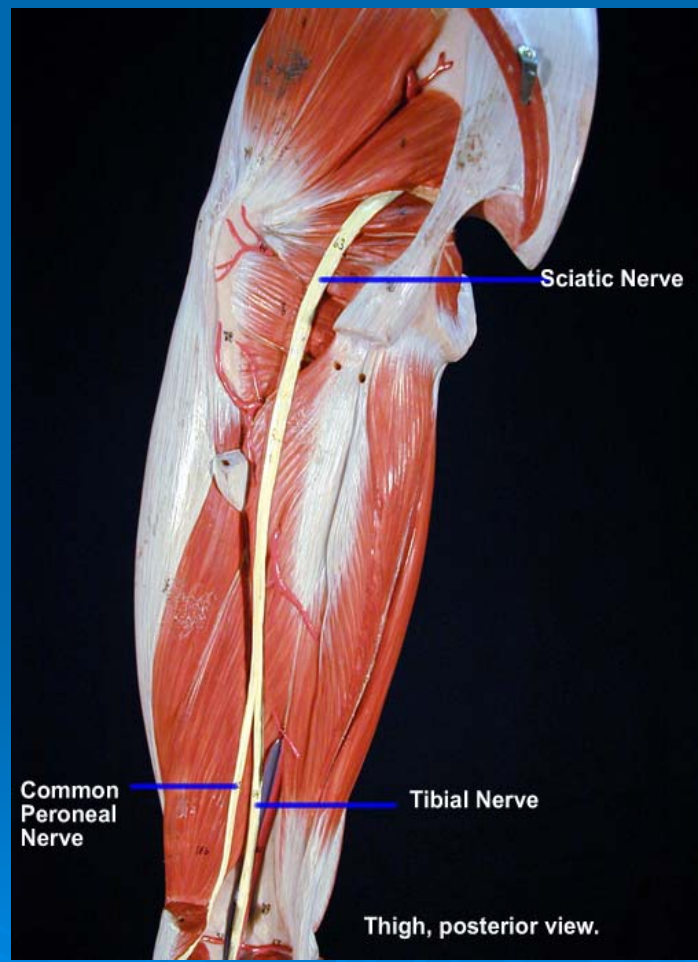
- **Indications**
  - Total knee Arthroplasty
  - Skin grafting
  - Lower leg surgeries
- **Localizing Femoral Nerve**
  - Rhythmic twitching of patella
- **Continuous Infusion Catheter**
  - **Green label** applied to tubing

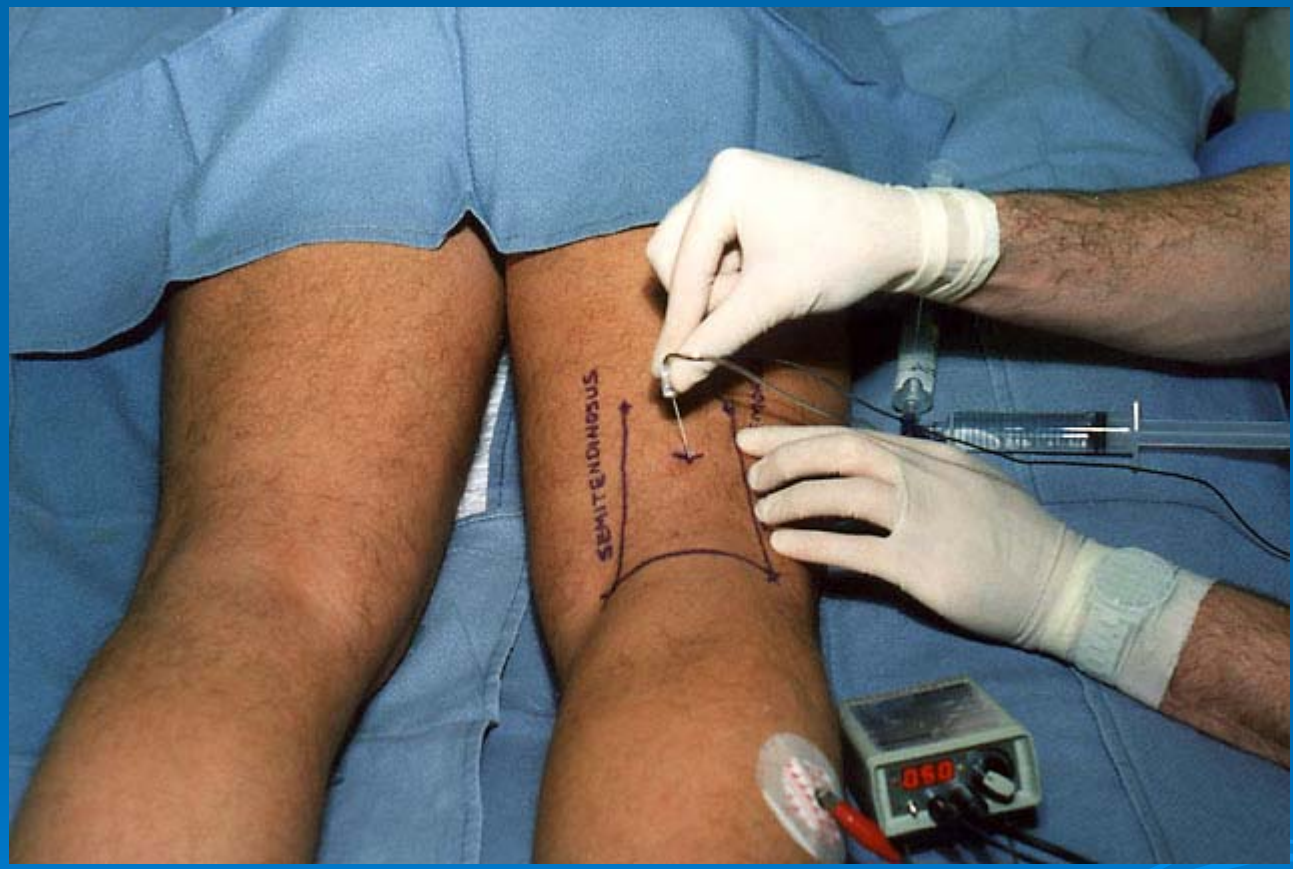


Nerve Stimulation

Popliteal Nerve Block - Intertendinous

- **Indications**
  - **Total Knee Arthroplasty**
  - **Ankle and Foot Procedures**
- **Localizing the nerve**
  - **Rhythmic plantar or dorsi-flexion of foot and/or toes**

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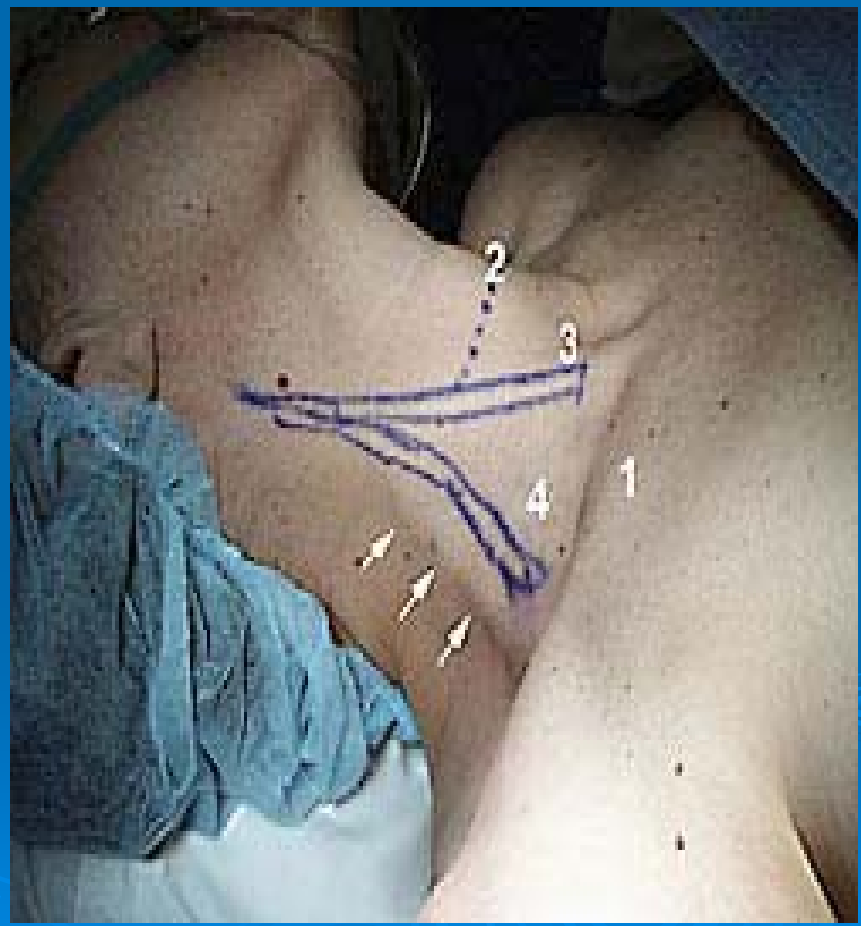
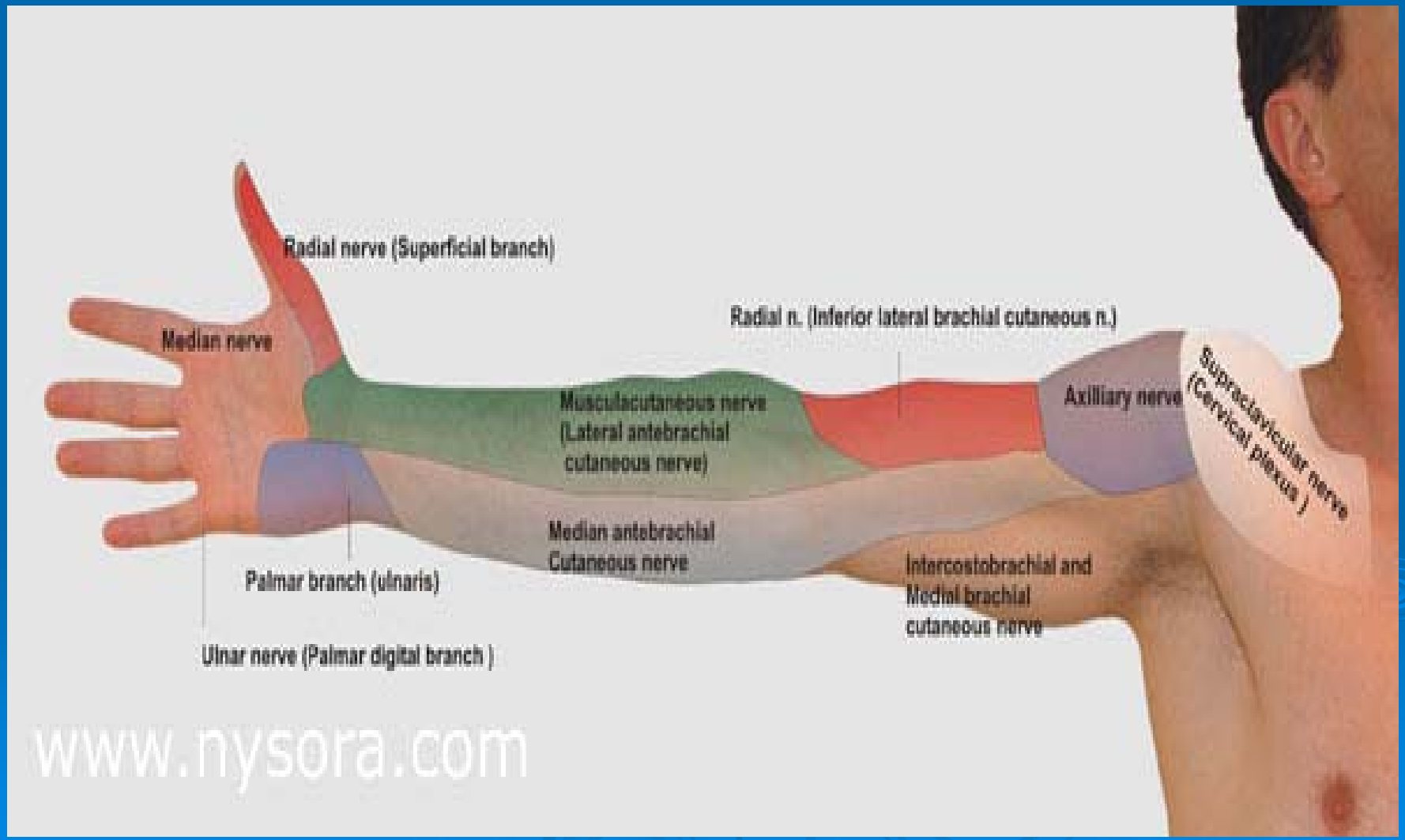
Interscalene Block – Interscalene Groove

- **Indications**
  - **Total Shoulder Arthroplasty**
  - **Rotator Cuff**
  - **Clavicle Surgery**
- Localization of Brachial Plexus
  - **Twitch noted at - Deltoid, arm, forearm**



Interscalene Block/ Brachial Plexus



Potential Complications

- Infection
- Hematoma
- Vascular Puncture*
- Local Anesthetic Toxicity* – usually immediate
- Nerve Injury – paresthesias continue
- Horner's Syndrome – Interscalene block
- Diaphragmatic Paralysis – Interscalene block

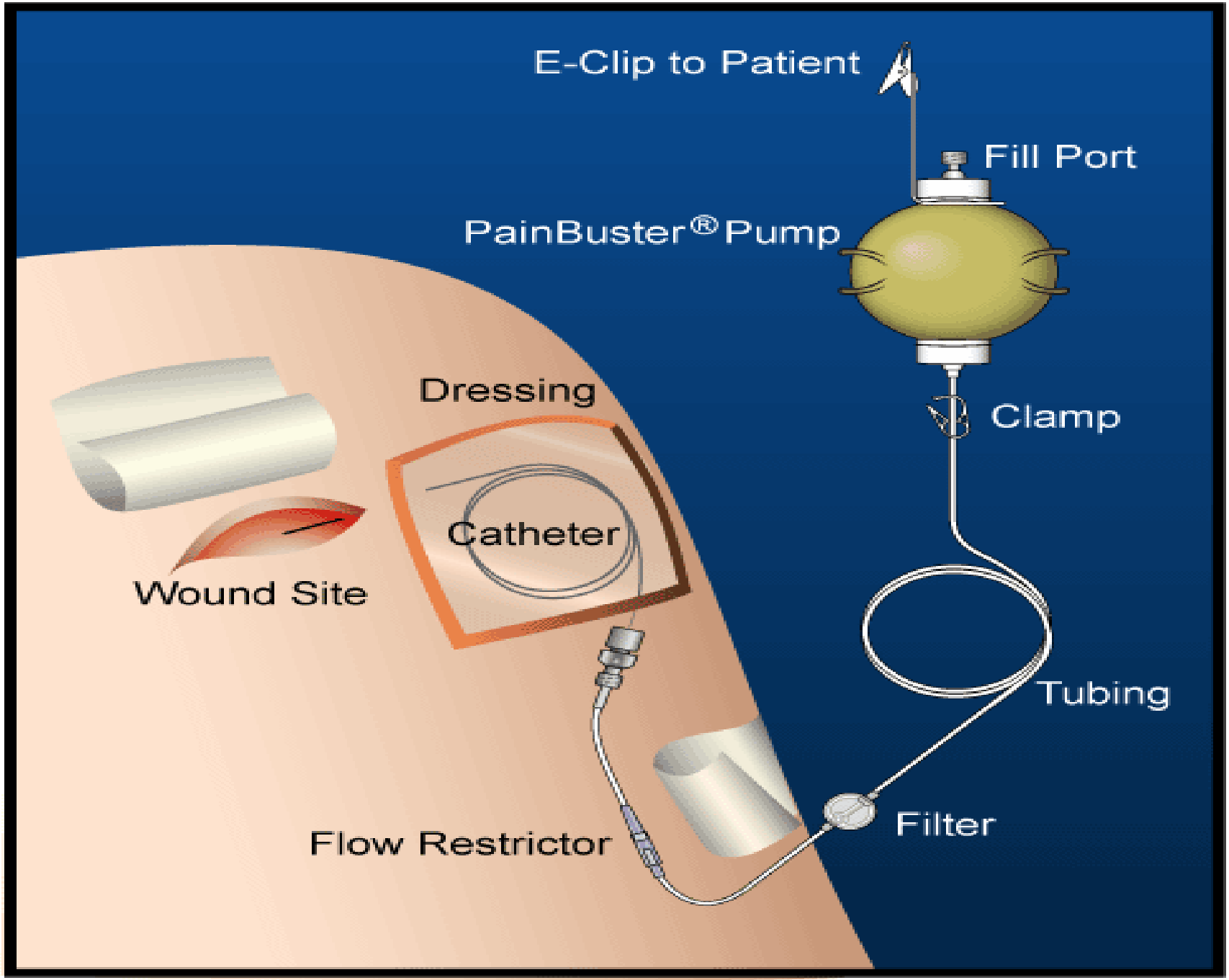
Peripheral Block Protocol

- Assess ,Report and Document
  - **Time and amount of Anesthetic block**
    - Solution rates on MAR
  - **Catheter site labeled – green label**
    - Observation for leakage, disconnect or hematoma formation
  - **Pain control level- NN, Pain section**
  - **Motor sensory function**
- Patient Education
  - **Procedure and side effects**
  - **Protection of extremity till return of function**
  - **Pt. responsibility to report concerns and unusual signs and symptoms**

What's New!!

On-Q Pain Buster –

- Elastometric Infusion Pump – single use item
- Types of Surgeries –
  - Cardio-thoracic
  - General Abdominal
  - C-sections
  - Orthopedic
- Benefits –
  - Decreased need for opioids and side effects
  - Earlier extubation and ambulation
  - Decreased length of stay
  - Patients verbalized pain control


E-Clip to Patient
Fill Port
PainBuster® Pump
Dressing
Clamp
Catheter
Wound Site
Tubing
Filter
Flow Restrictor

Physician's Orders

- Key points to assess and manage:
  - Catheters are placed in the OR
  - Assess pain and administer post-op meds as ordered
  - White tubing clamps should be open
  - Check for kinks in tubing
  - Flow restrictor should be taped to the body and away from any cooling or heating devices
  - Make sure no tape is over the filter
- Pump is filled in Pharmacy
- Pump selection:
  - PMO25 – 300ml volume
    - Flow rate– 4mlx72hrs
  - PMO12 – 125ml volume
    - Flow rate- 2mlx60hrs
- Med selection:
  - Lidocaine 1%
  - Bupivicaine
    - 0.25% or 0.5%

Physician's Orders

- Key points to assess and manage:
  - Catheters are placed in the OR
  - Assess pain and administer post-op meds as ordered
  - White tubing clamps should be open
  - Check for kinks in tubing
  - Flow restrictor should be taped to the body and away from any cooling or heating devices
  - Make sure no tape is over the filter
  - Medication label should be attached to tubing
  - Clear dressing should be clean dry and intact.
- Med selection: (Filled in the Pharmacy)
  - Lidocaine 1%
  - Bupivicaine
    - 0.25% or 0.5%

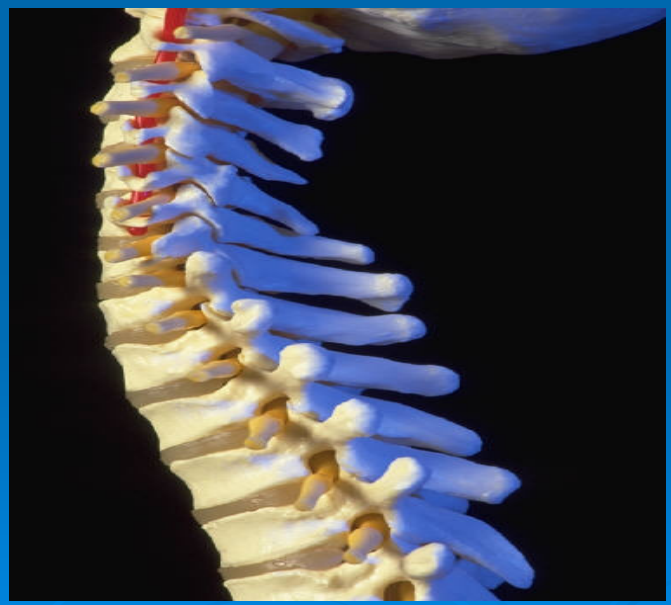
Documentation

- **Assess**
  - **Adequate pain relief**
  - **Incision and catheter site for ;**
    - **Redness, swelling, tenderness**
    - **Leakage of anesthetic or discharge**
- Report
  - **All of previous**
  - **Patient symptomatic for allergic or toxic reaction:**
    - **Hypotension, Palpitations, Bradycardia**
    - **Seizure activity**
    - **Restlessness**
    - **Itching,nausea or vomitting**

Catheter Removal

- An RN may remove the catheter with an MD order.
- Remove site dressing and loosen adhesive skin closure strips.
- Grasp catheter close to the skin and gently pull.
- There should be no pain and no resistance.
- Do not forcefully remove the catheter.
- Make sure the black marking at the distal end of the catheter is present upon removaland document on MAR and Nurses Notes.
- Redress site.

Intrathecal and Epidural Anesthesia and Analgesia



Administration of Spinal Anesthesia/Analgesia

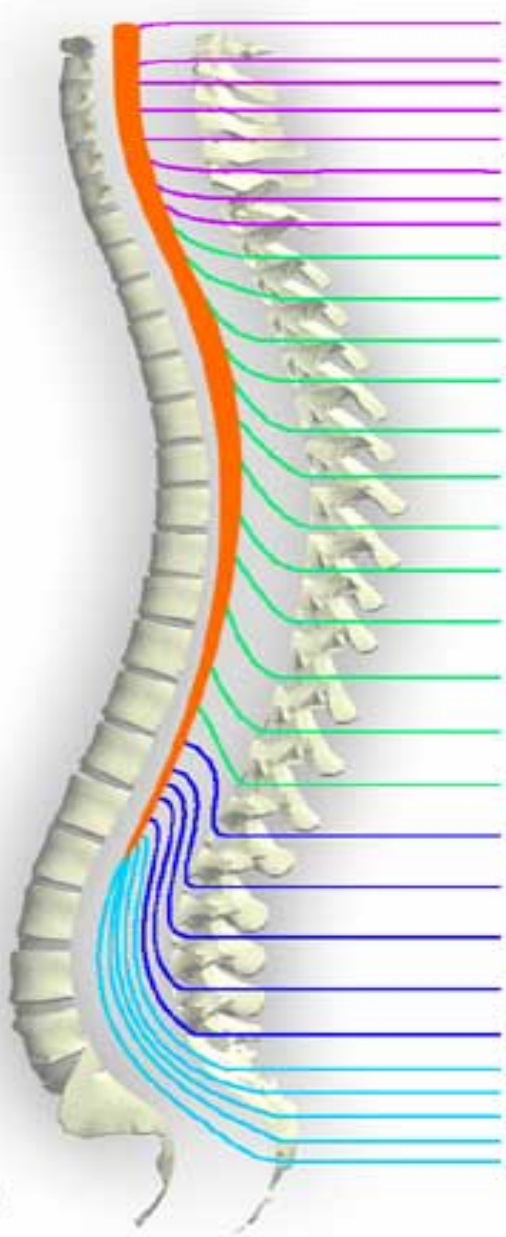
- Temporary Catheter Epidural
- Permanent Tunneled Catheter Epidural
- One time intra-operative injection Epidural or Intrathecal
  - Injection (ongoing – Pain Clinic Setting)

Benefits of Intrathecal and Epidural Drug Administration

- Especially beneficial for patients with cardiac or respiratory disease because it lessens adverse effects:
  - cardiovascular and respiratory depression
  - incompetent airway, difficult intubation
  - inadequate ventilatory drive
  - pulmonary diseases
- Shorter Recovery Time
- Minimal drug exposure
- Reduced Blood Loss
- Continued Post-operative analgesia

Surgical Case Preference for Spinal Anesthesia Administration

- Spinal anesthesia is achieved by a single injection of local anesthetic to create sensory, motor, and autonomic blockage of the nerve roots and spinal cord
- Indicated for surgical procedures below the diaphragm
  - Thoracic and Upper Abdominal – T6-T12
- Indicated for surgical procedures – L3-L4
  - Genitourinary - Prostatectomy
  - Orthopedic – TJR, knee arthroscopy
  - Vascular
  - Obstetric and Gynecological



Bone notch at the base of the neck is C7.

Cervical spinal nerve roots C1 - C7 correspond with upper aspects of vertebral bodies.

Sensation of C7 nerve is for the middle finger.

C8 and lower spinal nerve roots leave below the corresponding vertebral body.

Sensation of T4 spinal nerve is approximately level with the nipple line.

Sensation of T6 spinal nerve root is approximately level with the bottom of the sternum.

Sensation of T10 spinal nerve root is approximately level with the abdomen.

Sensation of T12 spinal nerve root is approximately level with the pubic bone.

The spinal cord ends approximately between L1 & L2.

Sacral cord segments (S1-S5 "Cauda Equina") are level with T12-L1 Vertebrae.

The sensations of lumbar nerves are over the legs.

The sacral vertebrae are fused to make up the sacrum.

Sensation of S3,S4 & S5 nerves is the Perineal (genital) area.

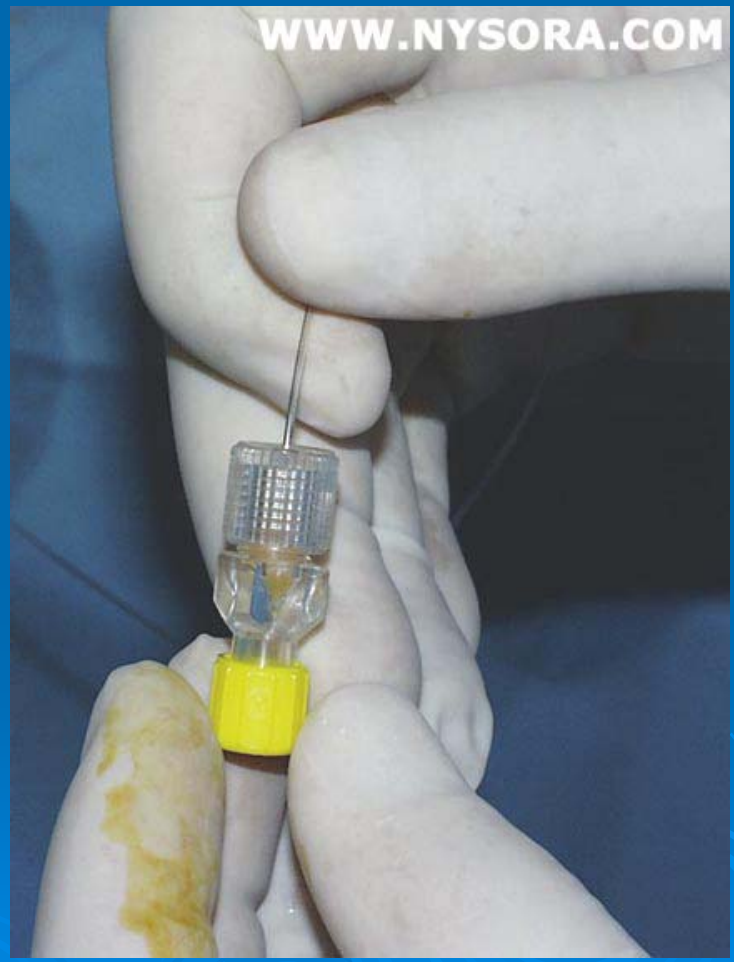
The coccygeal vertebrae are fused to make the coccyx or "tail bone".

Contraindications

- Coagulation problems
  - **Risk for Hematoma- Compression of Spinal Nerves or Cord**
    - Neurological deficits or Permanent Paralysis
    - Anticoagulant RX per protocol for Heparin SQ
- Infection
- Allergy to the anesthetic agent
- Increased Intra-Cranial Pressure
- Acute neurologic disease
- Scoliosis and neural tube abnormalities
- Hypovolemia - Severe hypotension (trauma)

Labeling and Securing Connections

- All connections should be securely taped
- Epidural catheter and tubing should be labeled with a yellow Epidural label as well as:
  - **Chart**
  - **Patient room**
  - **Head of Patient bed**
  - **CADD Pump**

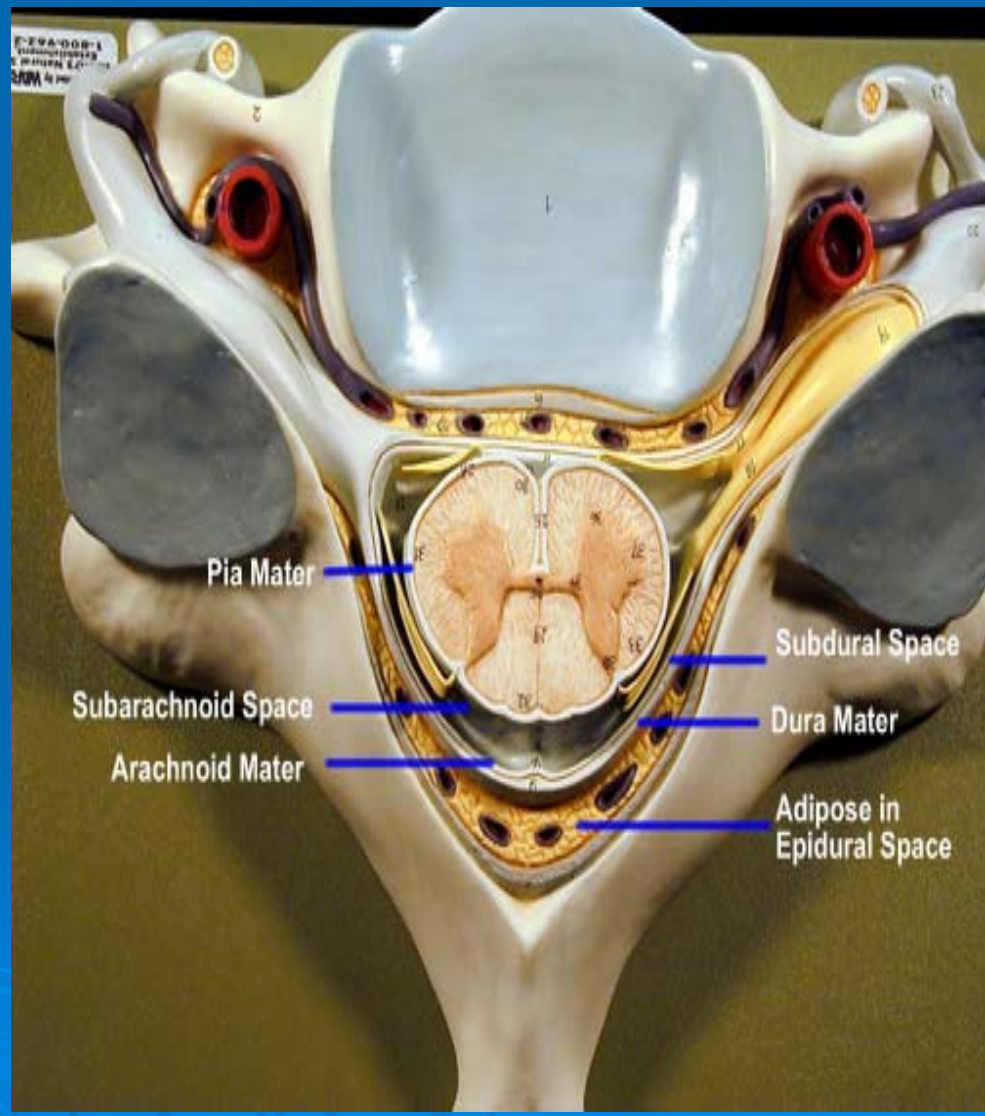


Epidural Catheter Complications

- Malposition
- Shearing
- Kinks
- Leaks
- Clot
- Displacement, Accidental DC is common
- Anatomical Abnormality (i.e. scoliosis)

Epidural Space

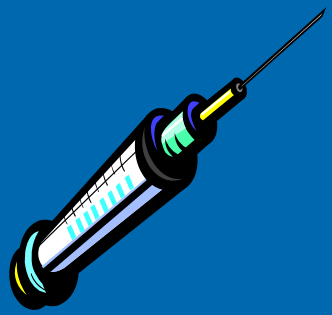
- Epidural Space
- Potential space (reservoir) for 70 ml. in Adults
- Space is made up of fat and veins
- Insertion site is approximately:
  - L-3 or below for abdominal and lower extremity surgeries
  - T6-T12 for thoracic and AAA surgeries
- Water Soluble and Fat Soluble drugs may be given per epidural route
- #1 Drug Choice is Duramorph (Hydrophyllic/Water)
- #2 Drug Choice is Fentanyl
- (Lipophyllic/Fat)

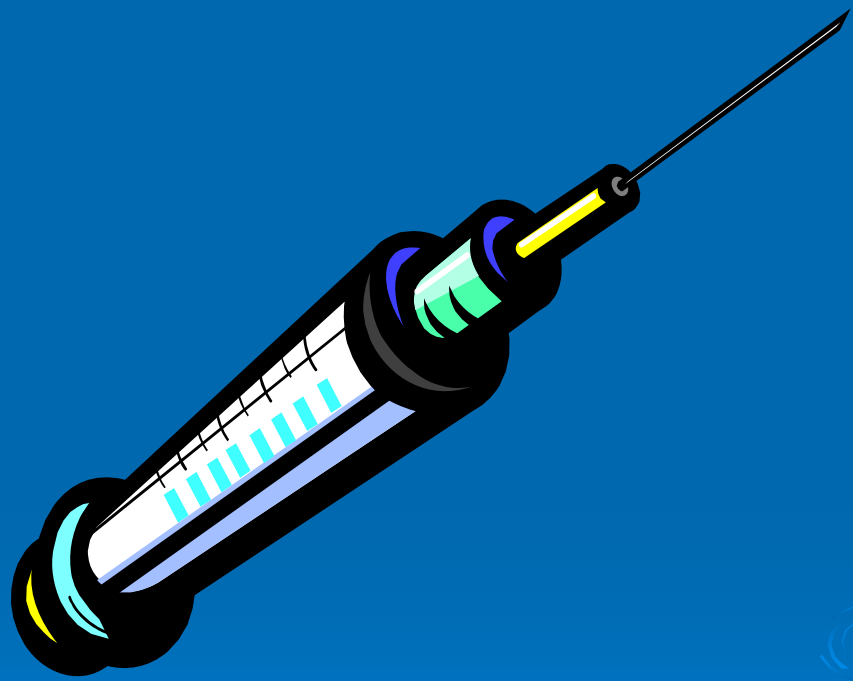


Intrathecal Space Anesthesia and Analgesia

- **Intrathecal Space** (subarachnoid space)
- “Spinal Anesthetic”
- Actual space surrounding the spinal cord.
- Contains approximately 170 ml.of CSF.
- Injection site should be at or below L3 to avoid contact with the spinal cord.
- Duramorph or Fentanyl, and Local Anesthetic injected into CSF intraoperatively
- Rapid absorption, shorter duration
- Post-op complications would be observed quicker

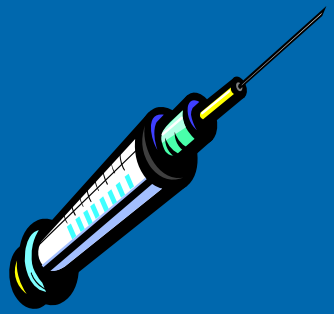
Medication Choices and Dosing Differences





- Intrathecal drugs come into DIRECT contact with the spinal cord so a fraction of the epidural dose is needed (10X Less)
- Intrathecal <10X < Epidural < IV PCA < 10X

Medication Choices and Dosing Differences



- Intrathecal drugs come into DIRECT contact with the spinal cord so a fraction of the epidural dose is needed (10X Less)
- Intrathecal dosing <10X of Epidural
- Epidural dosing < 10x IV PCA

- Fentanyl –
  - Lipophilic (fat soluble)
  - Penetrates duramater faster
  - Immediate pain control (fast onset and short duration)
- Duramorph – preservative free Morphine
  - Hydophilic (water soluble)
  - Prolonged analgesia
  - Slower onset, longer duration – 12-24 hrs

Anesthetic and Analgesic Dosing

Name of Drug	Dose	Onset	Duration
Lidocaine 2%	**7-10ml**	**5-15 min.**	**2-5hrs**
Tetracaine	**MD dependent**	**15-30 min.**	**3-6 hrs**
Bupivicaine 0.5% (Marcaine) (5mgm/1ml)	**0.3 - 0.4mgm (intrathecal)** **6 -12 mgm (epidural)**	**Immediate** **20-30 min**	**2-3hrs** **4-6hrs**
Fentanyl *Cont. Infusion	**MD preference** ***10mcg/1 ml (100mlNS)**	**2-5 min.**	**15-18hrs**
Duramorph *Cont. Infusion *10mgm/100ml NS	**(Intrathecal)0.1mgm (epidural) 4-6mgm T6-T12(epidural 6-8mgm L2-L4**	**5-10 min.** **30 min.**	**18-24 hrs** **resp. arrest/ depression**

Potential Problems of Epidural and Intrathecal Analgesia

Most common

- *Decreased Breathing
- *Urinary Retention
- *Itching (Pruritis)
- *N / V
- *Urinary Retention

Less Common

- **Allergic Reaction**
- **Hypotension**
- **Break Through Pain**
- **Altered LOC**
- **Altered Motor and Sensory**
- **Hematoma – Emergent**
  - **Sudden incontinence of Bowel or Bladder when no previous history and after complete return of motor/sensory function**
- **Catheter Complications**
- **Infection**
- **Spinal Headache**
- **c/o needle placement**

Spinal Headache

- A leak of CSF through a dural tear. Symptoms may occur 6-12 hours to the second post-op day.
- Symptoms are continuous, throbbing, moderate to severe pain in frontal or occipital region, tinnitis, double vision, nausea, photophobia
- Keep supine, large amounts of oral and IV fluids, analgesia as needed - Elevating HOB and light will increase HA pain
- Anesthesia may perform an **autologous Blood Patch** with 10-20 ml., if no relief within 24 hrs.

Epidural Narcan Protocol

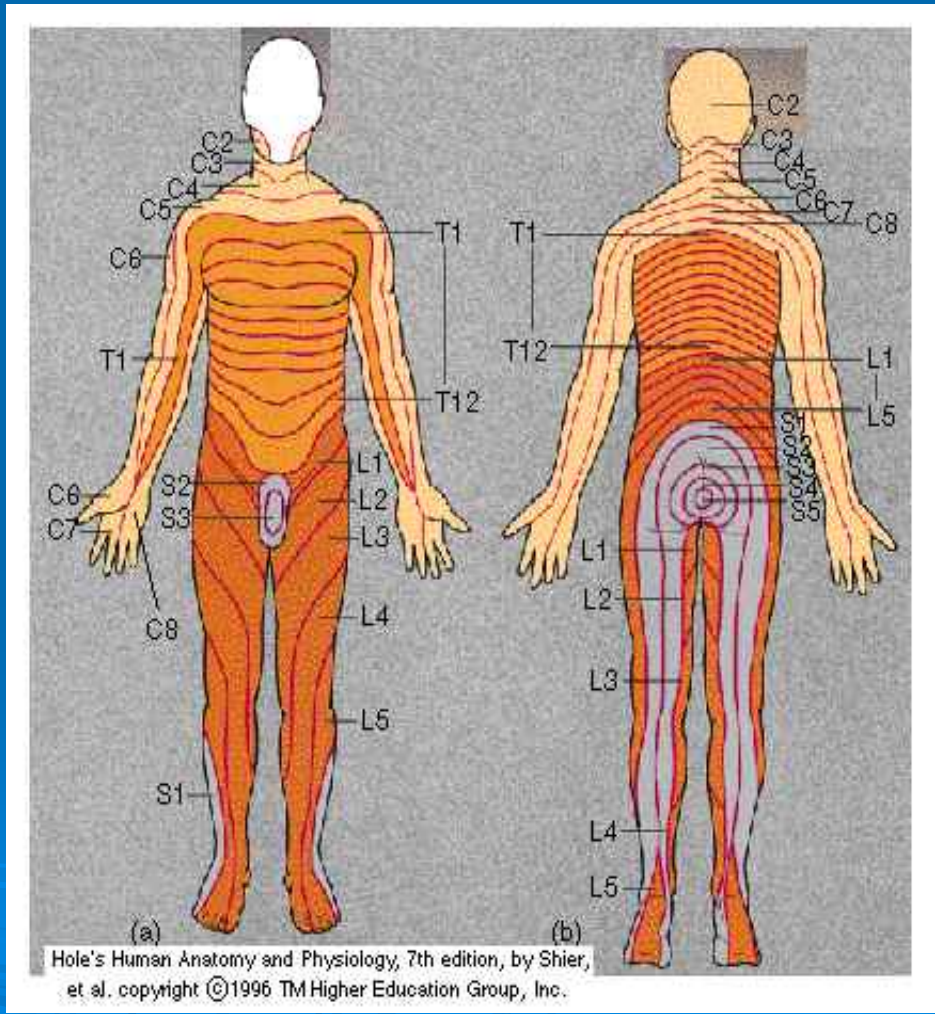
- **Notify anesthesia if respiratory rate < 10 or airway obstruction**
- **Continuous SaO2 monitoring >90% saturation**
- **Narcan Infusion:**
  - **Narcan 2 mg/250ml LR at 25ml/hr**
- **Itching:**
  - **Narcan 0.2mg IM every 4hrs prn**

Altered Motor Sensory Function

- Usually a local anesthetic agent may be given (Bupivicaine, Marcaine)
- A low dose anesthetic agent used for analgesia may produce mild tingling or dullness.
- Spinal anesthesia will result in loss of motor sensory function. Motor function will return first. Patient will detect light touch and pressure before temperature and pain. Anesthesia moves from large muscle groups to the fine muscle groups and may be uneven.
- Patients should not experience any change in LOC, they should be oriented, easy to arouse, and alert

Assessment of Dermatomes (Spinal Level)

- Common Landmarks
  - **T4 – nipple line**
  - **T6 – xiphoid process**
  - **T10 – umbilicus**
  - **L1 - hip**
  - **L2 and L3 – thigh**
  - **L4 and L5 – calf**
  - **S1 - toes**



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Assess, Report and Document

- **Note time of initial epidural injection**
- **Assess Q 4 hrs and prn:**
  - Quality of Pain (relieving and aggravating factors)
  - Sedation Scale / GU dcale
  - Assess for respiratory depression q. 1 hr.-
    - rate maintained > 10 / min.
  - Continuous pulse oximetry > 90%
  - Dermatome level
  - Integrity of infusion- observe for leaking, kinks, yellow labels
- **Two RNs verify correct CADD Pump settings (qs) and changes**
  - Temporary Catheter infusion dressing that are damp may be reinforced
  - Maintain IV Access/patency up to 24 hrs after catheter d/c'd
- **RN assignment** – catheter may be d/c'd with MD order by certified RN

Physician Orders - Anesthesiology

- Any deviation from the orders must be approved by the anesthesiologist
- Pain Management Orders may be initiated 4hrs after epidural catheter is D/C
- Notify the Anesthesiologist immediately
  - If inadequate pain relief – obtain order for clinician activated bolus
  - Change in responsiveness
  - Respirations of 10 or less (or airway obstruction)
    - –start O2 Give Narcan per orders.
  - Numbness or tingling or difficult ambulation
    - OOB with assistance for 48hrs.
    - Loss of bowel or bladder function
- Except for subcut. Heparin, RN must call anesthesiologist before starting any anticoagulant therapy.
  - Sucutaneous Heparin therapy may be initiated 4 hrs after the insertion of the epidural catheter.
  - When receiving Heparin therapy the epidural catheter must be d/c'd 1hr. Prior to the next Heparin dose. (Lowest blood level of the anticoagulant)

Discontinuation of Catheter

- Place patient in LP Position
- Stop pump and clamp catheter (Epidural space sub-atmospheric and will withdraw medication from cassette)
- Remove dressing
- Gently pull, if resistance felt, increase LP position, do not force! Notify Anesthesia if catheter is stuck
- Apply bandaid
- Document observation of dark cath tip – MAR,NN

Permanent Epidural Nursing Care

- Monitor cath sites Q day for redness, swelling, purulent drainage, warmth
- Maintain sterile technique for drug administration, clean technique for site care of permanent epidural catheter
- Monitor temp Q 4hrs. and WBC Count
- Ensure closed, sterile system
- Filter Change for Permanent Cath Q 48 Hours or more frequently as needed – High pressure alarm

Permanent Epidural Catheter Patency

- No flushing of catheter is needed due to sub-atmospheric pressure, drug is drawn in
- No alcohol due to neurotoxicity, use betadine for all purposes of care, including injection port cleaning
- Filter changes every 48 hrs.
  - may need to be changed prior to 48 hours if occlusion suspected

Bolus Injection into Permanent Epidural Catheter by RN

- Position Patient into LP Position to open intervertebral spaces
- Explain to patient that the sensation of water running down back is normal
- Slow the infusion over 1-2 minutes if burning is noted on injection
- If the catheter is not being used, flush once per week with 3 cc PRESERVATIVE FREE NS

Pain Management

- Assess Pain Scale minimum Q4
- First, Manage the patient's PAIN, not the Catheter or Infusion Pump!
- Teach the patient to use the Pain Scale 1-10
- Typical starting dose is 4-6 ml/hr basal rate and 2 ml Q20 minutes PCA dose
- Typical adult ***effective*** rate is 6-10ml/hr basal rate

Common Nursing Mismanagement

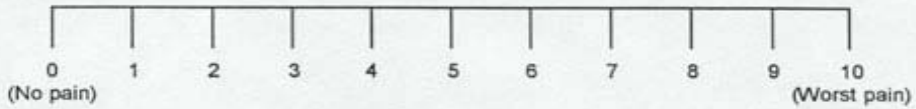
- Patient and Family education is key to them being effective partners in the pain management process (pain management by “Proxy”)
- Nursing judgment and bias prevents effective pain management for individual patient needs
- Anesthesia is often not called to make dosing changes due to nurse fear or lack of knowledge
- Lack of comfort with pump functions

Scripting for Patient and Family

- "….this pump is programmed for the patient to safely control the administration of pain medicine as he/she needs it.
- "One of the safety features is that as long as the patient is controlling the doses, they should not be able to overdose themselves. If you think the patient is experiencing more pain than usual or you believe they are not giving themselves enough doses,please do not touch the pump! Notify the nurse."

PAIN ASSESSMENT SCALES

0 - 10 Numeric Scale*



Wong - Baker FACES Pain Rating Scale

0	2.5	5	7.5	10
No Hurt	Hurts Little Bit	Hurts Even More	Hurts Whole Lot	Hurts Worst

Medical professionals please note:

Explain to the person that each face is for a person who feels happy because he has no pain (hurt) or sad because he has some or a lot of pain. Ask the person to choose the face that best describes how he or she is feeling. Rating scale is recommended for persons age 3 years and older and for cognitively impaired patients

Other Pain Assessment Information

Adjectives that may be used to describe pain:

aching
burning
cramping
crushing
dull
excruitiating
generalized
gnawing
guarding
heavy
mild
moderate
pressure
radiating
severe
sharp
sore
spasm
stabbing
stinging
throbbing
tightening
tingling
constant
intermittent
occasional
persistent

Pain Assessment Behavioral Scale (PABS)

Observation	Value = 0	Value = 1	Value = 2	Scores
Face	Face muscles relaxed	Facial muscle tension, frown, grimace	Frequent to constant frown, clenched jaw	Face Score:
Restlessness	Quiet, relaxed appearance, normal movement	Occasional restless movement, shifting position	Frequent restless movement may include extremities or head	Restlessness Score:
Muscle tone	Normal Relaxed	Increased tone, flexion of fingers and toes	Rigid Tone	Muscle Tone Score:
Vocalization	No abnormal sounds	Occasional moans, cries, whimpers or grunts	Frequent or continuous moans, cries, whimpers or grunts	Vocalization Score:
Consolability	Content , relaxed	Reassured by talk or touch, distractible	Difficult to comfort by touch or talk	Consolability Score:

Peripheral Nerve Block vs Epidural Analgesia Complications (**common to both)

Peripheral Nerve Block

- **Infection
- **Hematoma -
- **Vascular Puncture*
- **Local Anesthetic Toxicity usually immediate (allergy)
- **Nerve Injury – paresthesias continue
- **Failed block
- **Interscalene block**
  - Horner's Syndrome –
  - Diaphragmatic Paralysis

Epidural / Intrathecal

- Decreased Breathing
- Hypotension
- Urinary retention
- Itching (Pruritis)
- N / V
- Altered LOC
- Break through pain
- Altered Motor and Sensory
- Incontinence of Bowel or Bladder
- Catheter Complications
- Spinal Headache