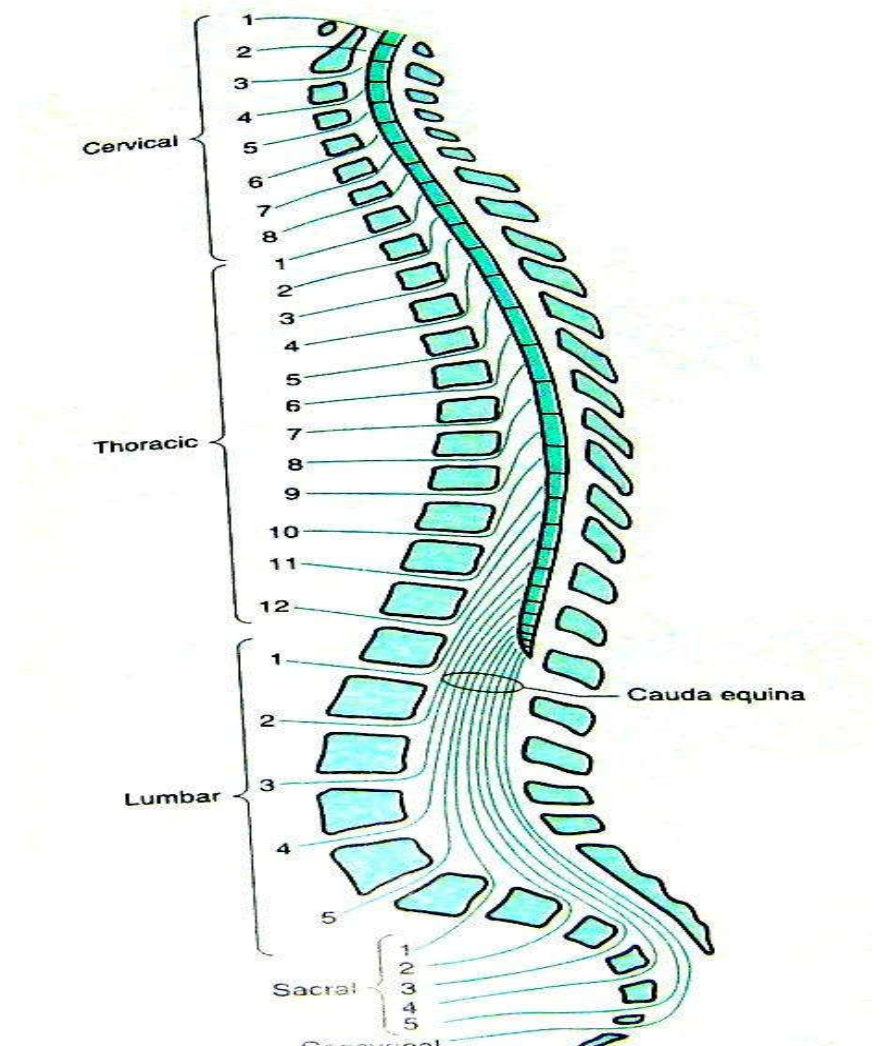


Regional aneesthesia

- Presented by:
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تركت فيكم شيئين
لن تضلوا بعدهما

قال تعالى

يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ

الآية (١١) من سورة المجادلة

كتاب الله وسنتي

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Objective

Definition

Types

Advantages and disadvantages of each method

Indications and Contra-indications of each method

Identify equipment and preparation of patients

How to perform spinal or epidural anesthesia

Complications of regional anesthesia

Definition of regional anaesthesia

- Local anesthetic applied around a peripheral nerve at any point along the length of the nerve (from spinal cord)-reducing or preventing impulse transmission
- No CNS depression; patient conscious

Types of regional block

- I-Neuroaxial blocks include:
 - Subarachnoid block
 - Epidural block
 - Caudal block
- II-Peripheral nerve blocks

BILL ABBOY

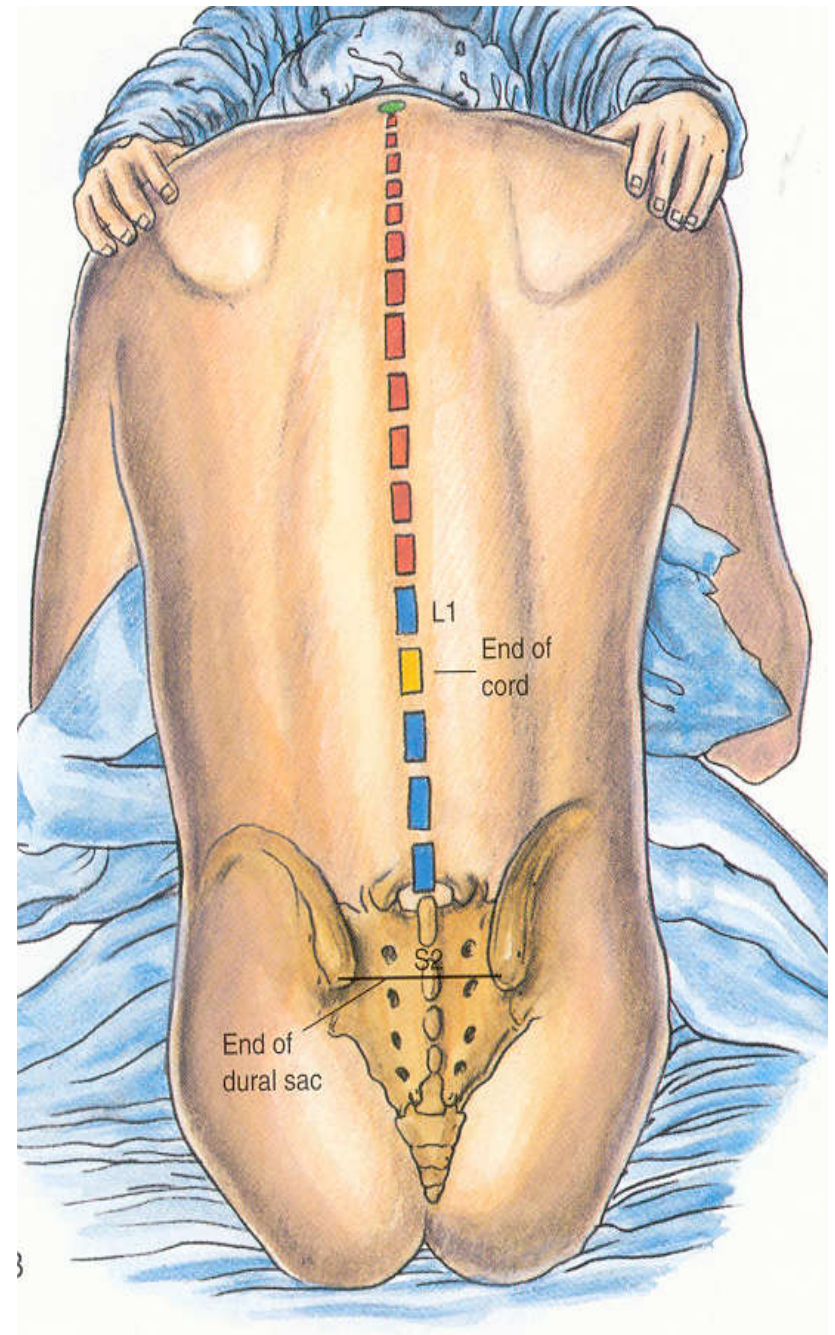
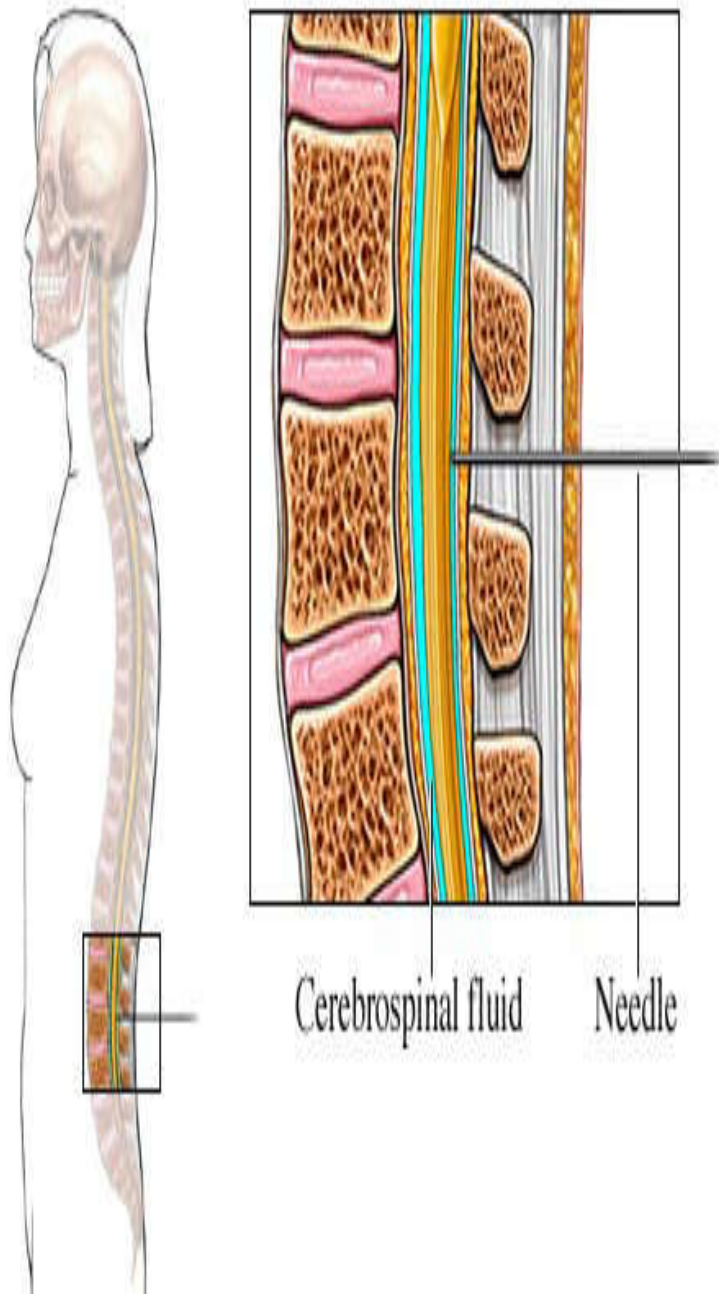


“...and this is Ralph, your anesthesiologist.”

Definition

Spinal anesthesia :

is the injection of small amounts of local anaesthetics into the (CSF) at the level below (L2) ,where the spinal cord ends , anesthesia of the lower body part below the umbilicus is achieved.



Advantages of spinal anesthesia (SPA)

1. **Cost.** The costs associated with SPA are minimal.
2. **Patient satisfaction.** the majority of patients are very happy with this technique.
3. **Respiratory disease.** SPA produces few adverse effects on the respiratory system as long as unduly high blocks are avoided.
4. **Patent airway.** As control of the airway is not compromised, there is a reduced risk of airway obstruction or the aspiration of gastric contents.



5. Diabetic patients. There is little risk of unrecognised hypoglycaemia in an awake patient.

6. Muscle relaxation. SPA provides excellent muscle relaxation for lower abdominal and lower limb surgery.

7. Bleeding. Blood loss during operation is less than when the same operation is done under general anaesthesia.



8. Splanchnic blood flow. Because of its effect on increasing blood flow to the gut, spinal anaesthesia reduces the incidence of anastomotic dehiscence.

9. Visceral tone. The bowel is contracted by SPA and sphincters relaxed although peristalsis continues. Normal gut function rapidly returns following surgery.

10. Coagulation. Post-operative deep vein thromboses and pulmonary emboli are less common following spinal anaesthesia.

Indications

❖ Subarachnoid block can be used to provide surgical anesthesia for all procedures carried out on the lower half of the body.

❖ Indications include :1-*surgery on the lower limb, pelvis, genitals, and perineum, and most urological procedures.*

❖ 2-Can be used for *analgesia (Intrathecal opioid)*

3-All operations on the leg except for limb amputation which is possible but an unpleasant experience for an awake patient so here the patient is supplied with light general anesthetic.

4. Special indications

- Elderly patients
- Chronic systemic disease , hepatic ,renal and endocrine disease (DM).
- Most patients with mild cardiac diseases except for stenotic valvular disease and uncontrolled hypertension.

Contra-indications

1. Patient refusal
2. Uncooperative patients : like young children and psychiatric or mentally handicapped patients
3. Clotting disorders : as bleeding from ruptured peridural vein is common , patients with low platlet count or those on anticoagulant drugs (heparin + warfarin) are at high risk of hematoma formation.

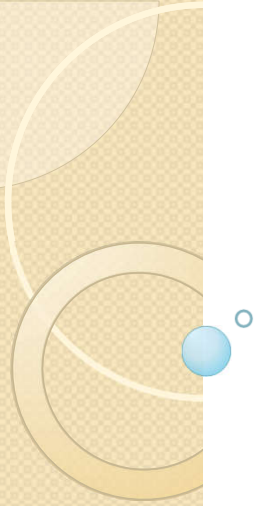
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4. Hypovolemia : since SPA has marked hypotensive effect ,hypovolemic patients must be adequately rehydrated and resuscitated
 5. Septicemia : leading to CSF infection and meningitis
 6. Anatomical deformities (relative contraindication) as it will probably only serve to make the dural puncture more difficult.

Contra-indications continue

- 7. Neurological disease. Any worsening of the disease postoperatively may be blamed erroneously on the spinal anaesthetic.
- 8. Inadequate resuscitative drugs and equipment. No regional anaesthetic technique should be attempted if drugs and equipment for resuscitation are not immediately to hand.

Preparation(Equipment)

- Basic equipment
 - Monitor
 - Oxygen
 - Suction
 - Airway adjunct capability
 - Emergency hemodynamic equipment
- Advanced equipment
 - ACLS (defibrillation)
 - Intralipids



How to perform the spinal injection?

- Clean the patient's back with antiseptic.
- Locate a suitable interspinous space.
- Raise an intradermal wheal of LA agent at proposed puncture site.



"You might feel a little prick."

How to perform the spinal injection? continue

- ▶ Insert the needle: the structures that will be passed

**skin , subcutaneous tissue, supraspinous
ligament , interaspinous ligament ,
lagementum flavum , dura mater.**

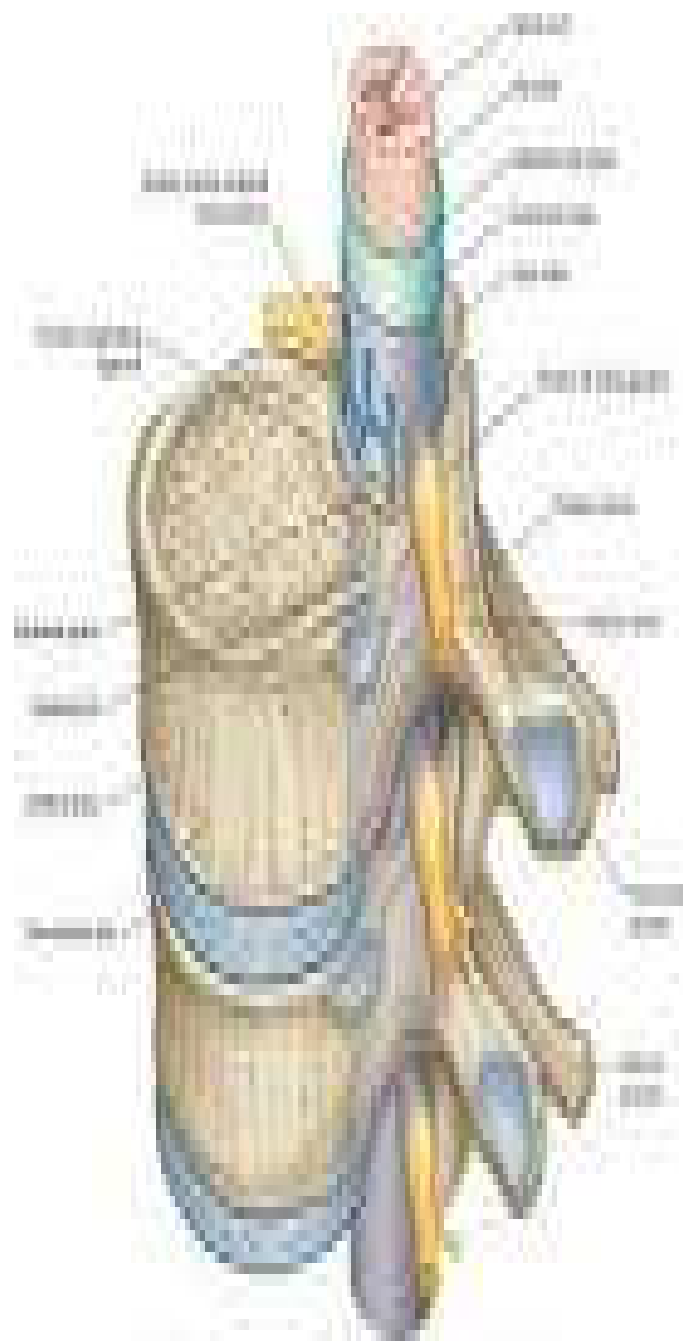
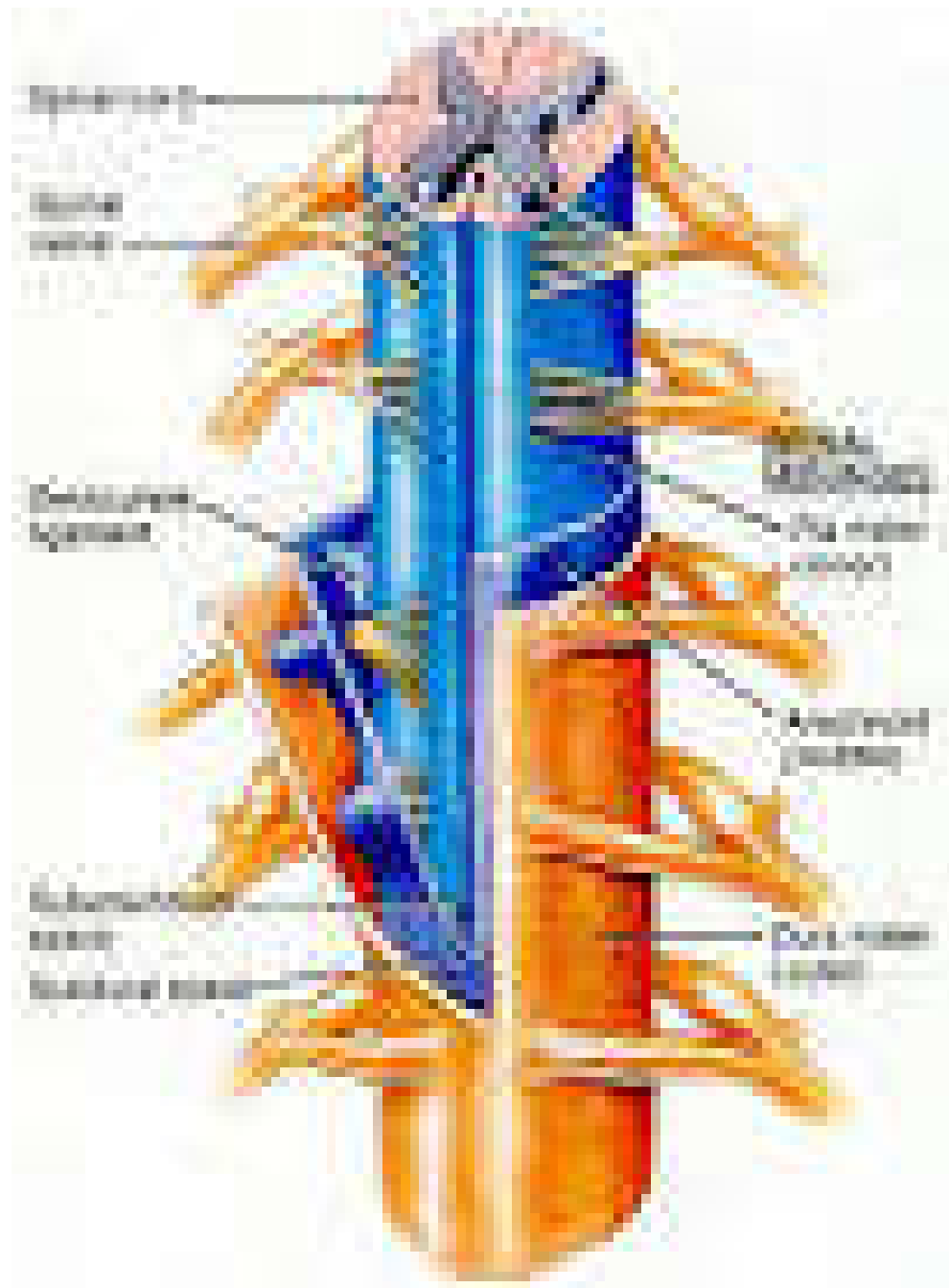
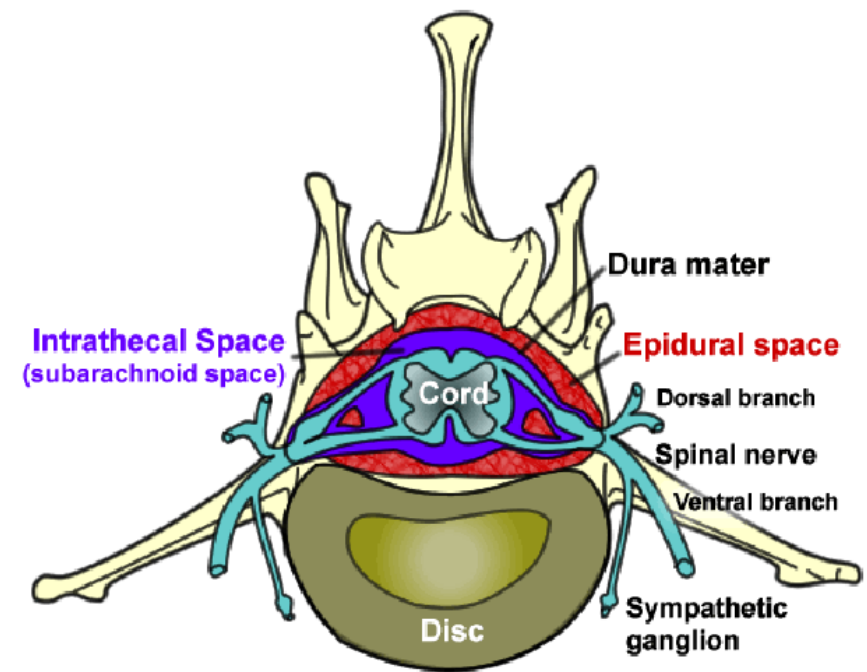
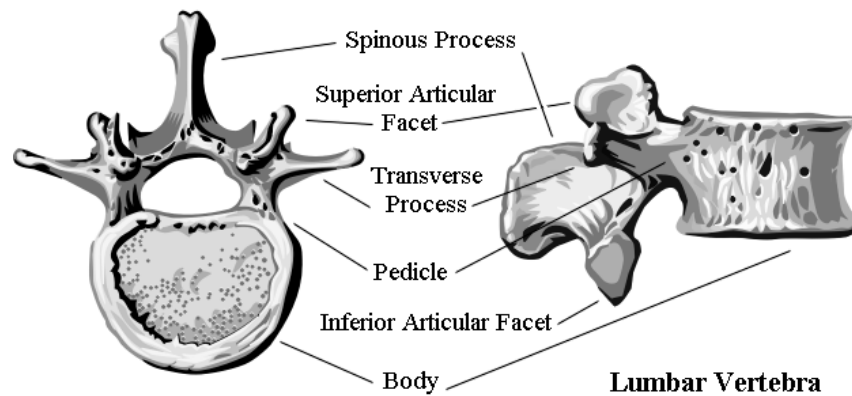


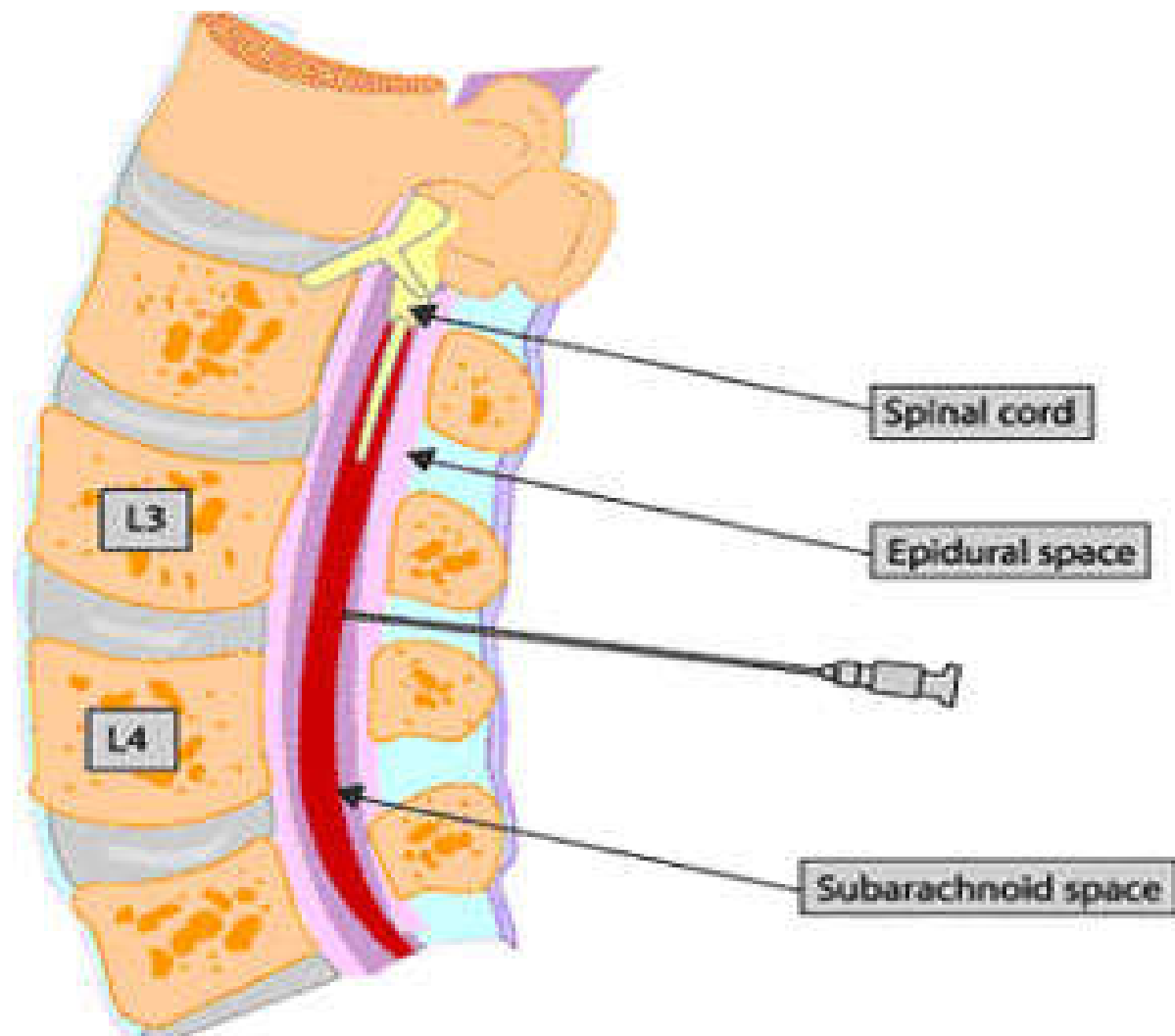
Figure 10-10 The vertebral body and intervertebral disc.



Vertebrea anatomy



When CSF appears then slowly inject the local anesthetic.



Spinal anaesthesia

SITE

- Adult : ***L3-L4 or L4-L5*** (or even L2-L3)
- Infant : ***L4-L5***
- A line drawn b/w the highest pt. of iliac crests (Tuffier's line) usually cross ***either body of L4 or the L4-L5 interspace***
- Position
 - ✓ Sitting
 - ✓ lateral
 - ✓ Prone(anorectal procedure, hypobaric solution, jackknife position)

Positioning

➤ **Sitting**

- ❖ With Legs hanging over side of bed
- ❖ Put Feet up on a Stool (no wheels)
- ❖ Assistant MUST keep the patient from Swaying
- ❖ Curve her back like a “C”,

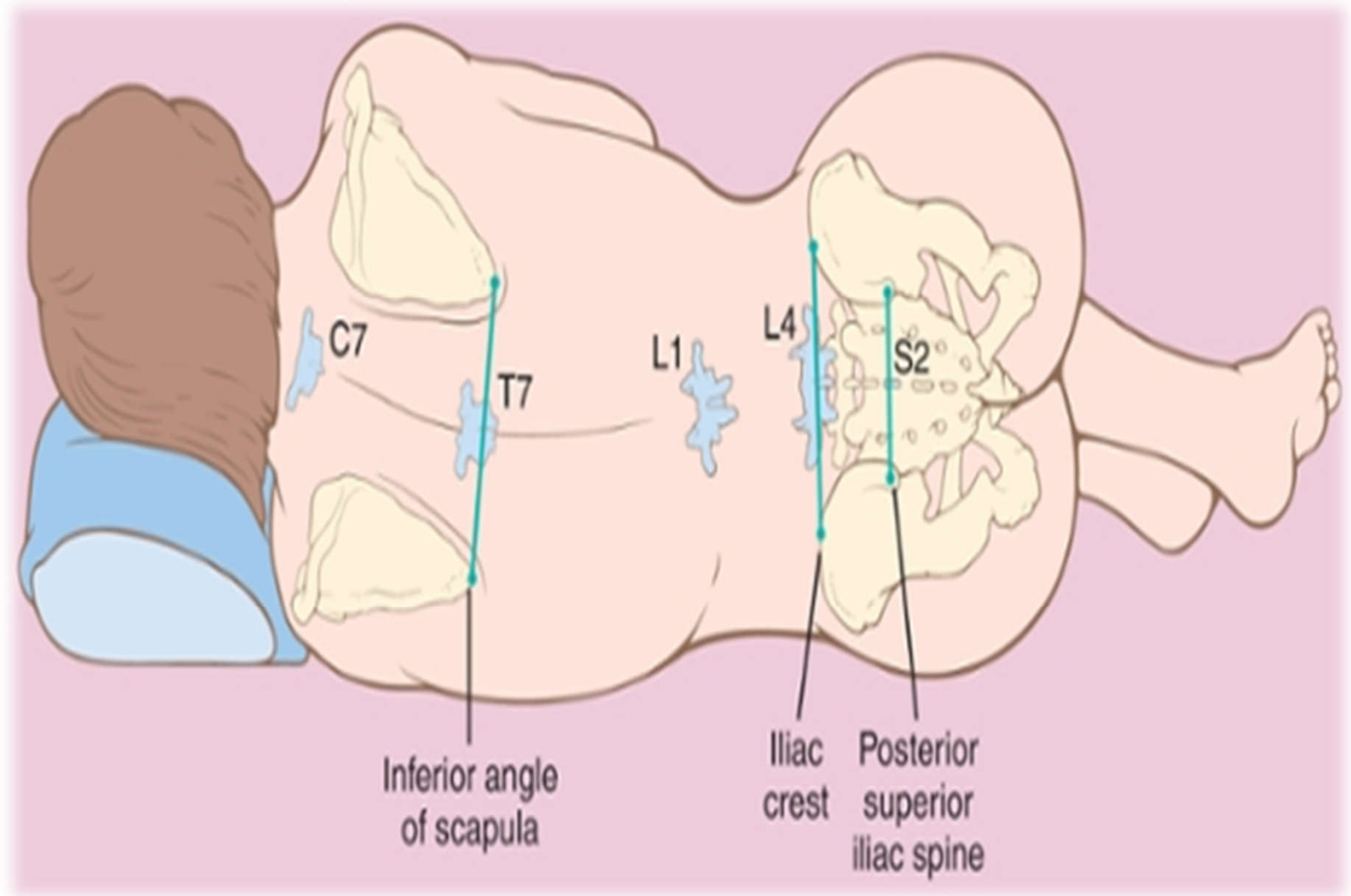
➤ **Lateral Decubitus (Left or Right?)**

- ❖ Needs to be Parallel to the Edge of the Bed
- ❖ Legs Flexed up to Abdomen
- ❖ Forehead Flexed down towards Knees

➤ **Jack-knife Position**

- ❖ Chosen for ano-rectal surgery
- ❖ CSF will not drip from hub of needle
- ❖ Use hypobaric solution

Surface landmarks



Anesthetic dose is injected at a rate of approximately 0.2 mL/sec

- The patient and operating table should then be placed in the position appropriate for the surgical procedure and drugs chosen.

Lateral decubitus positioning for a neuraxial block. The assistant can help the patient assume the ideal position of “forehead to knees.”





Factors Effecting the Spread of the Local Anaesthetic Solution

- The baricity of the local anaesthetic solution
- The position of the patient
- The concentration and volume injected
- The level of injection
- The speed of injection
- Site of injection

Additional Factors to Consider with SAB Height

- Patient Age
- Elderly patients > 80 yrs
- Patient Height
- Intra-abdominal Pressure
- Pregnancy & Obesity
- Drug Volume

Complication

BRADYCARDIA

- Defined as HR < 50 beats/ min.
- T1-4 involvement leads to unopposed vagal tone and decreased venous return which leads to bradycardia and asystole

NAUSEA AND VOMITING

- Causes (Hypotension, Increased peristalsis, Opioid analgesia)
 - Nausea and vomiting may be associated with neuraxial block in up to 20% of patients,
 - atropine is almost universally effective in treating the nausea associated with high (T5) neuraxial anesthesia.

Complication

- **CRANIAL NERVE PALSY**
- **TRANSIENT NEUROLOGICAL SYMPTOM** (More common with lidocaine)
- **CAUDA EQUINA SYNDROME** (Bowel-bladder dysfunction)
- **HIGH NEURAL BLOCKADE :**
 - Excessive dose, failure to reduce standard dose[elderly, pregnant, obese, very short stature]
 - Unconsciousness, hypotension, apnea is referred to as high spinal or total spinal

Hypotension

- Prevented by: Volume loading with 10-20 mL/kg of intravenous fluid
- **Predictors** of hypotension
 - low intravascular volume in case of hypovolemia due external loss by trauma, dehydration, internal loss
 - sensory block $\geq$ T5
 - age > 40 years
 - systolic BP < 120 mm Hg
 - combined spinal and general anesthesia
 - dural puncture between L2-3 and above
 - emergency surgery
 - pt with h/o uncontrolled hypertension
 - underlying autonomic dysfunction

Treatment of hypotension

- 100% O₂
- Elevation of leg
- Head down position
- **FLUIDS-**
 - crystalloid
 - Colloid [500-1000ml] preferred due to increased intravascular time, maintaining CO, uteroplacental circulation.

Treatment of hypotension

SYMPATHOMIMETICS:

- ❖ Epinephrine: increases HR, CO, SBP, decrease DBP.
- ❖ Phenylephrine: Increase in SVR, SBP, DBP. Causes reflex bradycardia, coronary blood flow increased.
- ❖ Ephedrine; increase myocardial contractility and rate.
- ❖ Mephentermin

Management of total spinal

- **Airway** - secure airway and administer 100% oxygen
- **Breathing** - ventilate by facemask and intubate.
- **Circulation** - treat with i/v fluids and vasopressor
- e.g. ephedrine 3-6mg or metaraminol 2mg increments or 0.5-1ml adrenaline 1:10 000 as required
- ***Continue to ventilate*** until the block wears off (2 - 4 hours)
- As the block recedes the patient will begin recovering consciousness followed by breathing and then movement of the arms and finally legs.

Post Dural Puncture Headache

- Due to **leak of CSF** from dural defect leads to **traction in supporting structure** especially in dura and tentorium & vasodilatation of cerebral blood vessels.
- Usually **bifrontal and or occipital**, usually worse in upright, coughing, straining
- Causes nausea, photophobia, tinnitus, diplopia[6th nerve], cranial nerve palsy
- Treatment plan include keeping **patient supine, adequate hydration, NSAIDs with or without caffeine** [increases production of CSF and causes vasoconstriction of intracranial vessels], if not relieved within 12-24 hr **then epidural blood patch.**
- Epidural blood patch consists of giving 20 ml

Relationships Among Variables and Post-spinal Puncture Headache

Factors that May Increase the Incidence of Post-spinal Puncture Headache

Age

Younger more frequent

Gender

Females > males

Needle size

Larger > smaller

Needle bevel

Less when the needle bevel is placed in the long axis of the neuraxis

Pregnancy

More when *pregnant*

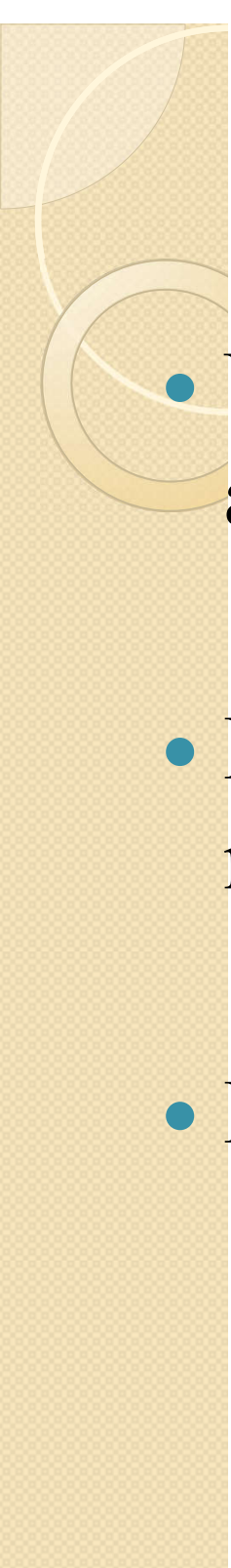
Dural punctures (no.)

More with *multiple punctures*

Factors Not Increasing the Incidence of Post-spinal Puncture Headache

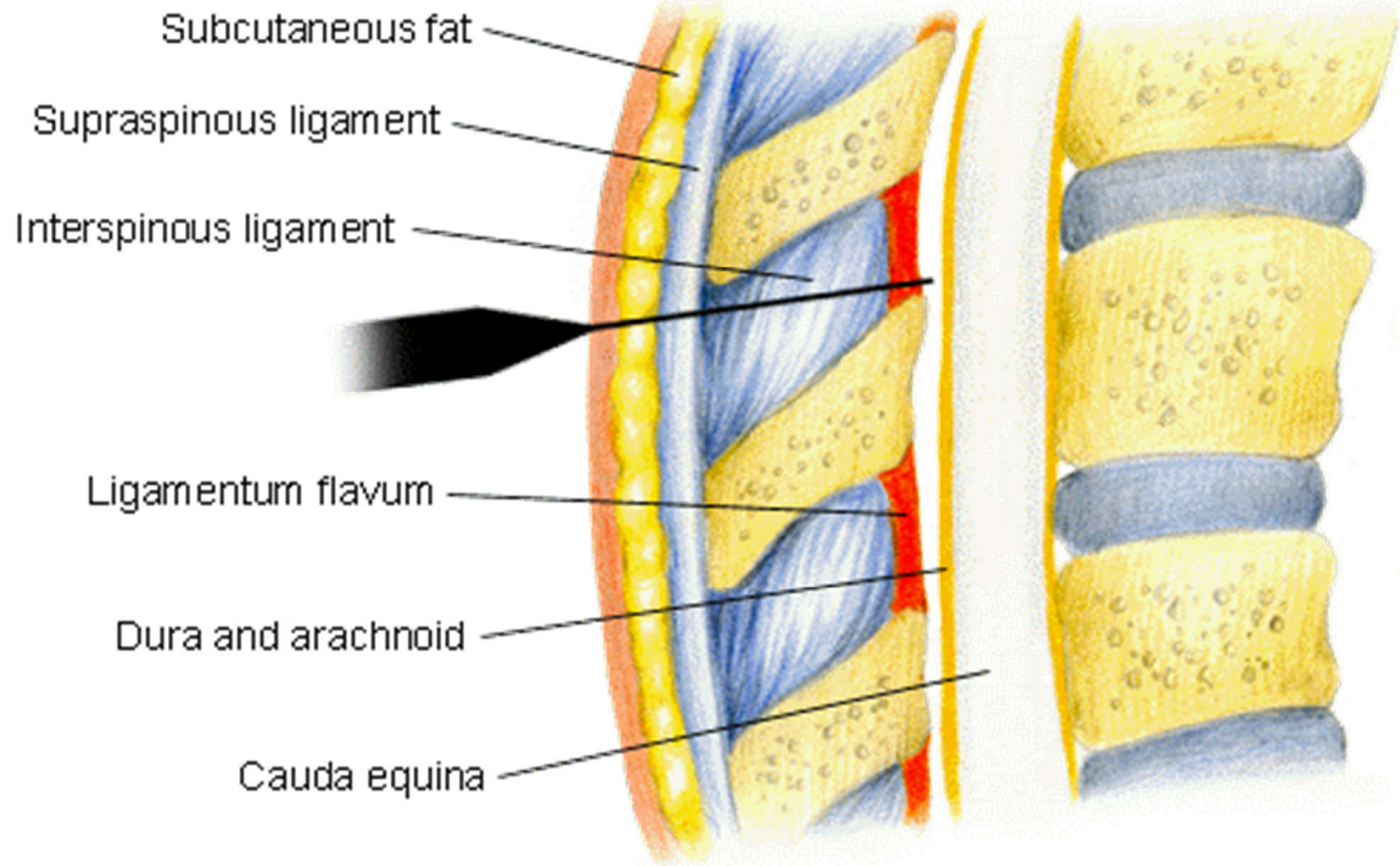
Continuous spinals

Timing of ambulation

- 
- Urinary retention : the sacral autonomic fibers are among the last to recover.
 - Permanent neurological complications (rare): meningitis, arachnoiditis , peridural abscess
 - Permanent paralysis: in elderly patient
other cause: direct injury of the spinal cord .

Epidural Anesthesia

- Local anaesthetic solutions are deposited in the peridural space between the dura mater and the periosteum lining the vertebral canal. The peridural space contains adipose tissue, lymphatics and blood vessels. The injected local anaesthetic solution produces analgesia by blocking conduction at the intradural spinal nerve roots.



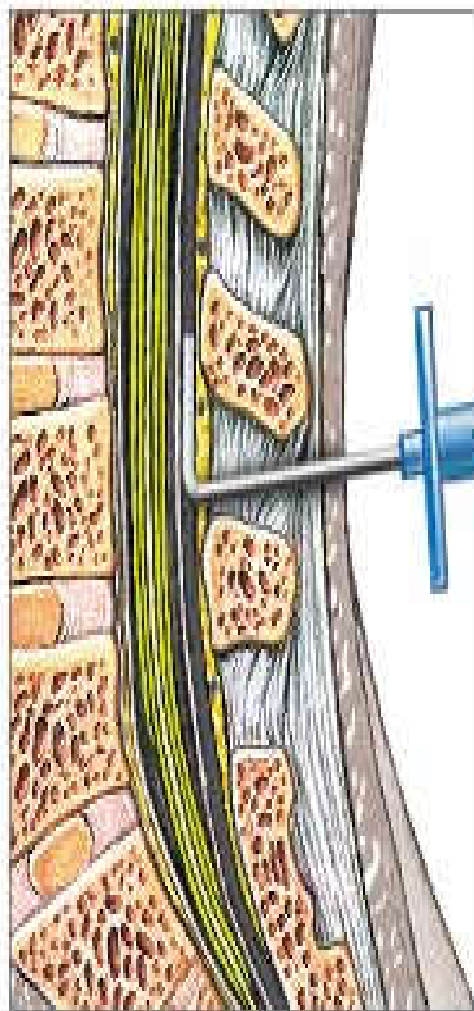
Epidural Anesthesia

continue

- **Technique:**

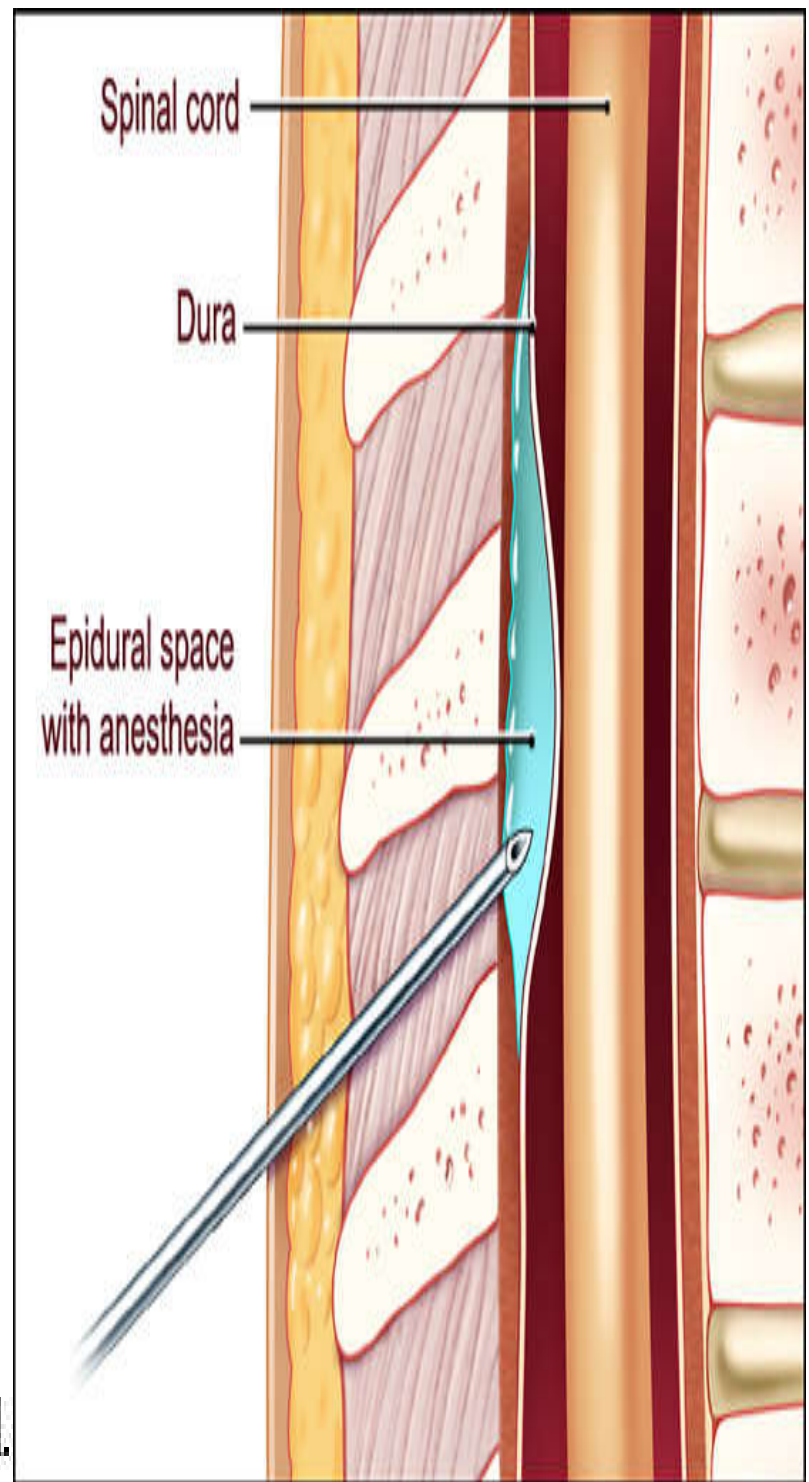
Loss of resistance technique to identify the epidural space.

- 0.5% Bupivacaine (mainly) or lidocaine (2.0%) is usually used to produce epidural anaesthesia.



Epidural needle

Catheter



Spinal cord

Dura

Epidural space
with anesthesia

Epidural Anesthesia continue

Indication and Contraindication:

- The same of spinal anaesthesia.
- Additional indication is the post operative Pain management using the epidural catheter technique.
- **Complications:** the same of spinal anaesthesia, **except** the post dural puncture headache.

Differences between Spinal and Epidural Anesthesia

Spinal anaesthesia	Extradural Anaesthesia
Level: below L1/L2, where the spinal cord ends	Level: at any level of the vertebral column.
Injection: subarachnoid space i.e puncture of the dura mater	Injection: epidural space (between Ligamentum flavum and dura mater) i.e without puncture of the dura mater
Identification of the subarachnoid space: When CSF appears	Identification of the Peridural space: Using the Loss of Resistance technique.
Dosis: 2.5- 3.5 ml bupivacaine 0.5% heavy	Doses: 15- 20 ml bupivacaine 0.5%
Onset of action: rapid (2-5 min)	Onset of action: slow (15-20 min)
Density of block: more dense	Density of block: less dense
Hypotension: rapid	Hypotension: slow
Headache: is a probably complication	Headache: is not a probable.

Peripheral Nerve Blocks

- Part of a pre-emptive multimodal analgesic technique providing safe and effective post-operative pain management with minimal side effects.
- Appropriate for both the in-patient and out-patient setting, PNB's afford both anesthesia and extended analgesia for a variety of surgical procedures.
- Afferent nociceptive (pain) stimulus from the injured tissue is prevented from reaching the central nervous system by preinjury neural blockade.
- Pain may be eliminated or minimized.

Advantages of PNB

- Reduced postoperative pain resulting in greater patient satisfaction with their pain management
- Early ambulation and discharge
- Decreased side effects of nausea and vomiting, drowsiness secondary to less opioid use for pain control.
- Less sedation during surgery allows patients to remain conscious (MAC) thus protecting their airway and avoiding airway manipulation and intubation

Disadvantages of PNB

- Requires technical expertise from a variety of medical clinicians
- Time required preoperatively for block placement. This may be offset by decreased anesthesia time in the OR and shorter length of stay in the PACU
- Contraindicated in patients with a history of coagulopathies, preexisting neuropathies, anatomical aberrancy/pathology at injection site, or systemic disease or infection

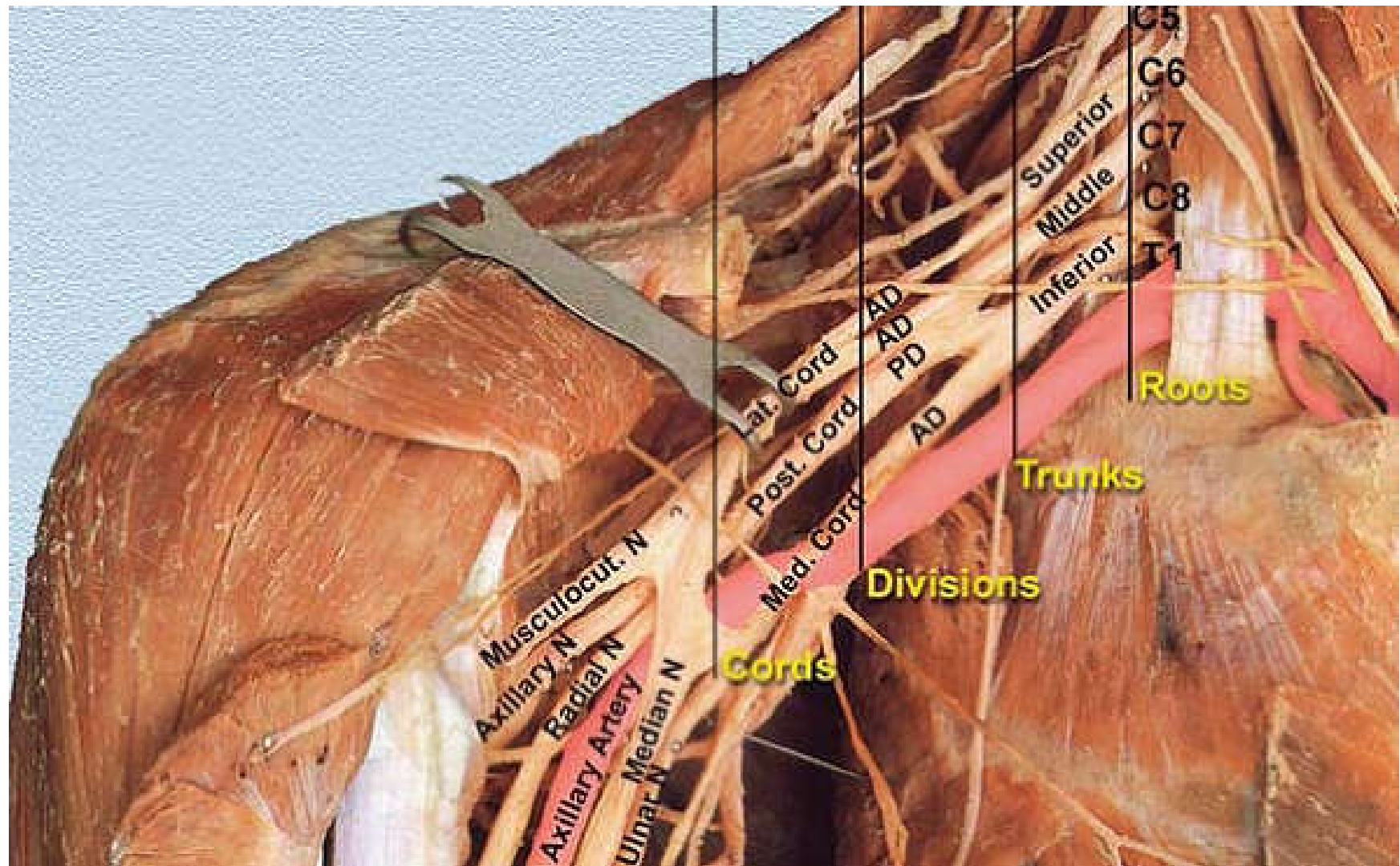
Pharmacology

- Peripheral nerve blocks (PNB) involve injecting a local anesthetic near or around the nerve or nerve plexus that supplies the surgical area.
- The duration of action for each anesthetic medication depends on several factors; injection volume, concentration of the medication, and absorption.
- Single injection commonly 30-40cc
- Percutaneous insertion of a catheter directly near the peripheral nerve supplies the surgical site with a continuous infusion

Types of PNB

- Upper extremity
- Lower extremity

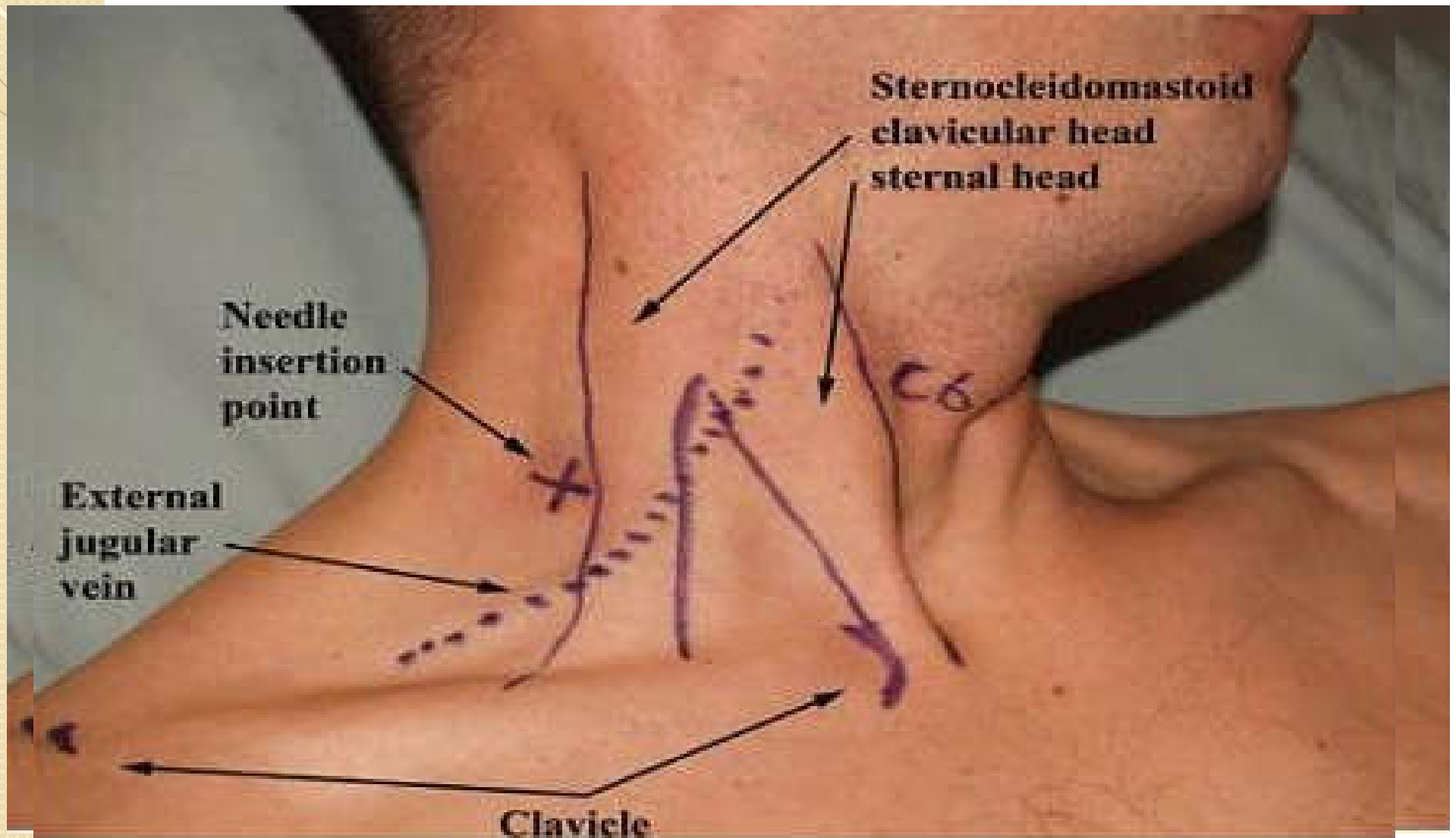
Brachial plexus block



Supraclavicular approach



Interscalene landmarks







Popliteal-sciatic block: two approaches



Prone



Supine

Complication of PNB

- May be associated with needle trauma, inadvertent injection of the nerve, or high injection pressures
- Intraneural injection may be identified during block administration by the patient complaining of a sharp pain. The injection is stopped immediately.
- Surgical trauma may also cause nerve damage
- May not manifest until 7-14 days post-op.
- Symptoms: persistent c/o paresthesia, aching or sensory or motor deficits
- Treatment is prevention

Complication of PNB

- Pneumothorax
- Horner syndrome
- Hemidiaphragmatic paralysis
- Local anesthetic systemic toxicity

Local anesthetic toxicity

- Symptoms: ringing in the ears, metallic taste in the mouth, numbness of the lips, twitching of the eyes and lips leading to seizures.
- Most serious; cardiovascular arrest, respiratory, and central nervous system depression (LOC)

Treatment of local anesthetic toxicity

- Immediate treatment: provide adequate ventilation, oxygenation, and circulation (CPR)
- **Infusion of Intralipid**
- Adult Bolus 1-1.5 ml/kg over 1-2 minutes.
- Pediatric Bolus 1ml/kg.
- Repeat dosing every 3-5 minutes up to max dose of 3ml/kg.
- Provide maintenance infusion 0.25-0.5ml/kg/min

THE END





THANK YOU

