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Regional Anesthesia Technique

Objectives:

- Relevant anatomy and surface landmark for Neuraxial block.
- Differences between spinal and epidural.
- Equipment and local anesthetics.
- Indication and contraindication.
- Side effects, complications and treatment.
- LAST

Color index:

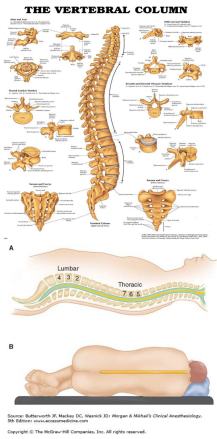
- Red: important /
- Black: content slides
- Gray: extra
- Green: dr. Notes

IMPORTANT

Anesthesia 438 teamwork

Anatomy

Knowledge of anatomy for neuraxial blockade is essential!



7 cervical vertebrae

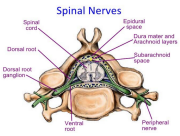
5 lumbar [2] vertebrae

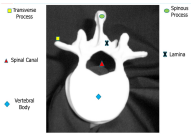
Coccyx
3-4 primitive vertebrates
Not well developed

12 thoracic vertebrae spinous processes incline caudally and can reach the transverse process of the lower vertebra making thoracic epidural difficult

5 fused Sacrum [1]

Individual Vertebral Anatomy

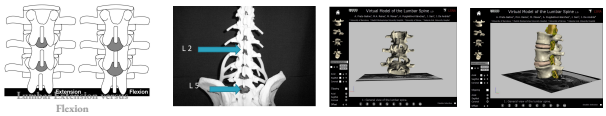




Each vertebra consists of:

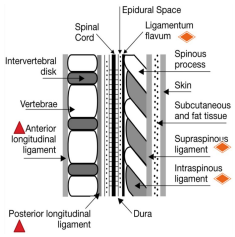
- pedicle
- transverse process
- superior and inferior articular processes
- spinous process.

Vertebral anatomy



- Each vertebra is connected to the next by intervertebral discs.
- There are 2 superior and inferior articular processes (synovial joints) on each vertebra that allows for articulation.
- Pedicles contain a notch superiorly and inferiorly to allow the spinal nerve root to exit the vertebral column.
- Interlaminar spaces are larger in the lower lumbar region :If an anesthesia provider finds it challenging at one level it is important to remember that moving down one space may provide a larger space

Ligaments that support the vertebral column



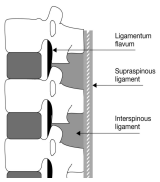
- Ventral side: Anterior and posterior longitudinal ligaments.
- Dorsal side: (Important since these are the structures your needle will pass through!
- Ligaments are identified by tactile sensation (feel): Dorsal ligaments are transversed during neuraxial blockade.With experience the anesthesia provider will be able to identify anatomical structures by “feel”.

IMPORTANT

- ligamentum flavum: it’s yellow connect the ventral parts of the laminae of adjacent vertebrae
- Supraspinous ligament: connect the **tip** of spinous process from C7 down to the sacrum
- Interspinous ligament: connect the spinous process

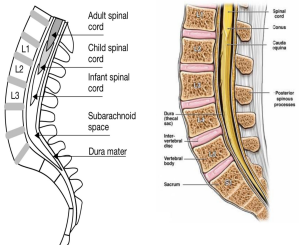
The difference between spinal and epidural whether the needle penetrate the dura or not :

- If the needle stops in the epidural space not penetrating the dura means it’s epidural
- If it penetrates the dura into intrathecal (subarachnoid space) it becomes spinal Anesthesia



Termination of spinal cord

IMPORTANT



Adults: usually ends at L1. There are anatomical variations. For most adults it is generally safe to place a spinal needle below L2. As a rule NO spinal anesthesia above L2, you can do L3, L4, L5, but NEVER above L2, in epidural anesthesia there's no limitation

Children: ends at L2

Infants: L3

1- The 5th sacral vertebrae has no laminae so there’s no fusion in the midline so there’s no spinous process, we can access this area especially in pediatric we do caudal block (**low epidural**), in Adult you can do it but with difficulties and help of X ray and Fluoroscopy

2- To straighten the lumbar curvature we ask the pt to bring his knee near his chest (flex) like In praying, but there are difficult situations such as pregnant women or who have fracture, lumbar spinous process is almost horizontal and wider space makes it easy access

Surface anatomy and landmark [1]

IMPORTANT

Locating prominent cervical and thoracic vertebrae:

C2 is the first palpable vertebrae

C7 is the most **prominent** cervical vertebrae you can easily feel it in your neck

With the patient's arms at the side the tip of the scapula generally corresponds with T7

Spinous process are generally palpable to help identify the midline.

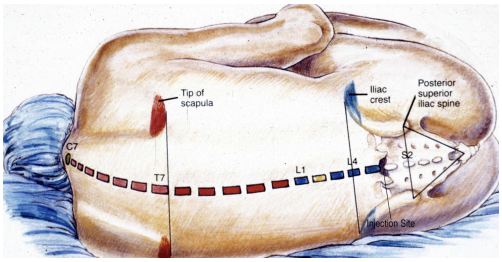
If unable to palpate the spinous process? one can look at the upper crease of the buttocks and line up the midline as long as there is no scoliosis or other deformities of the spine

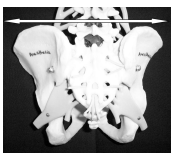
IMPORTANT

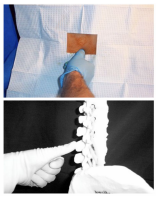
- The 2 dimples we all have on our lower back is the posterior superior iliac spine on S2, which is the end of the epidural space & dura mater
- Put your 2 fingers on each of the dimples and with the 3rd finger make an equilateral triangle and this is your caudal space on S5. so, two fingers on S2 and one finger on S5 for caudal block mostly in pediatrics (low EA).
- Ligamentum flavum ends at S5 but including S5 as S5 is covered by sacrococcygeal membrane an extension of ligamentum flavum
- Angle of scapula is T7, spine of scapula is T3. (most of thoracic EA between T3-7)

What is Tuffier's Line? (intercristal line) imp in OSCE

- A line drawn between the highest points of both iliac crests will yield either the body of L4 spinous process or the L4-L5 interspace
- Space above and below are excellent sites for both SA and EA.







The Subarachnoid Space [2] is a continuous space that contains **CSF**, **Spinal cord** & **nerves.**

CSF

Clear fluid that fills the subarachnoid space

Total volume in adults is ~100-150 ml (**2 ml/kg**) [3]

Volume found in the subarachnoid space is ~35-45 ml.

Continually produced at a rate of 450 ml per 24 hour period replacing itself 3-4 times

Specific gravity is between 1.003-1.007 (this will play a crucial role in the **baricity** of local anesthetic that one chooses) .

Reabsorbed into the bloodstream by arachnoid villi.

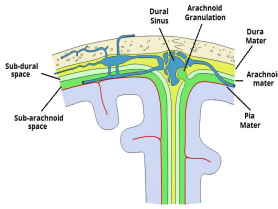
Body wt is the only measurement that coincides with CSF volume (this becomes important in the obese and pregnant).

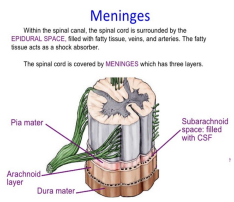
CSF plays a role in patient to patient variability, in relation to block height and sensory/motor regression (80% of the patient to patient variability)

1- Bony landmarks never change whether the pt is tall or short, thin or obese
2- Extends up to S2
3- 75 kg male or female typically have 150ml CSF , half in the brain, half in the spinal cord

Membranes that surround the spinal cord (meninges):

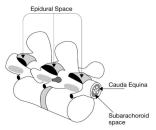
Pia mater	Arachnoid mater	Dura mater ("tough mother")
highly vascular	non vascular	- extension of the cranial dura mater. - extends from the foramen magnum to **S2**.
- covers the spinal cord and brain -Filum terminalis is an extension of the pia mater attaches to the periosteum of the coccyx.	- attached to the dura mater. - Principal barrier to the migration of medications in and out of the CSF**.**	





Epidural space anatomy:

Extends from the foramen magnum to the sacral hiatus [1]. The epidural space surrounds the dura mater anteriorly, laterally, and most importantly to us posteriorly.



The Bounds of the Epidural Space are:

Anterior

posterior longitudinal ligament

it's a very strong ligament, so most herniations happen laterally not anterior/posterior.

Lateral

pedicles and intervertebral ligaments

Posterior

ligamentum flavum: thick and dense

- Posterior to the epidural space
- Extends from the foramen magnum to the sacral hiatus S5
- Distance from skin to ligament varies from 3-8 cm in the lumbar area. It is 4 cm in 50% of the patients and 4-6 cm in 80% of the patients.
- **Thickness** of the ligamentum flavum also varies. In the thoracic area it can range from 3-5 mm and in the lumbar it can range from 5-6 mm. And thickness on the same level varies (the part in midline is the thickest part of this ligament)
- Connect lamina above and below

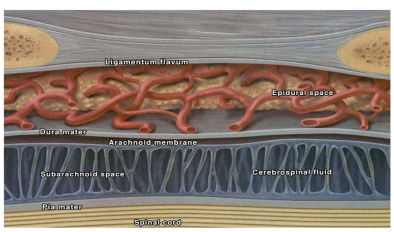
Contents of epidural space:

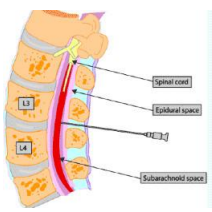
1- Fat acts as shock absorber

2- Areolar tissue

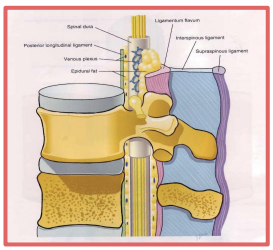
3- Lymphatics

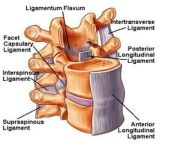
4- Blood vessels including the **Batson venous plexus** (Valveless veins which are connected to the thoracic veins (which have a negative pressure). Because batson veins are valveless, this negative pressure is passed on the epidural space. We know we are in the epidural space when we come upon negative pressure (it is difficult to pass the needle).

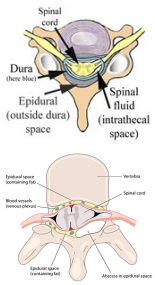




Once penetrated ligamentum flavum only: epidural block.
Penetrated The dura and arachnoid: Spinal Anesthesia.







1- That's why there's no limitation to which level we can do the epidural anesthesia unlike spinal anesthesia where we have to make sure we are below the level of L2

Spinal anesthesia

Injection of small amounts (2-3 ml) 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 .

Indications

Operations below the umbilicus

- Most commonly used in C-sections
- hernia repairs
- gynaecological, urological operation
- orthopedics Unilateral hip replacement (not bilateral because bilateral takes a long time). Knee, Femur
- any operation on the perineum or genitalia.

Short operations, no longer than 2-3 hours (single shot)

Contraindications

Absolute:

- Refusal (most definitive contraindication)
- Infection like bed sores or abscess around the site involved (to not carry infection into CSF)
- Coagulopathy & anticoagulated patient. [1]
- Severe hypovolemia [2]
- Increased ICP causes herniation
- Severe aortic or mitral stenosis (they face difficulty dealing with the sympathetic effect)

Relative: *Use your best judgment*

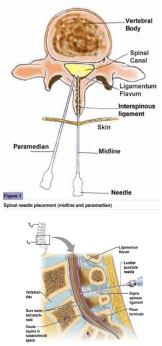
Spinal technique

	Position :	
Sterility & set	Sitting (easier)	Lateral decubitus	single shot technique
			 Injecting lidocaine to anesthetize the skin & subcutaneous tissue

Approaches:

Midline Approach

- Skin
- Subcutaneous Tissue
- SupraSpinous ligament
- Interspinous ligament
- Ligamentum flavum
- Epidural space
- Dura mater
- Arachnoid mater



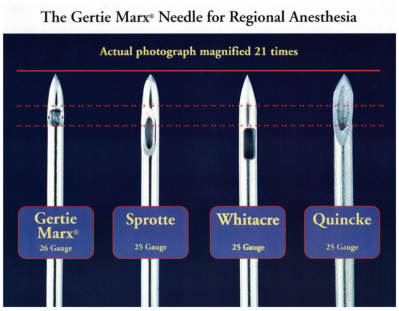
Paramedian or Lateral Approach

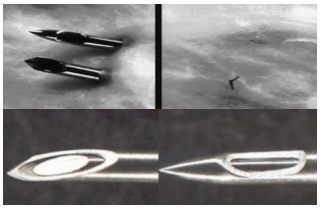
Same as midline excluding supraspinous & interspinous ligaments. Immediately to ligamentum flavum

1- Patients on warfarin/heparin, idiopathic thrombocytopenic purpura, hemophilia, because its a closed space, a small amount of blood will cause hematoma and compression

2- Why? Because in both spinal and epidural you are going to block the motor, sensory and sympathetic leading to dilation of Arteries and veins causing hypotension so you have to preload by giving 1 L crystalloid fluid

Needle types





- Mainly two types: **Quincke** and **pencil point** (eg. Gertie marx, sprotte and whitacre are all called pencil point)
- Quincke needle is sharp, it cut (tears) the dura fibers leading to leakage of CSF, Young female patients are commonly prone to Post-Dural Puncture Headache (PDPH) so it is quite common in obstetric procedures.
- Pencil point needles are better in terms of post dural puncture headache we don't see it nowadays because when they penetrate the dura they only separate it rather than creating a hole behind that leaks CSF & once the needle is withdrawn the fibers will return to normal or pre-puncture position by elastic recoil
- You need to choose a large gauge (small diameter) needle to reduce the risk of post-dural puncture headache. We usually use **27** gauge pencil point needles.

Post-dural puncture headache (PDPH)

- A side effect of spinal anesthesia.
  - Depends on the design of the tip (blind end with sideboard) and gauge size (the smaller the better)
- Develop 12-48 hours after **spinal** anesthesia.
- Headache improve when lying supine.
  - Increases when standing upright, If it not then it is not a PDPH

Differential Diagnosis

- Meningitis
- Sinusitis
- Migraine
- Pregnancy related hypertension
- Intracranial Pathology (sol)
- Dural Venous thrombosis,
- Pneumocephalus,
- Spontaneous intracranial hypotension.

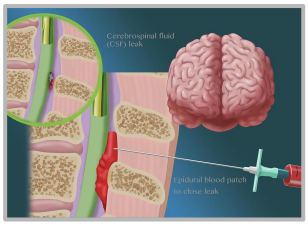
Mechanism: Persistent **leakage of CSF** Leading to:

1. **Decrease in CSF volume** → Shift of intracranial contents → stretching the meninges
2. **Decrease in CSF pressure** → Activating adenosine receptors → vasodilation of intracranial vessels

- Monro law: the volume in the cranial cavity consists of fixed brain matter, CSF, blood.
- If the CSF decreases so the blood will increase, meaning we have vasodilation = headache. Giving caffeine will cause vasoconstriction and the patient will feel better.

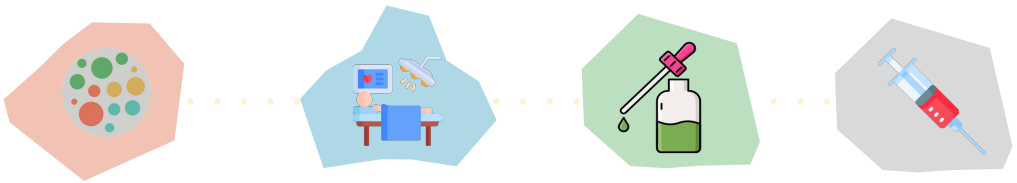
Treatment

- **Conservative:** by giving fluids, caffeine, lying supine, paracetamol or ibuprofen, abdominal strap.
- **Epidural blood patch:** if pt did not improve with conservative treatment, I have to go to the epidural space above the previous puncture site, taking 20 ml of patient own blood (autologous blood) and injecting it in the epidural space (the fibrin and other blood products will close like a glue the defect and the relief happens almost immediately).



Factors affecting the level of spinal anesthesia:

Most important factors:



Baricity
of anesthetic solution

Patient positioning [1]:
During and immediately after injection

Drug dosage

Site of injection.

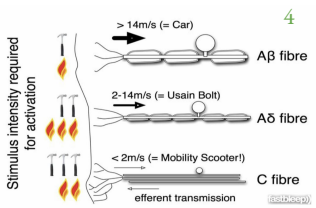
Other factors:

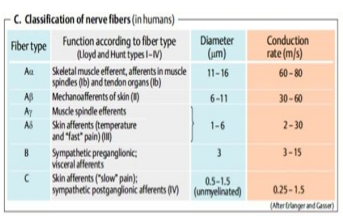
- Age
- Curvature of spine
- Drug volume
- Intra-abdominal pressure
- CSF
- Patient height
- Pregnancy
- Needle direction

Baricity (a concern only in spinal anesthesia)

IMPORTANT	Hyperbaric [2] >1.007 (Heavy)	Hypobaric [3] <1.003	Isobaric 1.003-1.007
	Typically prepared by mixing local with dextrose	Prepared by mixing local with sterile water	Neutral flow that can be manipulated by positioning Increased dose has more effect on duration than dermatomal spread. We don't use it in spinal. In epidural anesthesia the baricity doesn't matter so we use an isobaric solution.
	Flow is to most dependent area due to gravity Very predictable spread	Flow is to highest part of CSF column.	
	Hyperbaric bupivacaine  • Sterile, clear • Preservative free • 3 ml ampoules • See the expiry date • Be sure it is bupivacaine??		Isobaric bupivacaine (20 ml) Slow onset (30 min), less dense block. Used for epidural anesthesia.

Note: Be cognizant of high & low regions of spinal column

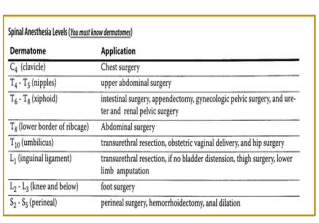




C. Classification of nerve fibers (in humans)

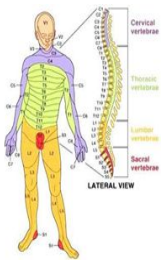
Fiber type	Function according to fiber type (Lloyd and Hunt types I–IV)	Diameter (μm)	Conduction rate (m/s)
Aα	Skeletal muscle efferent, afferents in muscle spindles (Ib) and tendon organs (Ib)	11–16	60–80
Aβ	Mechanoafferents of skin (II)	6–11	30–60
Aγ	Muscle spindle efferents		
Aδ	Skin afferents (temperature and "fast" pain) (III)	1–6	2–30
B	Sympathetic preganglionic; visceral afferents	3	3–15
C	Skin afferents ("slow" pain); sympathetic postganglionic afferents (IV)	0.5–1.5 (unmyelinated)	0.25–1.5

(After Erlanger and Gasser)



Spinal Anesthesia Levels (You must know dermatome)

Dermatome	Application
C_4 (clavicle)	Chest surgery
T_4 - T_5 (nipples)	upper abdominal surgery
T_4 - T_9 (xiphoid)	intestinal surgery, appendectomy, gynecologic pelvic surgery, and ureter and renal pelvic surgery
T_8 (lower border of ribcage)	Abdominal surgery
T_{10} (umbilicus)	transurethral resection, obstetric vaginal delivery, and hip surgery
L_1 (inguinal ligament)	transurethral resection, if no bladder distension, thigh surgery, lower limb amputation
L_2 - L_5 (knee and below)	foot surgery
S_2 - S_5 (perineal)	perineal surgery, hemorrhoidectomy, anal dilation



1- If you place the head down the anesthetic will go up to the the brain due to baricity
2- We are injecting liquid inside liquid, that's why it's important to choose hyperbaric bupivacaine only in spinal anesthesia, while the epidural you inject into space so there's no issue
3- It has low gravity in relative to CSF, so it will go up to the brain if you use it in spinal anesthesia!!
4- Sensitivity of fibers towards local anesthesia differ according to the: size of the fibers (myelinated or un)

Differential block in local anesthesia

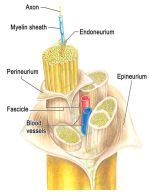
Spinal Injection [1] :

Sympathetic block is 2 dermatomes **higher** than sensory block

Motor block is 2 dermatomes **lower** than sensory block

Detect the sensory level [2] by cold sensation test (Ice cubes).

Neuron type	Function	Myelination	Order of Blockade	Signs of Blockade
A alpha	Motor -skeletal muscle	Myelinated	Fifth	Loss of motor function
A beta	Sensory – touch, pressure	Myelinated	Fourth	Loss of sensation to touch and pressure
A gamma	Motor - muscle spindles proprioception	Myelinated	Third	Loss of proprioception
A delta	**Fast pain temperature**	**Myelinated**	**Second**	**Pain relief, loss of temperature sensation**
B	Autonomic, Pre-ganglionic sympathetic	Myelinated	First	Increased skin temperature
C	**Slow pain, autonomic, postganglionic sympathetic, polymodal nociceptors**	**Unmyelinated**	**Second**	**Pain relief, loss of temperature sensation**



Block Order: B> C= A delta > A Beta > A alfa

Complications

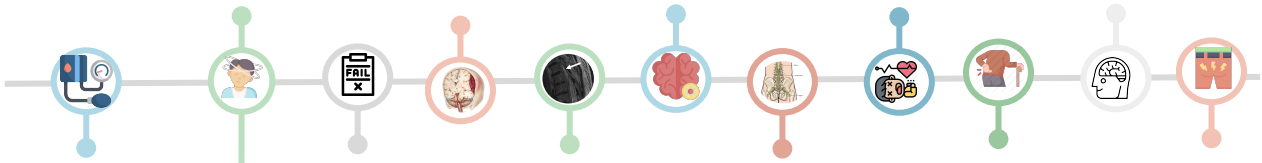
Epidural hematoma
if patient is on anticoagulants

Spinal headache

Meningitis

Bradycardia-Cardiac arrest

Neurological deficit



Hypotension (most common)
You can't have spinal or epidural without it, if there was no hypotension means something went wrong with the injection, it's a side effect that has to happen

Failed block

Epidural abscess
in immunocompromised or with improper aseptic technique.

Cauda equina

Back pain

TNS
Transient neural stimulus, pain in buttocks, then analgesia, then nothing.

Spinal headache

- **Onset** typically occurs first or second day post-op
- **Treatment:** Bed rest, Fluids, Caffeine, Blood patch
- **Larger needle size** increase severity
- More common in women ages 13-40

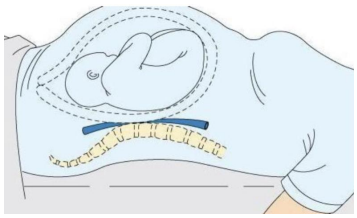
Best way to treat hypotension is physiologic not pharmacologic

Primary Treatment: Increase the cardiac preload using large **IV fluid (Ringer's Lactate) bolus** within 30 minutes prior to spinal placement, minimum 1 liter of crystalloids

Secondary Treatment: Pharmacologic **vasopressor agents** 5-10 mg **Ephedrine** or phenylephrine but it's not preferable .Pharmacological treatment is incase crystalloid preloading can't be given like in cardiac patients or if physiologic treatment fails.

IVC syndrome (pregnancy)

Seen with spinal anesthesia in cesarean section , epidural in vaginal birth
The uterus, IVC and vertebrae are compressed. this complication can happen with any pregnant women any time but It will be more intense during spinal anesthesia because of the hypotension, we do a left uterine displacement during the surgery to relieve the pressure from the IVC and we advise them not to lie supine but to better lie in their left side (the IVC is more right sided)

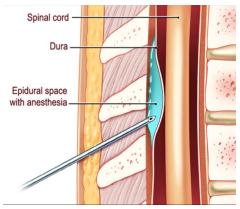


1- Sympathetic fibers are the highest sensitivity towards local anesthesia then sensory fibers (intermediate) then motor fibers (lowest)
2- We always keep ice cubes available to place them in the Pt skin and check for sensory feeling of the Pt. starting from the top of the Pt's back till you reach the umbilicus and the Pt say NO then your sensory level is T10, sympathetic is T8, motor is T12, If sensory level at T4 (overdose of local anesthesia) then the sympathetic will be at T2

Epidural anesthesia

Anatomy

Needle inserted into epidural space



Position

C- shaped position

Anesthetic agent

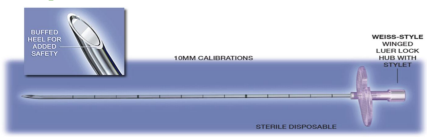
Isobaric bupivacaine (20 ml)

duration

Slow onset (30 min), less dense block
But can last up to 5 days

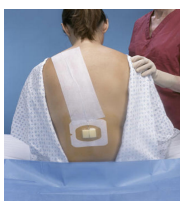
Needle

Tuohy needle total length = 8 cm & you'll enter the needle up to 5.5 cm



Techniques

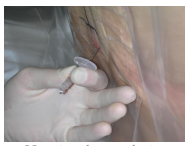
1- Insert the needle slowly into the subcutaneous tissue
2- Remove the stylet and put in the syringe (we fill the syringe with either water, saline, or air)
3- start putting pressure in the plunger while inserting the needle more
4- once the plunger stop returning back (loss of resistance) means you finally entered the epidural space
5- replace the syringe with the catheter

Loss of resistance	Catheter [2]	Set	
			

Epidural test dose [1]

- After checking the catheter
- Careful aspiration, NO blood or CSF
- 3 ml **Lidocaine** 1.5% mixed with **epinephrine** 5 micg/ml
- With careful monitoring, give the epidural injection 15-20 ml bupivacaine in allequete.

There is another technique called (**hanging drop** 💧)
The doctor will keep one drop of fluid hanging from the tuohy needle then whenever the inserted needle reaches the epidural space it will be sucked inside because of the negative pressure so you know you have reach the right space.


Hanging drop technique

IMPORTANT Quick Summary by doctor

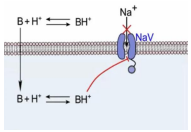
	Block Onset	Duration	Technique	Amount needed of Local anesthesia
Spinal	3-4 mins	2-3 hrs	Single shot	2-3 ml
Epidural	30-40 mins	4-5 days	Catheter	20 ml

1- Done only in epidural, 20 ml is a large quantity. if the catheter migrate intrathecal it will cause total spinal anesthesia or if it gets inside the vessels it will cause local anesthesia systemic toxicity (LAST) so we need a test dose, if tachycardia happened or there was a rise in bp 20% from baseline after the dose test that means the catheter inside one of the vessels if not you are in safe side. Second wait for 5 mins then ask the Pt to move his feet & big toe if it still moving means it's not intrathecal and you are in the safe side.
2- Can stay up to 4-5 days, while spinal only 2-3 hours

Local anesthetics

Mechanism of action

Un-ionized local anesthetic diffuses into nerve axon > ionized form > binds the receptors of the Na channel in the inactivated state. It blocks voltage gated sodium channels from **inside cell** and it's **reversible** (by the amine group in the anesthetic agent). While nerve toxins blocks Na channels from **outside** and is **irreversible**



Duration of action

The degree of protein binding is the most important factor

Lipid solubility is the second leading determining factor, controls potency.

Greater protein bound + increase lipid solubility = longer duration of action

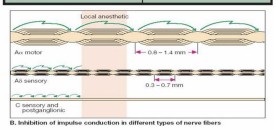
Toxicity & Allergies

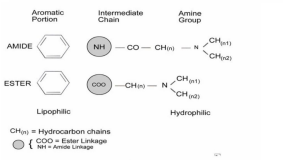
Esters: Increase risk for allergic reaction due to para-aminobenzoic acid produced through ester-hydralysis not in the market anymore

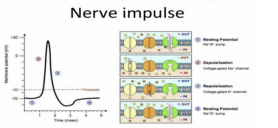
Amides: Greater risk of plasma toxicity due to slower metabolism in liver by CYP450.

TABLE 2. Local anesthetics

AMIDE GROUP	ESTER GROUP
Lidocaine	Cocaine
Mepivacaine	Procaine
Bupivacaine	Chloroprocaine
Etidocaine	Tetracaine
Prilocaine	







Local Anesthetic Systemic Toxicity (LAST)

Causes

- Intravascular injection [1]
- Exceeding the maximum safe dose:

- Bupivacaine [2] (2 mg/kg)
- Lidocaine [3](5 mg/kg).

Manifestations

CVS:

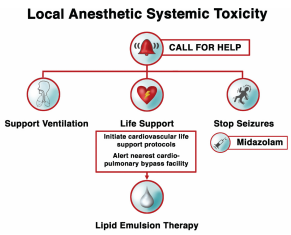
>Tachycardia and hypertension.
> Hypotension
> Wide QRS
>VF
> Cardiac arrest

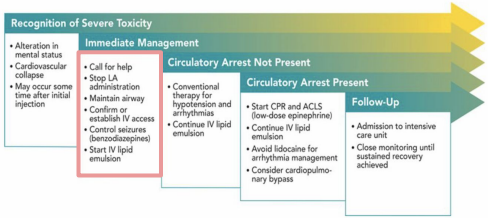
BOX 1 *Manifestations of Systemic Toxicity*

Minor (Associated With Low Plasma Levels)	Major (Associated With High Plasma Levels)
■ Perioral numbness	■ Sudden loss of consciousness
■ Facial tingling	■ Tonic-clonic seizures
■ Restlessness	■ Cardiovascular collapse
■ Tinnitus	■ Cardiac arrest
■ Metallic taste	
■ Vertigo	
■ Slurred speech	

activation phase first (as tingling, agitation...) then depression phase (as loss of consciousness...)
First the patient will experience oral numbness then blurred vision then becomes unresponsive, then convulsions then coma.

Management[4]





IV lipid emulsion is an effective antidote for lipophilic drugs poisoning

1- Due to the C-max, immediate building up of Anesthetics in the plasma. It's dangerous because it's really fast that there is no time for the body to defense (يا غافلين لكم الله)
2- Used in nerve block, long acting, more potent, higher cardiac toxicity, 75kg > 150ml
3- Most common. used in plastics, dental, and skin anesthesia , short acting, 100kg > 500ml
4- Intubate and ventilate immediately to prevent hypoxia, hyperkalemia that causes Acidosis which will shift the local Anesthesia from protein binding to free type which rises the toxicity

Lecture Quiz

answers: 1(D) 2(A) 3(B) 4(B) 5(A) 6(C)

Question 1: All of the following factors may influence the spinal level achieved during spinal anesthesia, except:

A. Drug dose
B. Needle direction
C. Patient position at the time and immediately following injection
D. Patient weight

Question 2: During placement of an interscalene block utilizing 0.5% bupivacaine, a 62-year-old patient suddenly starts experiencing seizures and loses consciousness. Which of the following statements regarding local anesthetic toxicity is correct?

A. Seizure is a sign of neurotoxicity from high dose of local anesthetic
B. Loss of consciousness is a sign of low-dose local anesthetic neurotoxicity
C. The seizure threshold is increased by the administration of thiopental
D. Seizure may have been caused by injection of the local anesthetic into cervical nerve root

Question 3: A 27-year-old G2P1 at 39 2 weeks' gestation is electing to have spinal anesthesia for a repeat cesarean section. Five minutes after bupivacaine spinal injection, the patient becomes hypotensive and is complaining of tingling in her fingers with subjective difficulty breathing. Her oxygen saturation remains 100% and blood pressure is 95/55. The most likely etiology is:

A. Engorgement of epidural veins contributed to inadvertent intravascular injection of the local anesthetics
B. Decrease in volume of CSF in the subarachnoid space facilitated higher spread of local anesthetics
C. Severe patient anxiety
D. Increased peripheral nerve sensitization to local anesthetics

Question 4: During epidural placement using a midline approach, the epidural needle penetrates all the following anatomical layers, except:

A. Ligamentum flavum
B. Subarachnoid membrane
C. Supraspinous ligament
D. Intraspinous ligament

Question 5: A 75-year-old female with ovarian cancer is scheduled for total abdominal hysterectomy/bilateral salpingo oophorectomy and tumor debulking. A thoracic epidural anesthesia was performed using a test dose of 1.5% lidocaine with 1:200,000 epinephrine injected through the epidural Tuohy needle that resulted in no evidence of adverse sequelae. An epidural catheter was then threaded through the needle followed by evidence of negative aspiration through the catheter. A total of 10 mL 0.5% bupivacaine was administered through the epidural catheter. Thirty seconds later, the patient became agitated and complained of lightheadedness, tinnitus, and feeling faint, but still able to move all of her extremities. Her BP decreased from 150/70 to 100/45 mm Hg and her HR decreased from 85 to 55 bpm. The patient maintained spontaneous breathing throughout with an oxygen saturation (SpO_2) of 95%. The most likely diagnosis is:

A. Local anesthetic systemic toxicity (LAST)
B. High epidural anesthesia
C. Total spinal anesthesia
D. Anaphylactic reaction

Question 6: All of the following local anesthetic systemic toxicity (LAST) treatment measures should be performed when caring for a patient who may be experiencing toxicity, except:

A. Stop epidural medication administration
B. Support the airway with 100% oxygen
C. Administer intravenous epinephrine according to ACLS protocols
D. Administer an intralipid bolus and continuous infusion

Explanation File

Good Luck

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