Types of anaesthesia

Pros Cons

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Todays agenda…

- Types of anaesthesia
- Advantages – disadvantages
- Airway maintance
- Clinical scenario

The term anaesthesia comes from the Greek meaning loss of sensation

History

Ancient/ medieval period

- Alcohol
- Opium (poppy)
- Hyoscine (Mandrake)
- Cannabis (Hemp)

Ether dome

History

1845 Horace Wells N2O

1846 William Morton Ether

1847 Simpson Chloroform

1853 John Snow

1878 endotracheal tube

1884 cocaine

1895-98 spinal analgesia/anaesthesia

W.T.G. Morton, Inventor and Revealer of Anesthetic Inhalation
Before Whom in all time Surgery was Agony
By Whom Pain in Surgery was Averted and Annulled
Since Whom Science had control of Pain

History

- 1921 Epidurals
- 1934 Thiopentone, cyclopropane
- 1942 Curare
- 1946 Lidocaine
- 1951 suxamethonium
- 1952 IPPV (intermittent positive pressure ventilation)
- 1956 Halothane

History

Recently..

- Monitoring
- Propofol
- Sevoflurane/desflurane
- Remifentanyl
- Sugammadex
- Peripheral blockade
- New local anaesthetics

Types of anaesthesia

- **General anaesthesia**
- **Locoregional anaesthesia**

  -> regional: spinal, epidural (combined spinal-epidural),

  peripheral nerve blocks

  *Intravenous Regional Anesthesia ->Bier block

  -> local anaesthesia

- **MAC:** monitored anaesthesia care

General anaesthesia

'reversible state of unconsciousness'

- Blocks awareness centers in the brain

Components

Hypnosis

Analgesia — obligatory!

Amnesia

Muscle relaxation (when intubation is needed)

General anaesthesia

Stages

1) induction

2) maintenance

3) emergence

General anaesthesia

Stages

1) induction

2) maintenance

3) emergence

- transition from an awake to an anaesthetized state
- time of physiological **disruption with multi-system effects**
- **Intravenous induction**: hypnotic agent (propofol, thiopental), opioid (fentanyl), muscle relaxant
- **Inhalation induction**: volatile agent (sevoflurane, N_2O)
- **Combination** (volatile and intravenous agents)
- Rapid sequence induction might be needed (minimize risk of regurgitation and aspiration)

General anaesthesia

Stages

1) induction

2) maintenance

3) emergence

- If intubation is required, it may be necessary to paralyse the patient using:

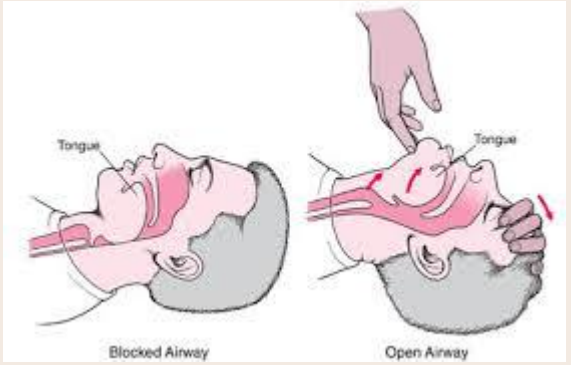
  -> Depolarizing **muscle relaxants** (e.g. suxamethonium)

  -> Non-depolarizing muscle relaxants (benzylisoquinoloniums, e.g. atracurium, or aminosteroids, e.g. rocuronium).
- the soft tissues of the airway relax and patency may be lost (include prolapse of the tongue into the posterior pharynx and loss of muscular tone in the soft palate)
- **Protective airway reflexes are also suppressed**

General anaesthesia

Airway maintenance

The **head-tilt chin-lift** is the primary maneuver used in any patient in whom cervical spine injury is NOT a concern



The **jaw-thrust maneuver** is an effective airway technique, particularly in the patient in whom cervical spine injury is a concern. This maneuver moves the tongue anteriorly with the mandible, minimizing the tongue's ability to obstruct the airway.
Cervical spine immobilization!!!

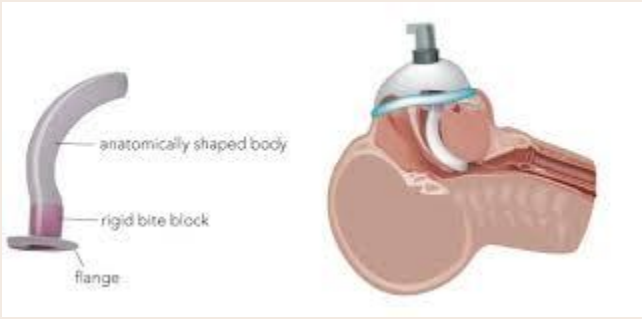
AIRWAY ADJUNCTS

- Oropharyngeal airways
- Nasopharyngeal airways

General anaesthesia

AIRWAY ADJUNCTS

- **Oropharyngeal airways (OPAs)** should only be used in a deeply unresponsive patient. In responsive patients they can cause vomiting and aspiration.
- The OPA is a curved, firm, hollow tube, with a rectangular aperture, that is used to maintain a conduit between the mouth and the glottis and to prevent obstruction by the patient's tongue and other soft tissue
- Placement: starting with the curve of the OPA inverted (ie, directed cephalad) and then rotating it 180 degrees as its tip reaches the posterior pharynx



While placing an Oropharyngeal airways make sure you are NOT:

- **Pushing the tongue posteriorly**, thereby exacerbating the airway obstruction
- Using an **incorrectly-sized device**: too small a device is ineffective and can be lost in the oropharynx, possibly causing obstruction; too large a device can press against the epiglottis and obstruct the larynx
- **Catching the tongue or lips** (usually the lower lip) between the airway and the teeth, thereby traumatizing the soft tissue
- Using the device **in a patient with intact airway reflexes**, possibly inducing vomiting.

The OPA must be removed if protective reflexes are present.

General anaesthesia

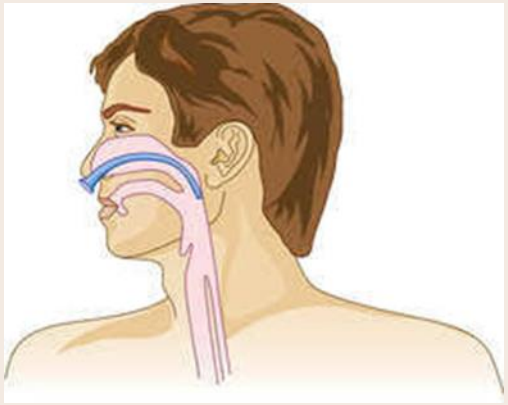
AIRWAY ADJUNCTS

Nasopharyngeal airway (NPA)

- soft rubber or plastic hollow tube that is passed through the nose into the posterior pharynx.
- Tolerated in patients with intact airway reflexes.
- Prior to insertion, the NPA should be coated with water-soluble lubricant or anesthetic jelly.

AVOID

- Using an airway that is too long (the tip to enter the esophagus, increasing gastric distention and decreasing ventilation during rescue efforts)
- Injuring the nasal mucosa causing bleeding (this occurs in 30% of insertions and can lead to aspiration of blood or clots)



And then what? Ventilate!

Single-hand technique
for bag-mask ventilation

double-hand technique
for bag-mask ventilation

Please don't give excessive tidal volumes

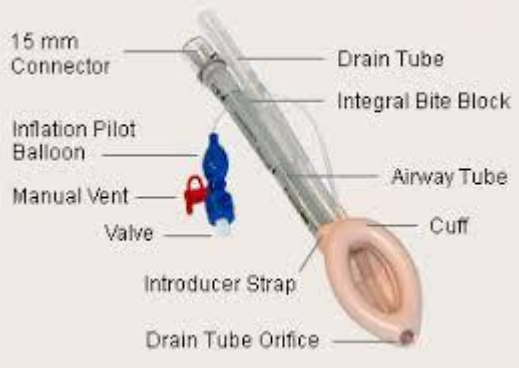
- don't force air too quickly

- don't ventilate too rapidly

Having trouble ventilating?

- **Inadequate airway maneuvers**: ensure the jaw-thrust and other maneuvers are being done effectively in order to open the airway.
- **Inadequate mask seal**: patients with facial hair may need jelly or water applied to improve the seal. Edentulous patients should have their false teeth reinserted or their cheeks expanded with 4 x 4 gauze.
- **Improper mask size**: ensure that the corners of the mouth and all airway adjuncts are inside the body of the mask, NOT creating a leak by interfering with mask seal.
- **Lack of airway adjuncts** (ie, nasopharyngeal and oropharyngeal airways): verify that airway adjuncts are being utilized and in proper position.

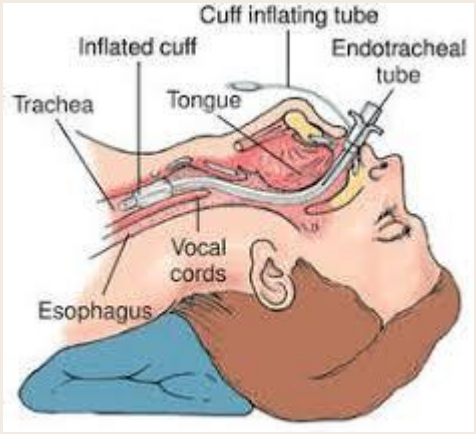
Inexperienced personnel: determine if a more experienced clinician needs to be recruited to help provide optimal bag-mask technique, particularly mask seal



What comes next?

Maintaining the airway!

- supraglottic devices (laryngeal mask, i-gel)
- infraglottic techniques (tracheal intubation)
- surgical methods (cricothyrotomy, tracheotomy)



Device	Supraglottic	Endotracheal
		
Features	Sits above vocal cords	Passes through vocal cords
	Maintains airway	Inflated cuff
	No airway protection against aspiration	Airway protected

General anaesthesia

Stages

1) induction

2) maintenance

3) emergence

- keeping a patient unconscious (**hypnosis, analgesia**) and can be achieved using inhaled **volatile agents** or continuous infusion of **intravenous agents** (or combination)
- The concentrations of the inhaled agents are measured and displayed.
- Expired end tidal concentration is equivalent to the alveolar concentration which in turn represents the concentration at the site of action (CNS)

General anaesthesia

Stages

1) induction

2) maintenance

3) emergence

critical stage!

- maintenance agents can be **switched off**

- adequate analgesia and anti-emesis should be ensured and **neuromuscular junction function restored** if a muscle relaxant has been used

- Patients may develop agitation, laryngospasm and breath-holding, hypertension

- oropharyngeal suction

- Awake or deep extubation

General anaesthesia

Last but Not Least

The recovery room

- An intermediate place of safety between theatre and the ward where immediate surgical or anaesthetic **complications can be detected and managed**

- Vital signs, pain scores and other potential problems such as postoperative nausea and vomiting are monitored.

General anaestesia

Advantages

- Patient cooperation is not essential
- Allows proper muscle relaxation for prolonged periods of time
- Can be adapted easily to procedures of unpredictable duration or extent
- Can be administered without moving the patient from the supine position
- Facilitates complete control of breathing, airway and circulation
- Can be administered rapidly and is reversible

Disadvantages

- Haemodynamic changes, cardiac depression and hemodynamic instability
- Virtually all anesthetic agents have intrinsic myocardia depressant properties. Negative chronotropy (↓heart rate), Negative inotropy (↓stroke volume)
- The vasodilatory effects of the volatile agents can resu in serious hypotension when combined with this negative inotropy
- The stress of anesthesia and surgery frequently unmasks previously undiagnosed heart disease

- Aspiration, laryngospasm, failure to ventilate
- Nausea and vomiting, drowsiness
- Hypothermia, Shivering
- allergic reactions, corneal abrations
- Delirium, Cognitive dysfunction,

Locoregional anaesthesia

-> **regional**: 1)spinal

2)epidural

(combined spinal-epidural)

Neuraxial blockade

3)peripheral nerve blocks

*Intravenous Regional Anesthesia ->Bier block

-> **local anaesthesia**

- CSF discovered 1764 by Domenico Catungo
- CSF circulation 1825 by F. Magendie
- First spinal analgesia 1885 by Leonard Corning
- First planned spinal anaesthesia 1891 by August Bier
- The epidural space was first described by corning in 1901 and Fidel Pages
- first used epidural anaesthesia in humans in 1921

Anatomy

- Spinal cord Begins at foramen magnum
  -> Extends to sacral hiatus
- Three coverings: Pia , dura, arachnoid

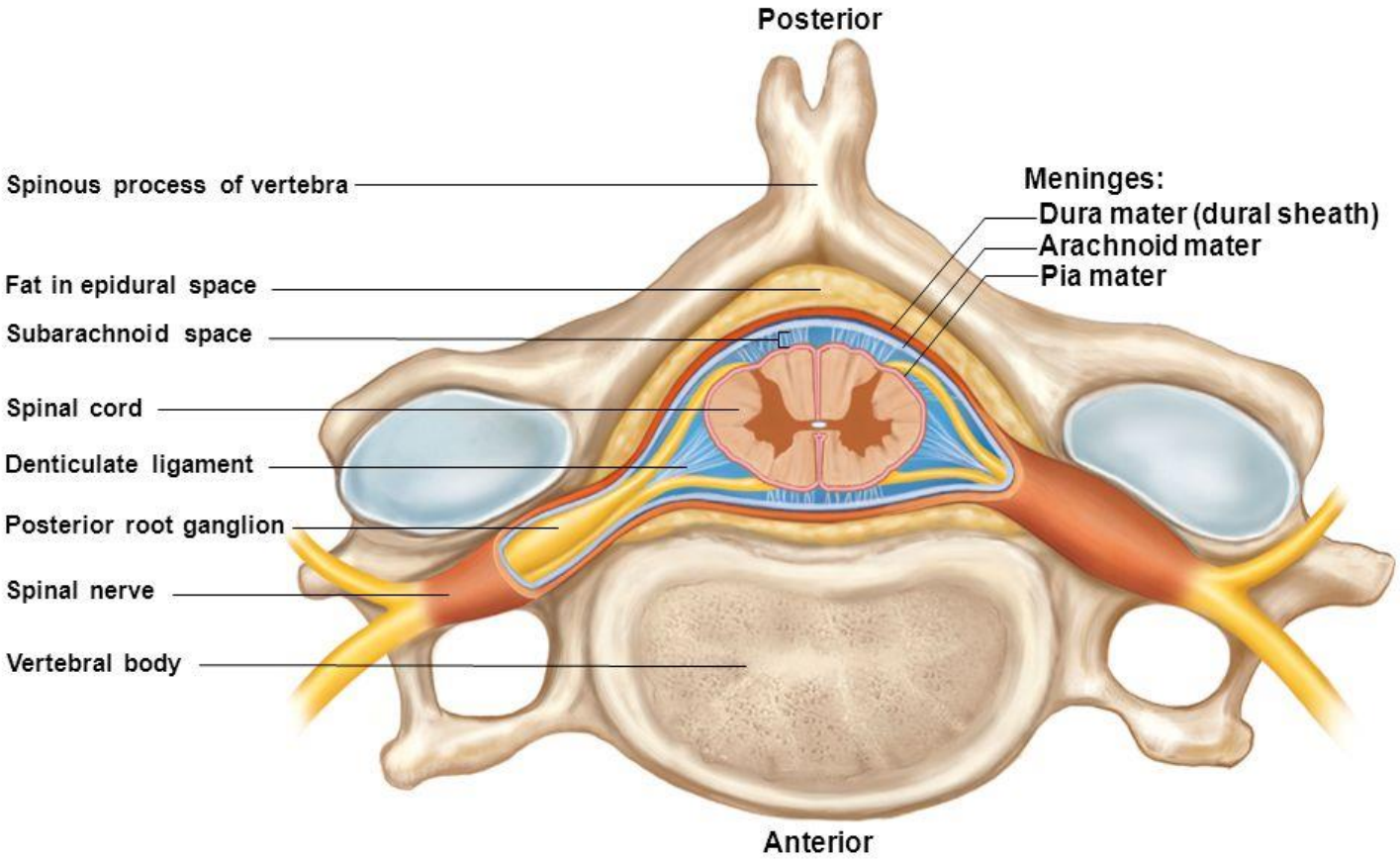
Subarachnoid space

Between pia and arachnoid
Cerebral ventricles to S2
Contain CSF spinal cord and its nerves &blood vessels
CSF total 100ml-150ml below foraman magnum 25-40ml
Spinal cord extends to L3 at birth L1-2 by age 2

Epidural space

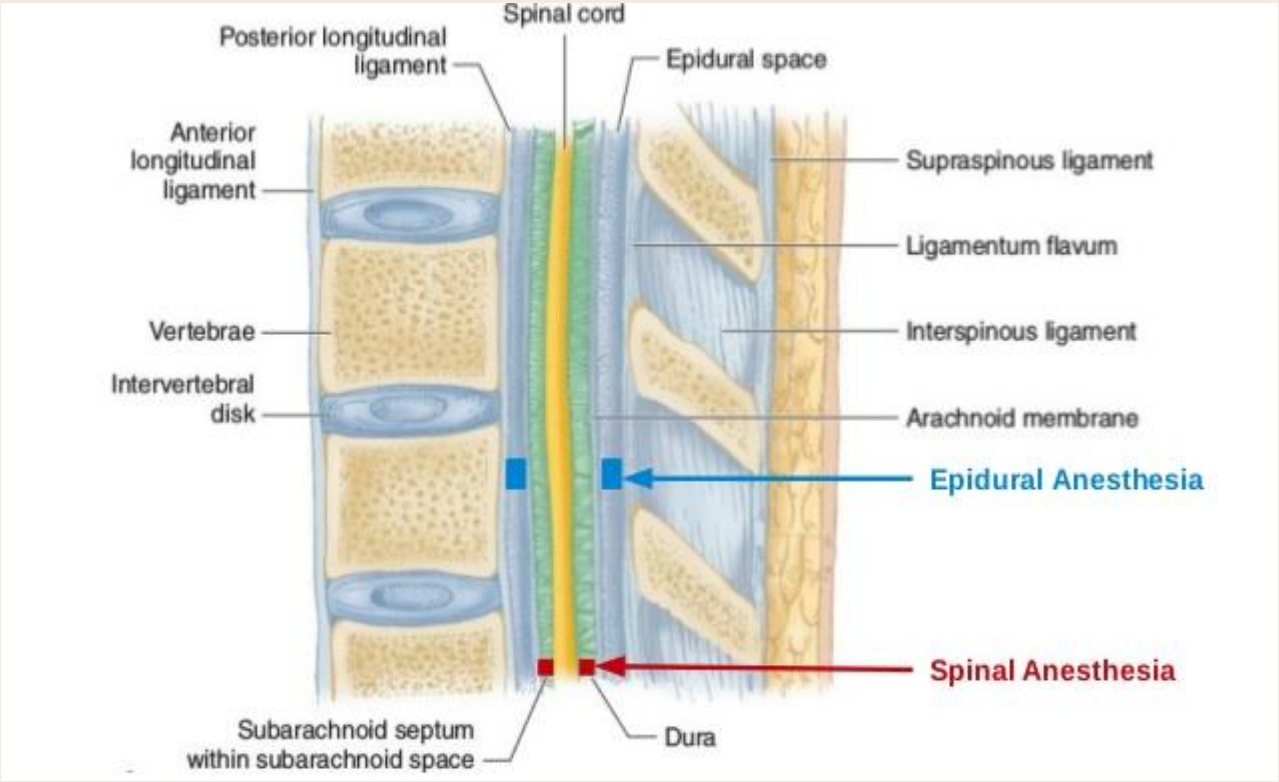
Potential space
Triangular in shape (apex posteriorly)
Superiorly foramen magnum -> sacrococcygeal ligament
to reach epidural space: Skin -> subcutaneous tissue -> supraspinous -> interspinous ->ligamentum flavum

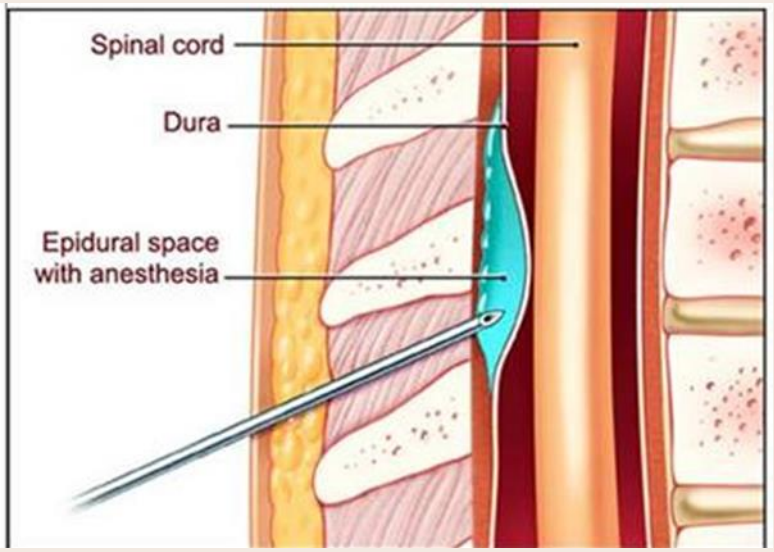
Spinal Cord, Nerve roots and Nerves

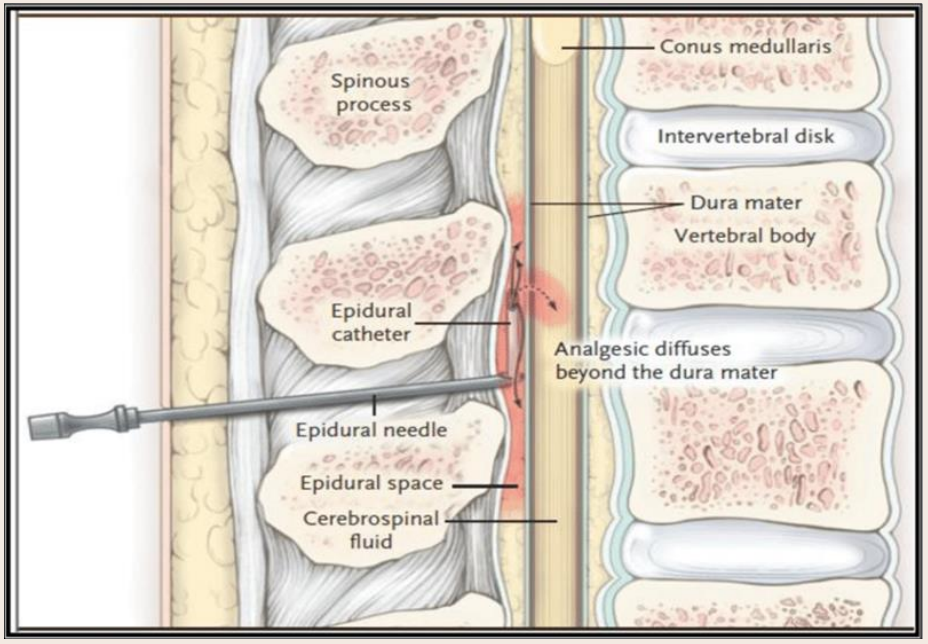


Neuraxial blockades

- Local anesthetic (alone or with adjunctives) is injected into CSF (**spinal anesthesia**) or the epidural space (**epidural anesthesia**) and bathes the nerve root in the subarachnoid or epidural space.
- The principal site of action for neuraxial blockade is believed to be the nerve root
- Reversible nerve blocking




Spinal cord
Dura
Epidural space
with anesthesia

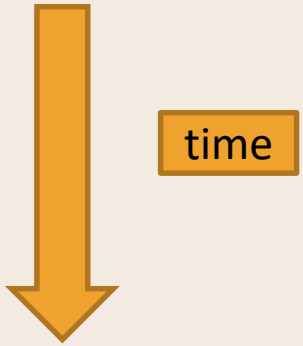

Conus medullaris
Spinous
process
Intervertebral disk
Dura mater
Vertebral body
Epidural
catheter
Analgesic diffuses
beyond the dura mater
Epidural needle
Epidural space
Cerebrospinal
fluid

Physiology of Regional Anesthesia

- Inhibition of sodium channels
- Absorption into systemic circulation terminate action

Sequence of neural blockade on spinal anesthesia

- Sympathetic block (B fibers: vasodilatation, skin temp ↑)
- Loss of pain and temp (Aδ & C fibers)
- Loss of proprioception & touch (Aγ & Aδ fibers)
- Motor blockade (Aα fibers)

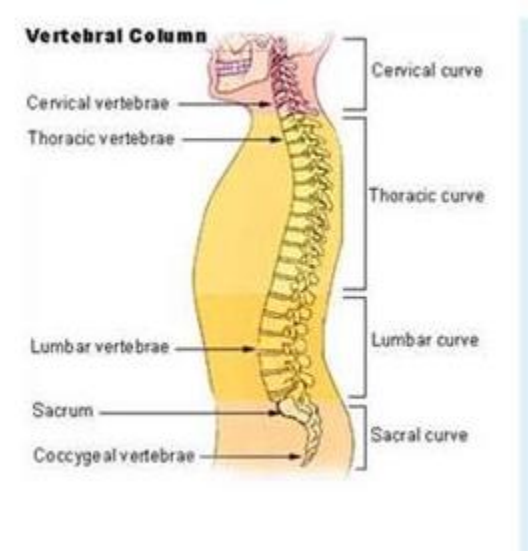


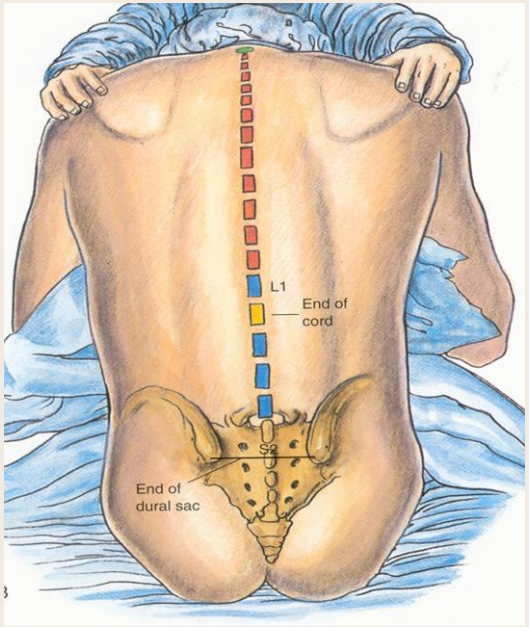
- Sympathetic blockade 2 segments higher than sensory
- Motor blockade 2 segments lower than sensory
- Motor blockade not very apparent during epidural anesthesia and patient can even ambulate

Spinal - epidural anaesthesia

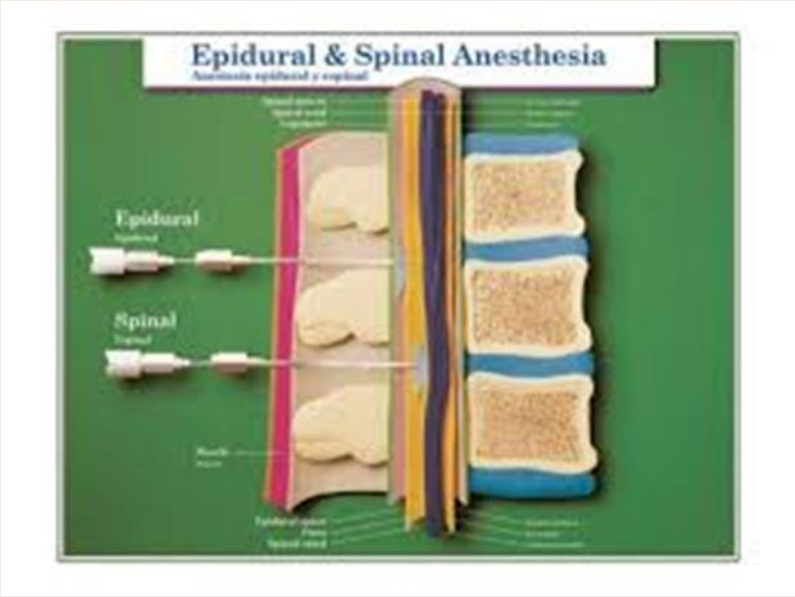
- A safe and effective alternative to general anesthesia when the surgical site is located on the lower extremities, perineum (eg, surgery on the genitalia or anus), or lower body wall (eg, inguinal herniorrhaphy).
- Spinal anesthesia produces intense sensory and motor blockade as well as sympathetic blockade the goal of spinal anesthesia is to instill the desired medications into the cerebrospinal fluid (CSF).
- Spinal: The sensorimotor block produced requires smaller doses of local anesthetics (hence, local anesthetic toxicity is rarely a concern) and is often more dense in character.
- continuous spinal anesthesia

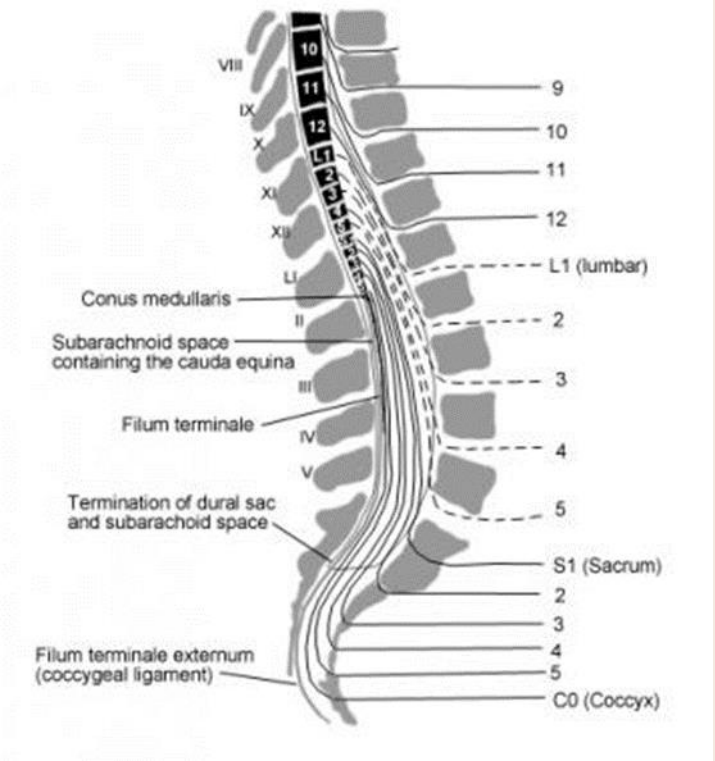
- The patient may be placed in either the lateral decubitus position or sitting up with support from an assistant.



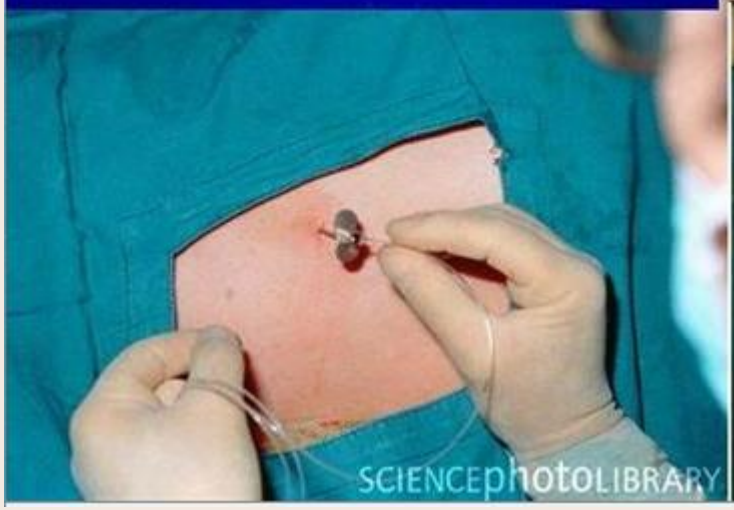


- The goal is to inject the chosen medication(s) into the cerebrospinal fluid-filled subarachnoid space.





epidural



spinal

Smaller needles!

Procedure	Dermatomal Level
Upper abdominal surgery	T4
Intestinal, gynecologic, and urologic surgery Transurethral resection of the prostate	T6
Vaginal delivery of a fetus, and hip surgery	T10
Thigh surgery and lower leg amputations	L1
Foot and ankle surgery	L2
Perineal and anal surgery	S2 to S5 (saddle block)

Differences between Spinal and Epidural Anesthesia

Spinal anaesthesia	Epidural Anaesthesia
Level: below L1/L2, where the spinal cord ends	Level: at any level of the vertebral column.
Injection: subarachnoid space i.e punture of the dura mater	Injection: epidural space (between Ligamentum flavum and dura mater) i.e without punture 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.

Cardiovascular effects of neuraxial blockade

- Vasomotor tone determined by sympathetic fibers arising from T5 to L1 innervating arterial & venous smooth muscle. A ↓ in blood pressure that may be accompanied by ↓ in heart rate.

- With high sympathetic block, sympathetic cardiac accelerator fibers arising at T1-T4 are blocked, leading to ↓ cardiac contractility.

- Bezold-Jarisch reflex has been implicated as a cause of bradycardia , hypotension and cardiovascular collapse after central neuraxial anaesthesia , in particular spinal anaesthesia

Pulmonary effects of neuraxial blockade

- Even with high thoracic levels, tidal volume is unchanged. A small decrease in vital capacity due to paralysis of abdominal muscles is necessary for forced exhalation & not due to decrease in phrenic nerve or diaphragmatic function.
- Effective coughing & clearing of secretions may get affected with higher levels of block.
- Rare respiratory arrest associated with spinal anaesthesia due to hypoperfusion of respiratory centers in brain stem.

Gastrointestinal function

- Nausea and vomiting in up to 20% patients due to gastrointestinal hyperperistalsis caused by unopposed parasympathetic(vagal) activity.
- Vagal tone dominance results in small contracted gut with active peristalsis & can provide excellent operative conditions for some laproscopic procedures when used as an adjunct to GA.
- Hepatic blood flow will ↓ with reductions in mean arterial pressure.

Renal function

- Renal function has a wide physiological reserve. ↓ in renal blood flow is of little physiological importance.
- Neuraxial blocks are a frequent cause of urinary retention which delays discharge of outpatients & necessitates bladder catheterization in inpatients.

Endocrine system

- Partially block the release of catecholamines , cortisol & ADH

Spinal anaesthesia

Advantages (2-4ml)

- used mainly for surgery of the lower belly and the legs.
- Avoids hazards of general anaesthesia
- Lower incidence of nausea vomiting
- Less opioids
- Simple, rapid onset, no risk of failed intubation/aspiration

Disadvantages:

- rapid onset of sympathetic blockade (abrupt, severe hypotension)
- recovery time may be prolonged (especially for short procedures)
- cannot prolong anaesthesia
- airway not secured for emergency
- Coagulation profile

Epidural anesthesia

Advantages (>10ml)

- titrated dosing and slower onset (volume dependent, not gravity dependent)

  -> lower risk of severe hypotension.

- Duration of surgery is not an issue
- less intense motor blockade, lower extremity “muscle pump” may remain intact (may ↓ incidence of thromboembolic disease)

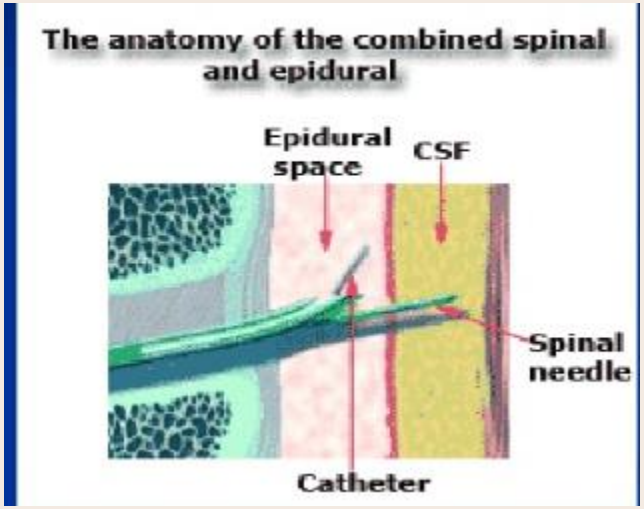
Disadvanatges

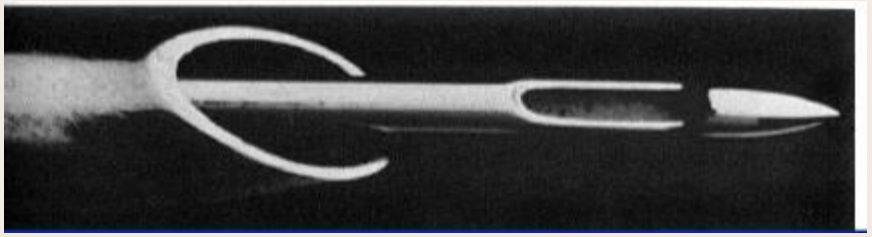
- dura puncture: 1/200-1/500 in experienced hands
- slower onset, less reliable, patchy
- Risk of epidural haematoma
- patient needs to be moved
- Coagulation profile

Combined spinal epidural

- Rapid onset and density of spinal anaesthesia combined with versatility of epidural anaesthesia
- Dense surgical anesthesia via intrathecal route and post op pain control via epidural route
- High risk patients are exposed to a gentler sympathectomy

**Potential for high spinal, inability to test epidural catheter





Neuraxial blockade omplications

- Systemic toxicity
- Headache - Post-Dural Puncture Headache
- Back pain
- Arachnoiditis, meningitis
- Injury to nerves, Permanent injury to the spinal cord
- Epidural hematomas
- Hypotension
- Shivering
- Bladder distension
- Epidural abscess

Peripheral nerve blocks (PNBs)

- Are widely used for surgical anesthesia as well as for both postoperative and nonsurgical analgesia

- The anesthetic **is injected near** a specific nerve or bundle of nerves to block sensations of pain from a specific area of the body (limp) PNBs provide analgesia that may be superior to other techniques for some patients.

Peripheral nerve blocks (PNBs)

How can we do it?

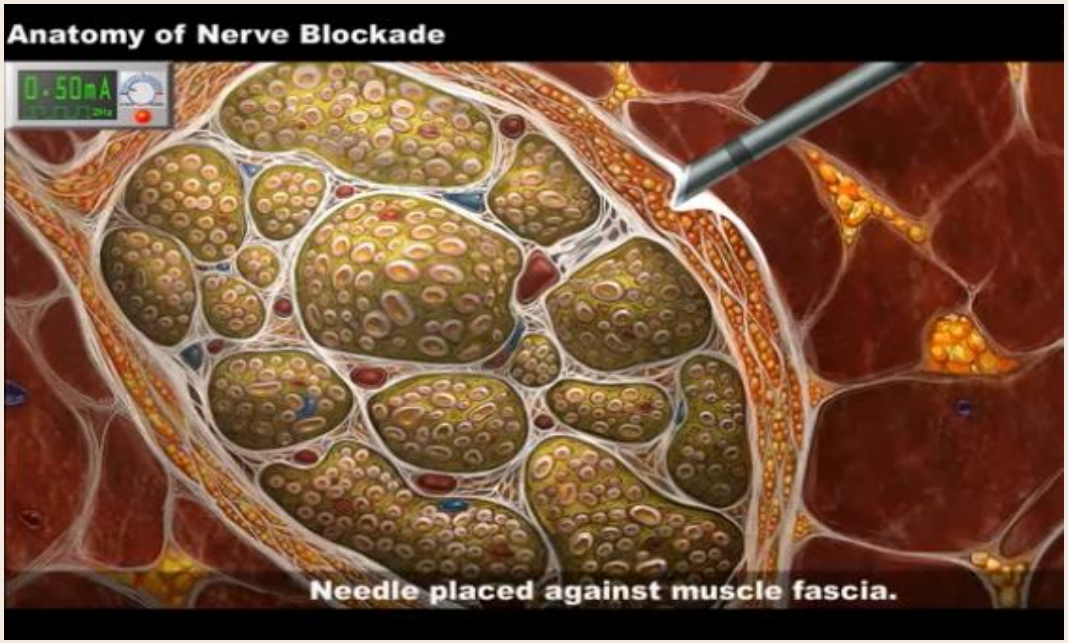
- Anatomic landmarks

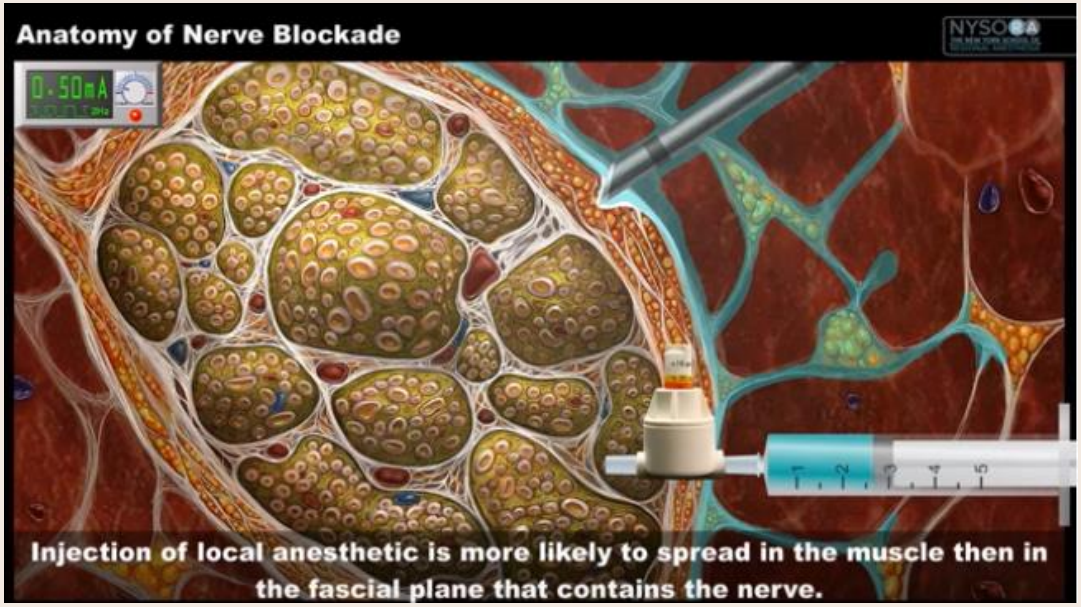
- Neurostimulation

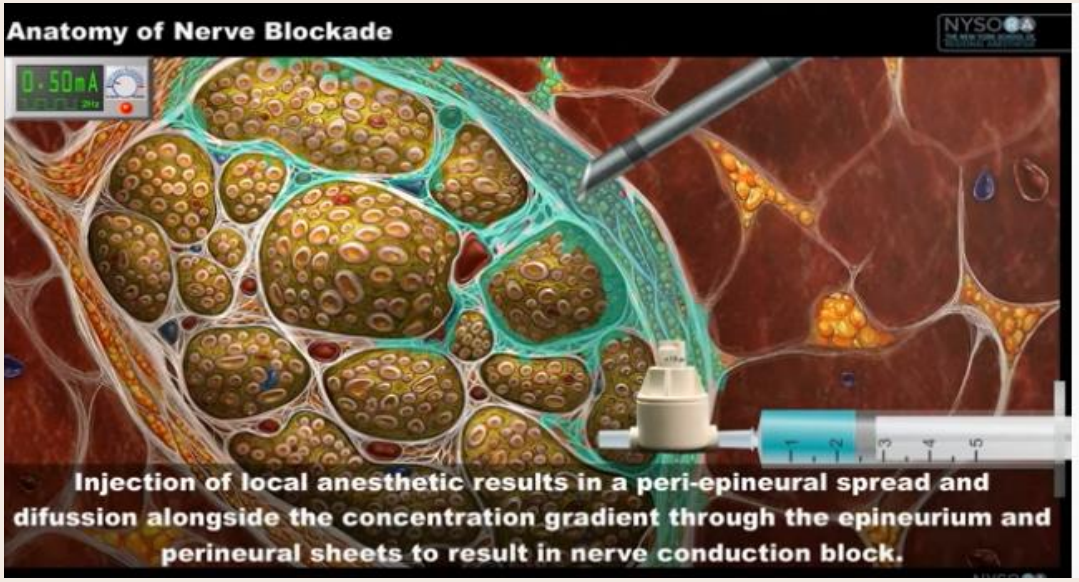
- Ultrasound guidance (goldstandard)

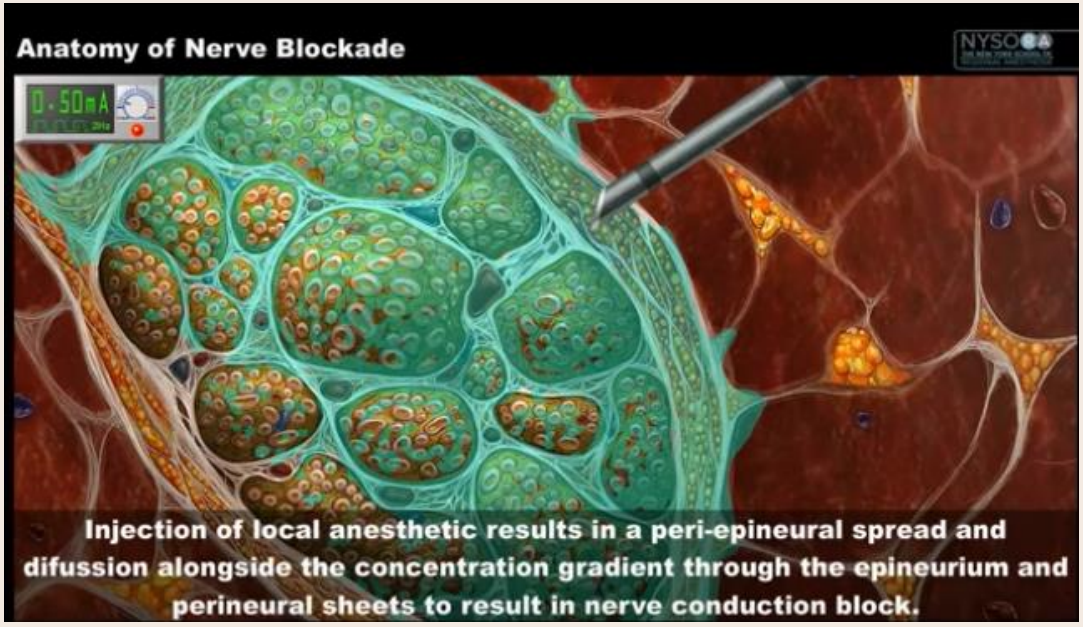
Combination!

*historical technique: Paraesthesia


Anatomy of Nerve Blockade
0.50mA
Needle placed against muscle fascia.


Anatomy of Nerve Blockade
0.50mA
Injection of local anesthetic is more likely to spread in the muscle then in the fascial plane that contains the nerve.


Anatomy of Nerve Blockade
0.50mA
Injection of local anesthetic results in a peri-epineural spread and difussion alongside the concentration gradient through the epineurium and perineural sheets to result in nerve conduction block.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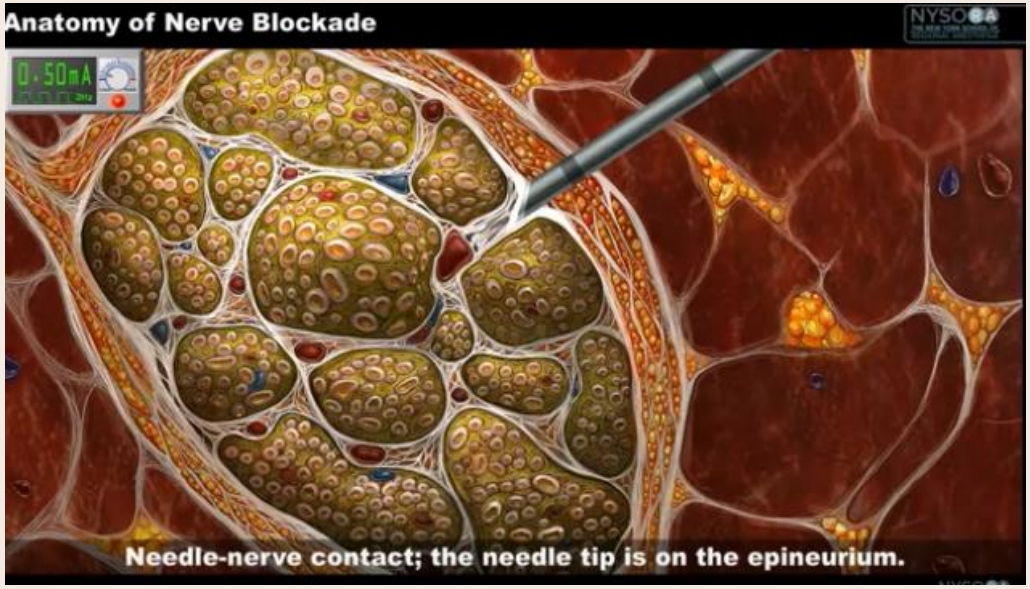
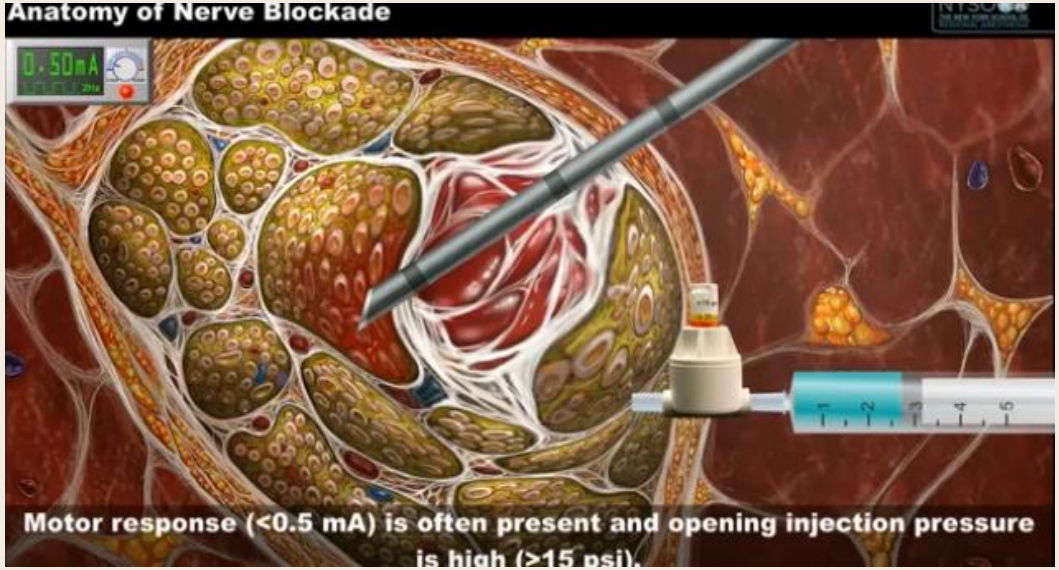
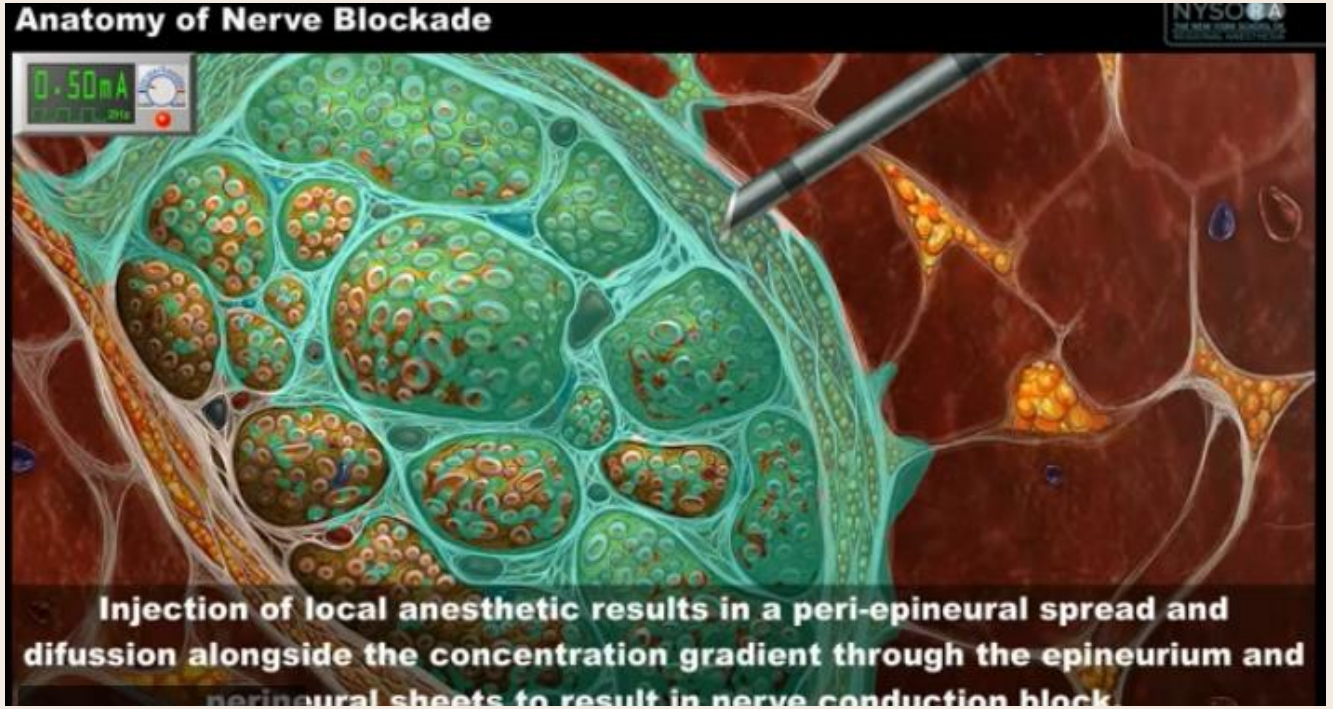

Anatomy of Nerve Blockade
0.50mA
Needle-nerve contact; the needle tip is on the epineurium.


Anatomy of Nerve Blockade
0.50mA
Motor response (0.5 mA) present in 75% of cases; opening injection pressure is high (>15 psi).


Anatomy of Nerve Blockade
0.50mA
Motor response (<0.5 mA) is often present and opening injection pressure
is high (>15 psi).


Anatomy of Nerve Blockade
0-50mA
Injection of local anesthetic results in a peri-epineural spread and difussion alongside the concentration gradient through the epineurium and

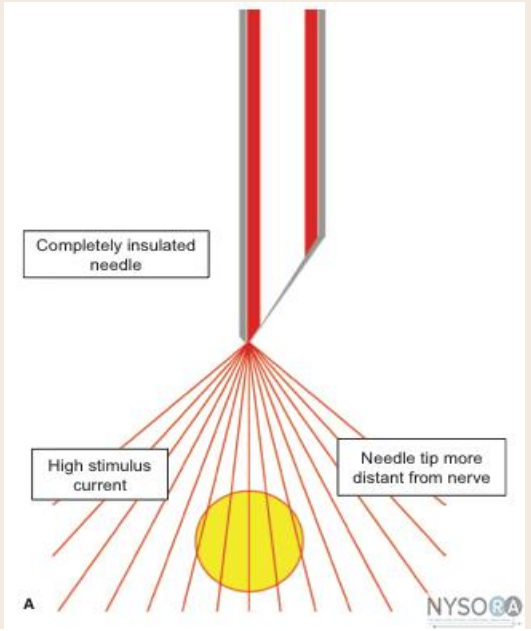
Peripheral Nerve Stimulator

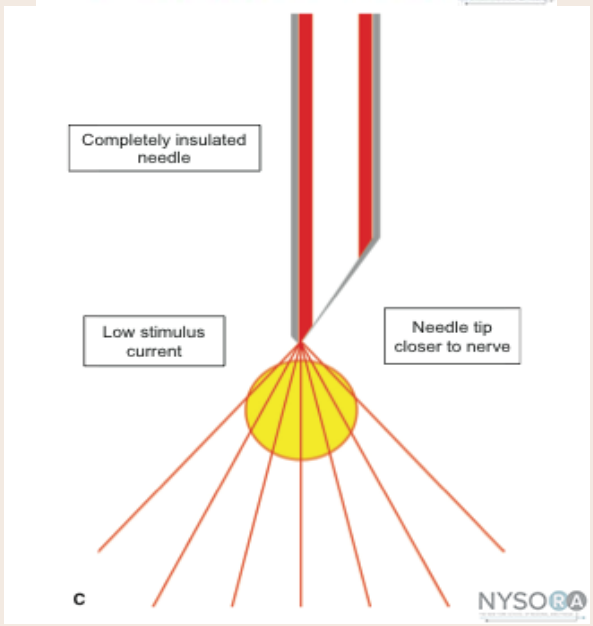
- Electrolocalization of PN: inserting a needle into the tissue and advancing it toward the expected location of the nerve(s) of interest

- RA: low-intensity (up to 5mA) and short-duration (0.05-1ms) electrical stimulus (at 1-2 Hz repetition rate)

PNS

- Atraumatic ball-shaped tip
- Conductive tip diameter <3mm
- Paired mapping pen and nerve stimulator



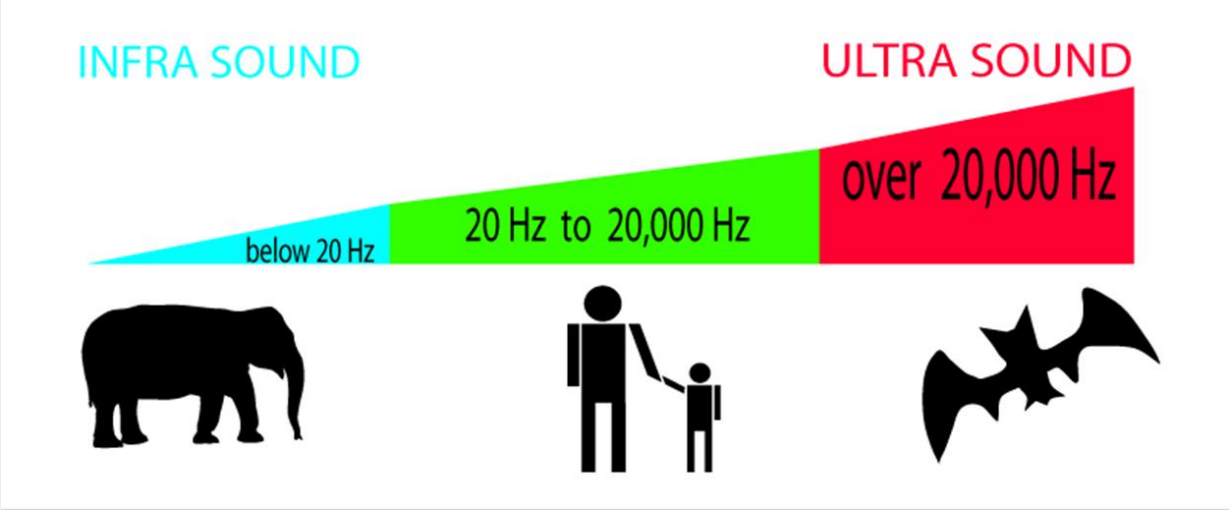


PNS-Goals

- to obtain a defined response (muscle twitch or sensation) to locate a peripheral nerve or nerve plexus with an (insulated) needle
- injection of a certain amount of LA in close proximity to the nerve to block nerve conduction and provide a sensory and motor block for surgery and/or analgesia for pain management
- avoidance of an intramural intrafascicular injection and nerve injury

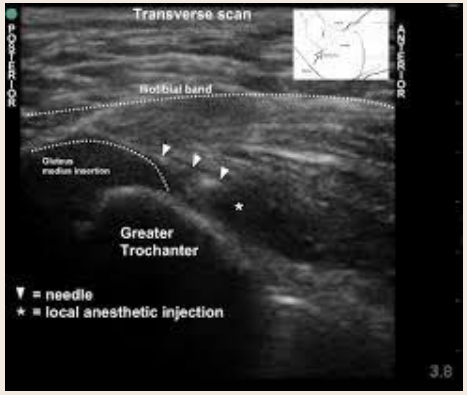

I see with sound....
What's your superpower?

Ultrasound


INFRA SOUND
ULTRA SOUND
below 20 Hz
20 Hz to 20,000 Hz
over 20,000 Hz

US guided
regional anaesthesia

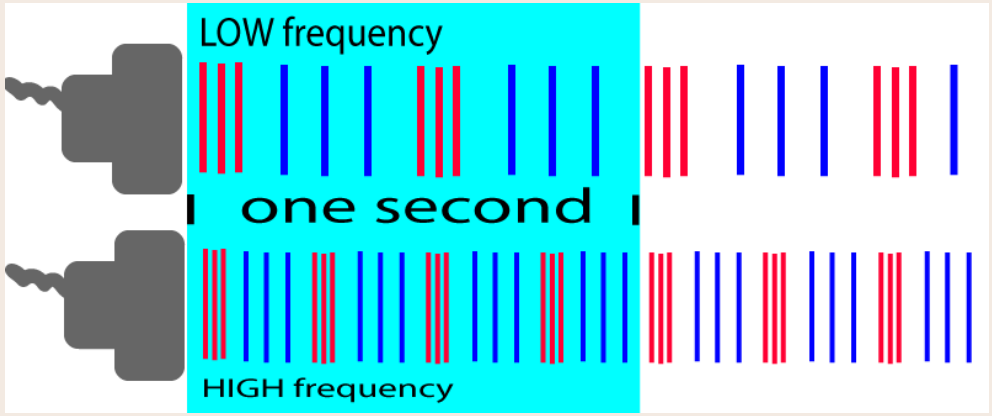
- ‘Seeing’ technique
- Real-time visualization of the nerve/needle interaction

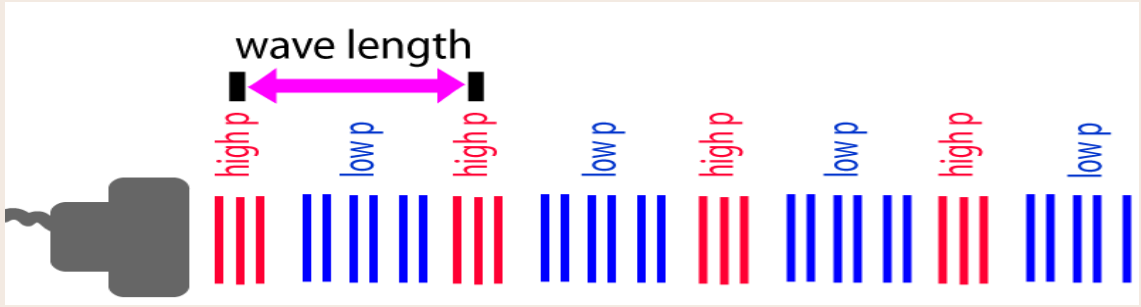


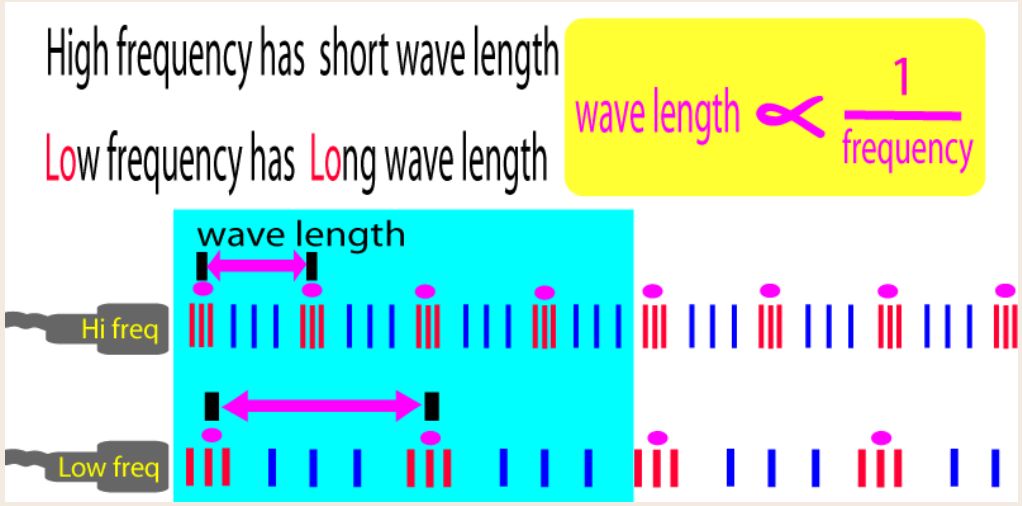
Carty S., Nicholls B. Ultrasound-guided regional anaesthesia. Continuing Education in Anaesthesia, Critical Care & Pain; 2007.

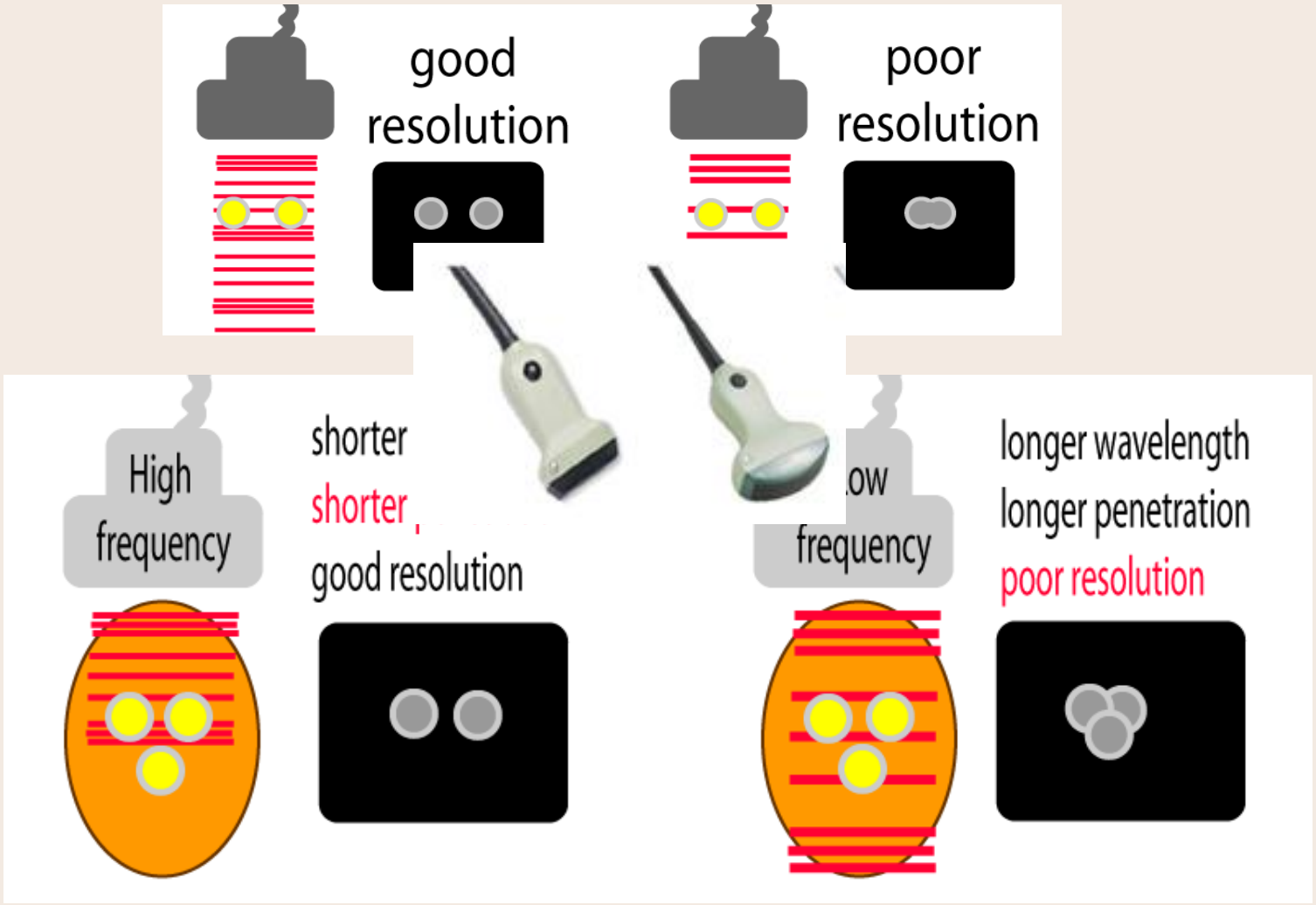
Advantages of US guided regional anaesthesia

- **Visualization** and identification of the target nerve(s) and
- Their **relationship to surrounding structures** (arteries, veins, lung, other nerves)
- Allowance for patient variability (size, shape, anatomical variations)
- Determination of the depth, angle and path of the needle to the target nerve
- Visualization of the spread of local anaesthetic (encircling nerve) and placement of a catheter (↓volume of local anesthetic)
- The procedure can be carried out on anaesthetised patients safely (eg children) and even repeated
- Portability and safety (no ionizing radiation)


LOW frequency
one second
HIGH frequency


wave length
high p
low p
high p
low p
high p
low p
high p
low p

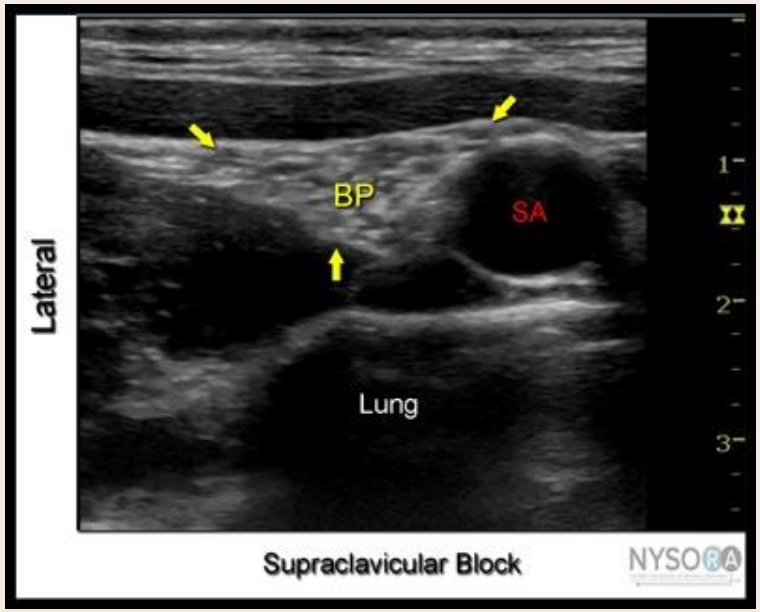

High frequency has short wave length
Low frequency has Long wave length
wave length ∝ 1 / frequency
wave length
Hi freq
Low freq

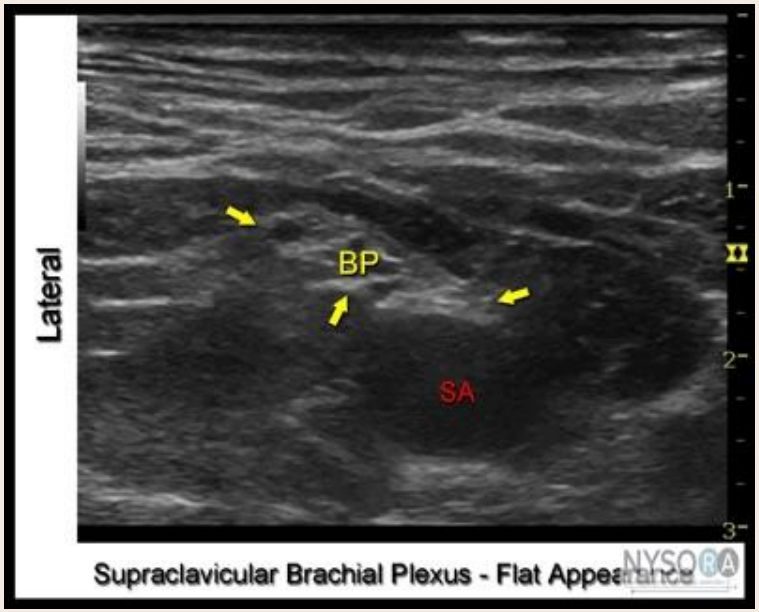


- high frequency has shorter penetration
- low frequency has longer penetration

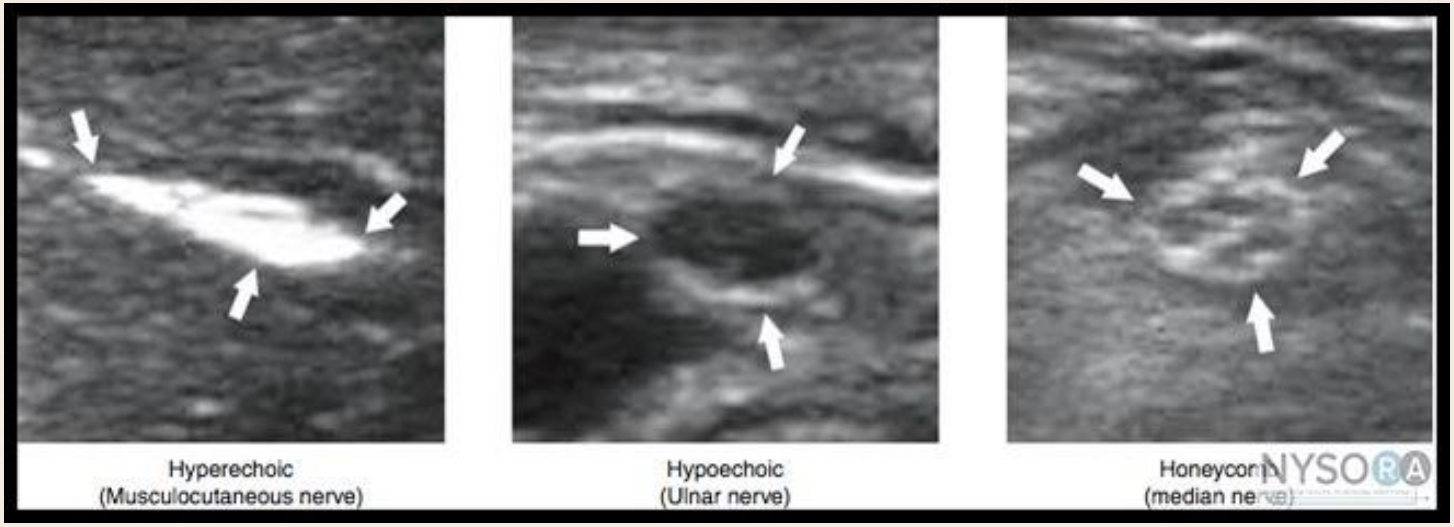
US appearance of the peripheral nerves

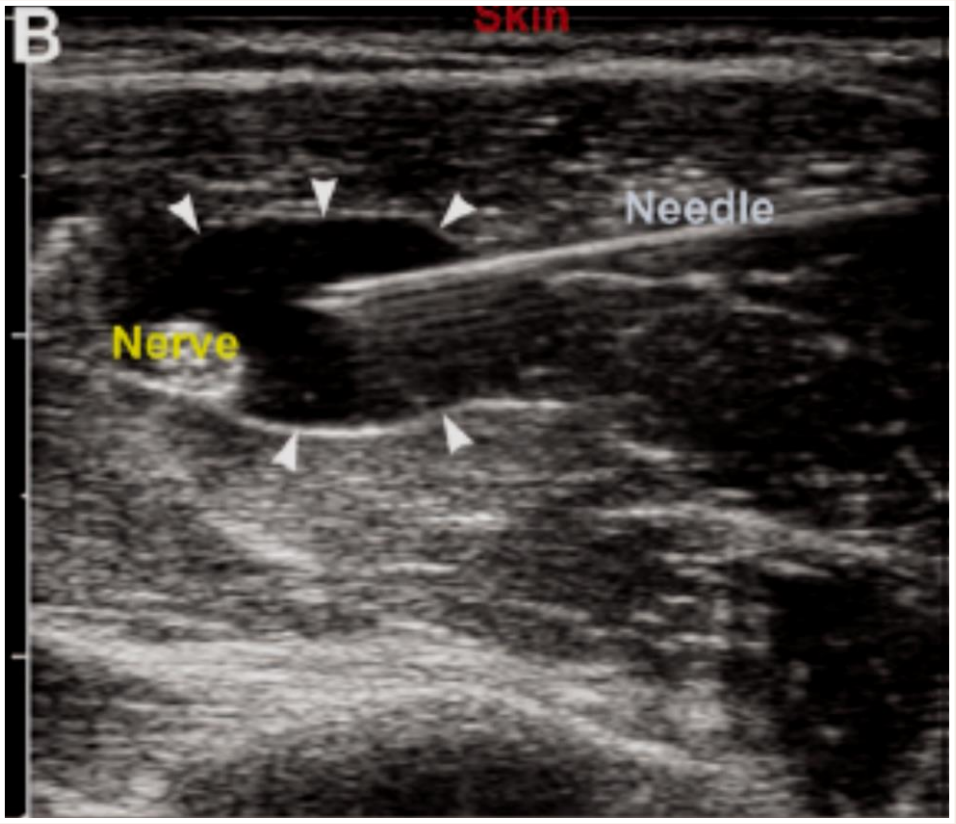
The US appearance of a nerve is primarily dependent on its **size** and the **amount** and **make-up of the support tissue** (epineurium, perineurium)
Axons, or in reality fascicles (collection of axons), appear **black** (hypoechoic) and the **supporting tissue appears bright** (hyperechoic)
At different levels (roots, trunks, and peripherally), the same nerve may vary in appearance from being hypoechoic (bubbles/holes at the roots) to hyperechoic ovoid, triangular or flattened structures in the periphery. This is possibly because of the changing nature of the fascial covering of the nerve as they divide and pass through different tissues





Architecture of PNs



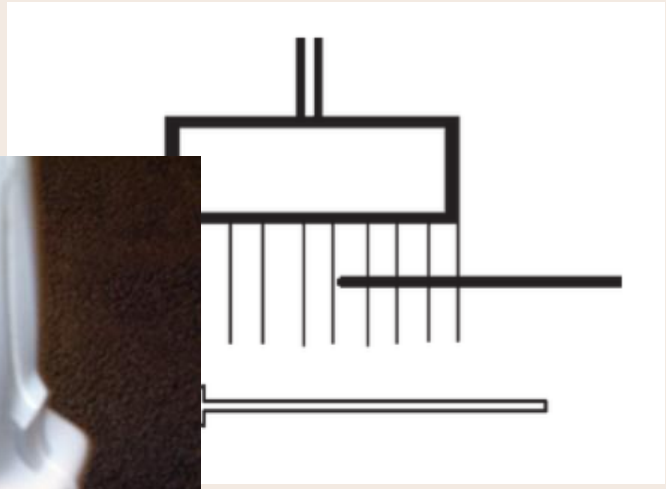

B
Skin
Needle
Nerve

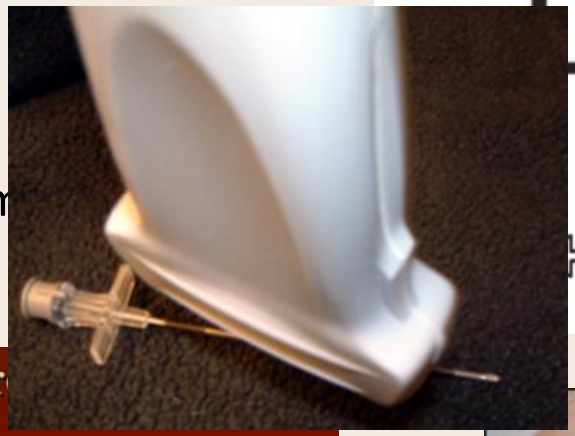
Needle Insertion Techniques

- With relevance to the needle-transducer relationship:
- In-plane (long axis) approach
- Out-of-plane (short axis) approach

In-plane (long axis)

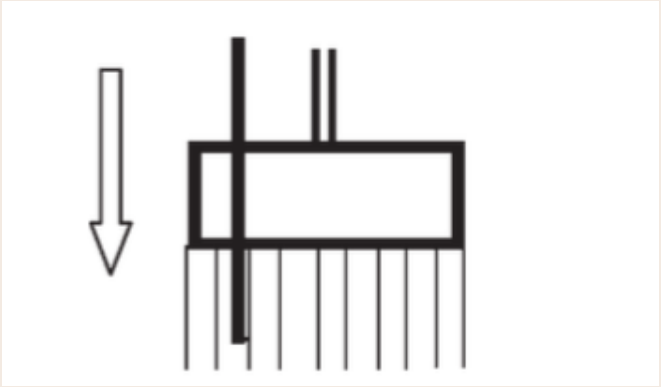
- needle is placed in the plane of US beam
- the tip can be observed real time
- When the needle is not visualized the advancem should be stopped

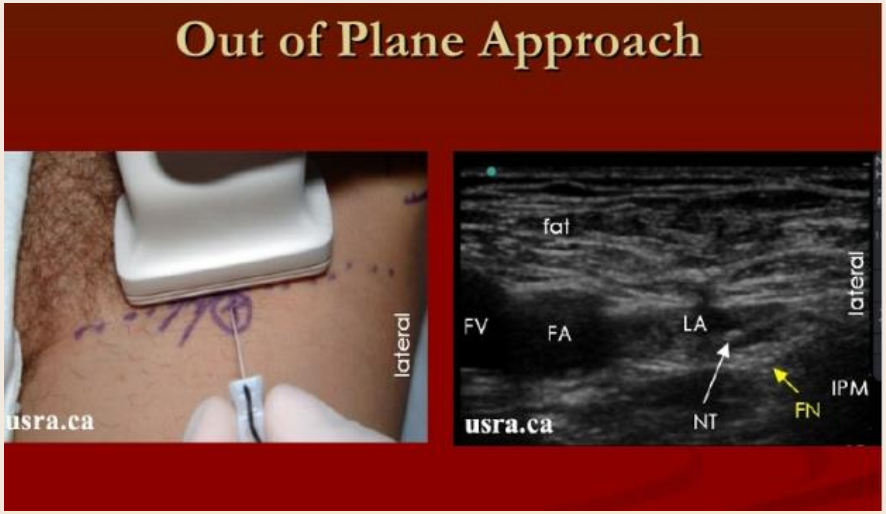




Out-of-plane (short axis)

- needle insertion perpendicularly to the transducer
- needle shaft: bright dot in the image
- AVOID resistance to injection





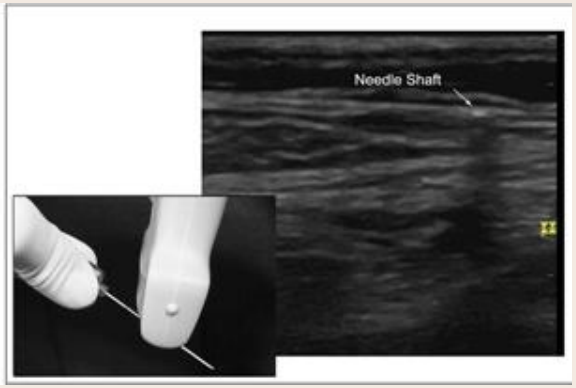
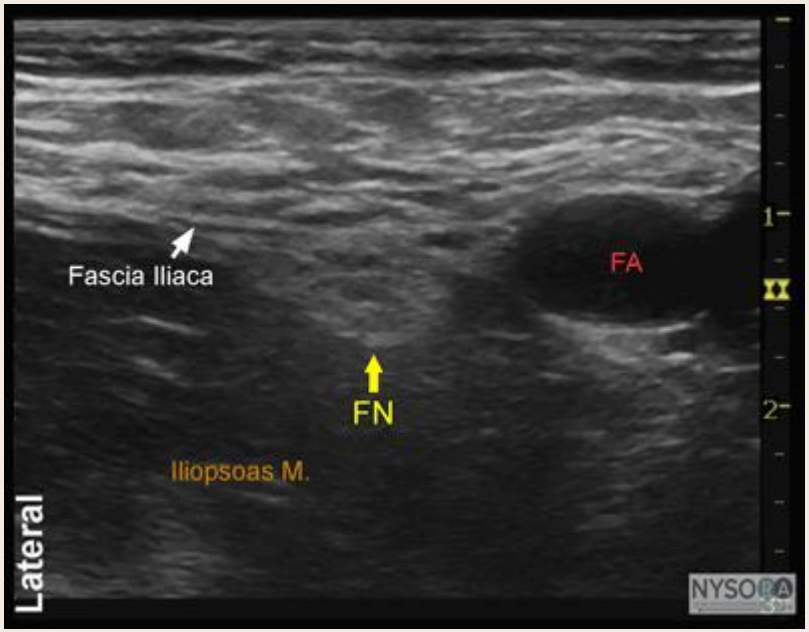
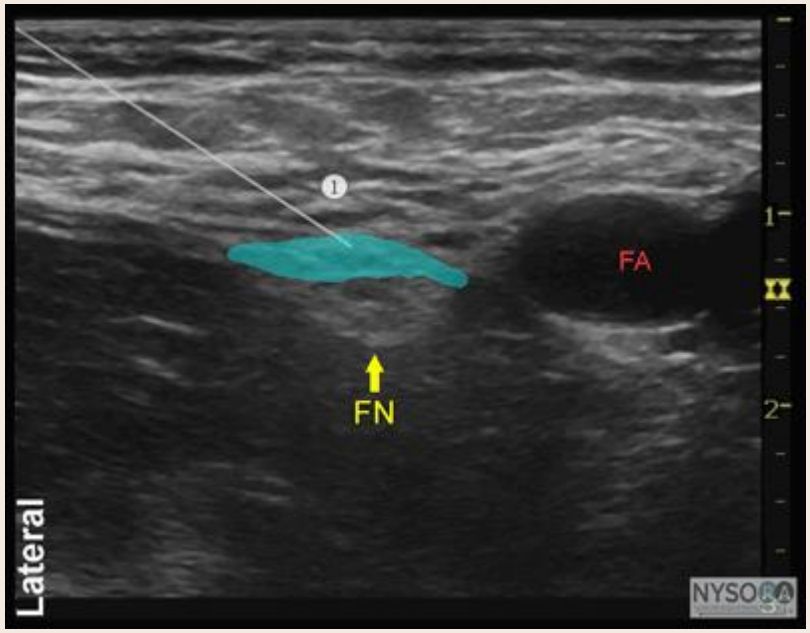


Table 3 Advantages and disadvantages of the LAT or SAT of needle insertion when using the SAX

Needle insertion SAX	Advantages	Disadvanatages
LAT Parallel to US beam—along the long axis of the probe	Needle visualized in entire length. Good visualization of needle–nerve proximity.	Difficult to keep needle in view. Unusual needle entry point. Longer distance—skin to nerve. Often passing through muscle—painful.
SAT At right angles to the beam—across the short axis of the probe	Uses normal entry points (Winnie's—interscalene block). Shortest distance skin–nerve. Less painful—not through muscle.	Needle only visualized as a bright dot when in the US beam. Poor vision of needle–nerve proximity.


Fascia Iliaca
FA
FN
Iliopsoas M.
Lateral
1
2


1
FA
FN
Lateral
1
2

PNBs advantages

- No airway manipulation and therefore no airway complications
- No mechanical ventilation, therefore decreased perioperative respiratory complications
- Decreased risk for postoperative delirium
- Decreased postoperative nausea and vomiting
- No hypotension (ie, no central inhibition of sympathetic nerves)
- No respiratory depression
- No risk of post-procedural headache
- No urinary retention

Disadvantages

- Not suitable for all kinds of operations
- Need time
- Possibility of insufficient blockade
- Neurological complications
- local anesthetic systemic toxicity (LAST)

Local anaesthesia

- Loss of sensation in a circumscribed area of the body caused by depression of excitation in nerve endings

- Affects a small, specific area by injection, topical or spray

- Limited duration of action

- Patient needs to be cooperative

- Minimal physiological disturbance

Intravenous Regional Anesthesia ->Bier block

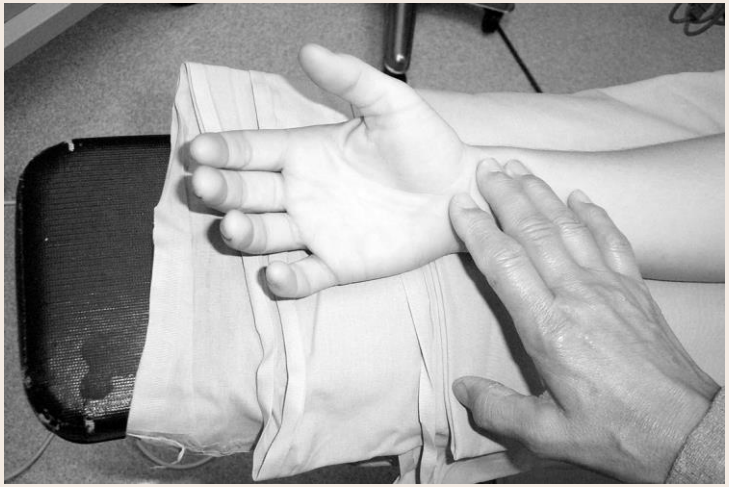
- Anesthesia is obtained by the intravenous injection of local anesthetic in a previously exsanguinated vascular space, isolated from the rest of the circulation by two Esmarch bandages used as tourniquets.

-Indications: short operative procedures for the extremities

-Duration 30-45 min

Intravenous Regional Anesthesia ->Bier block

Intravenous Regional Anesthesia ->Bier block



Intravenous Regional Anesthesia ->Bier block

Injection of local anesthetic

- Initial analgesia is produced by local anesthetic action on major nerve trunks, small nerves, and nerve endings.

Asphyxia

- Asphyxia occurs at 20-30 minutes complementing local anesthetic action.
- Local anesthetic molecules transverse venous walls into surrounding tissue

Hypothermia & acidosis

- Hypothermia and acidosis result in enhanced local anesthetic activity.

MAC (monitored anaesthesia care)

- planned procedure during which the patient undergoes local anesthesia together with sedation and analgesia
- Can be the choice of many surgical procedures
- 3 fundamental elements: a)safe sedation

  b) control of anxiety

  c) control of pain

MAC (monitored anaesthesia care)

MAC -> **conscious sedation**

Titration to a level that the patients are able to answer to orders and preserve spontaneous breathing and airway reflexes

what is needed?

- proper preanesthetic checkup
- standard intraoperative monitoring
- Fast half-life drugs (bolus or/and continuous infusion)
- Cooperative patient
- Cooperative/skilled surgeon
- routine postoperative care.

MAC (monitored anaesthesia care)

Less physiologic disturbance and a more rapid recovery than general anesthesia, suitable for day care procedures as it helps in fast tracking, fast discharge

Can be combined with other types of anesthesia (except of general)

Clinical scenario…

75 year old male suffers from an open tibial fracture.

Medical history: hypertension, diabetes

Reports upper respiratory tract infection 3 days ago

Who would you proceed?

Spinal
or
PNB

Clinical scenario…

60 year old female is diagnosed with gastric cancer.

She is a heavy smoker

Needs to be operated

How would you proceed?

General anaesthesia with epidural

Cooperation of the patient is not obligatory for

- A) General anaesthesia
- B) MAC
- C) Peripheral nerve block
- D) Epidural
- E) Bier block

Cooperation of the patient is not obligatory for

- A) **General anaesthesia**
- B) MAC
- C) Peripheral nerve block
- D) Epidural
- E) Bier block

Which of the followings is correct about epidural?

A) It has no action in sympathetic nervous system

B) It requires less volume of local anaesthetic than spinal anaesthesia

C) Motor function is affected immediately

D) The epidural catheter must be removed as soon as the operation is xompleted

E) None of the above

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Epidural and spinal anaesthesia

A) Can cause hypotention only through peripheral vasodilation

B) They can be safely performed performed in every level of the spine bellow A4

C) They can cause urinary retention and neurological complications

D) Nausea and vomiting are rare complications

E) They cannot be combined with general anaesthesia

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FREEDOM