MJF COLLEGE OF VETERINARY AND ANIMAL SCIENCE,CHOMU

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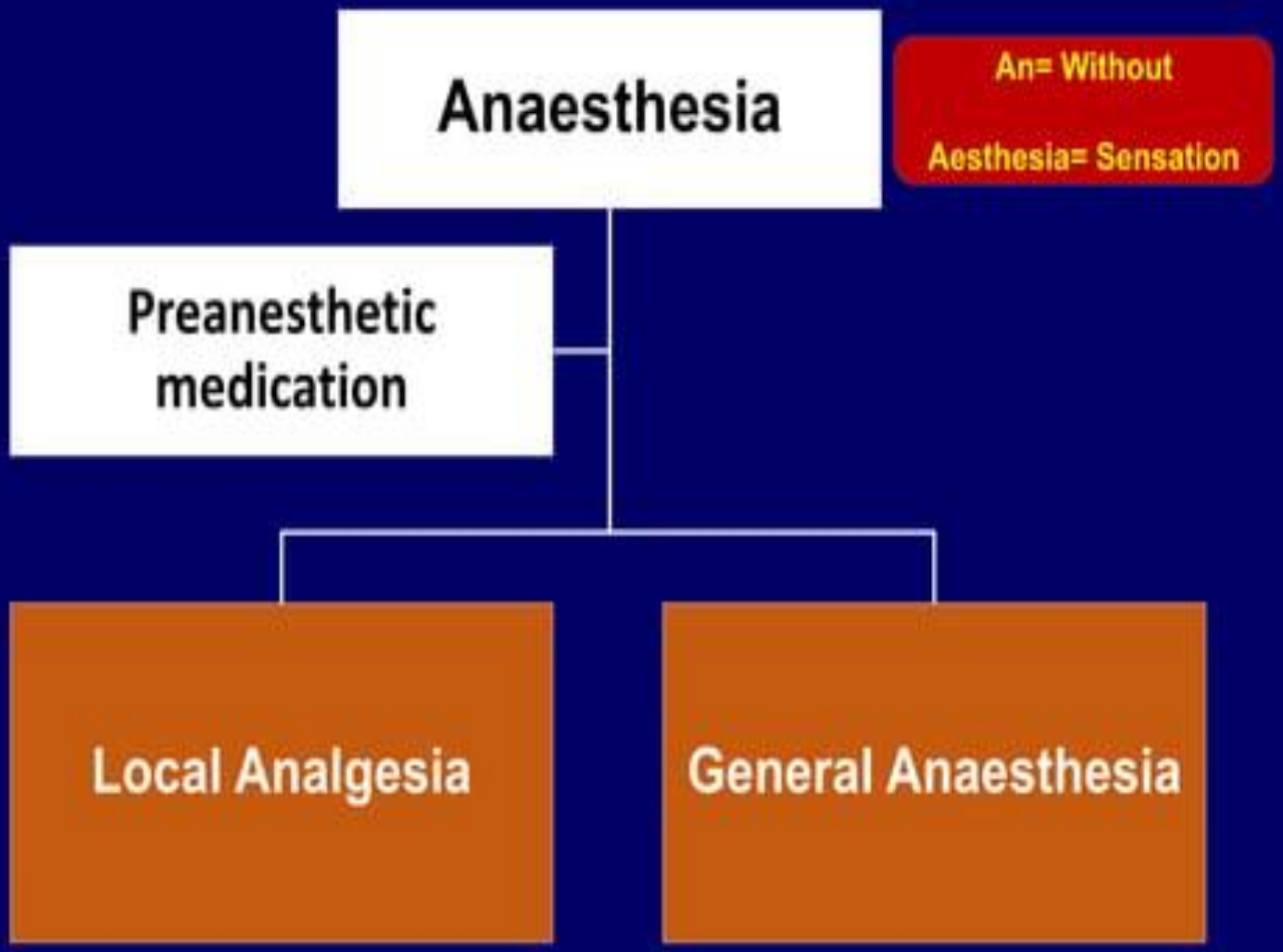
Local anaesthesia- Classification of local anaesthetics, Regional anaesthesia


Anaesthesia
An= Without
Aesthesia= Sensation
Preanesthetic medication
Local Analgesia
General Anaesthesia

Muscle relaxants

- To relax skeletal muscles for easy accessibility of surgical procedures.
- To facilitate control of respiration during intrathoracic surgery.
- To assist dislocated joints.
- To limit amount of general anaesthetic used.
- For easier inducing performance of endotracheal intubation and endoscopy.

Muscle relaxants may be indicated for intraocular surgery to ensure an immobile eye, during controlled ventilation to prevent 'bucking' of the ventilator, for reduction of displaced fractures, and during certain abdominal procedures (e.g. ovariectomy) to improve surgical exposure.

To recognize that the usual indicators of anesthetic depth are abolished (nystagmus, palpebral response, limb movement)

1- Succinylcholine

Free from usual complications of muscle relaxants such as hypotension, tachycardia, histamine release, urticaria, and cumulative effects.

Succinylcholine (SCh) has a rapid onset and duration of action.

Termination of effects

- Is due to hydrolysis by *plasma cholinesterase*.
- Prolonged duration of action of SCh occurs with decreased plasma cholinesterase activity.

– Organophosphate treatment, malnutrition, anemia, pregnancy, and hepatic disease have been shown to decrease plasma cholinesterase activity.

2- Gallamine triethiodide (Flaxedil)

Gallamine block of cardiac muscarinic activity can be useful during halothane anaesthesia since halothane tends to produce bradycardia via the vagus nerve. Tachycardia occurs within 1.0 to 1.5 min after i.v. injection in dogs. It is not detoxicated and is excreted unchanged in the urine.

Gallamine does not give rise to histamine release so that it is a useful non-depolarizing relaxant in dogs.

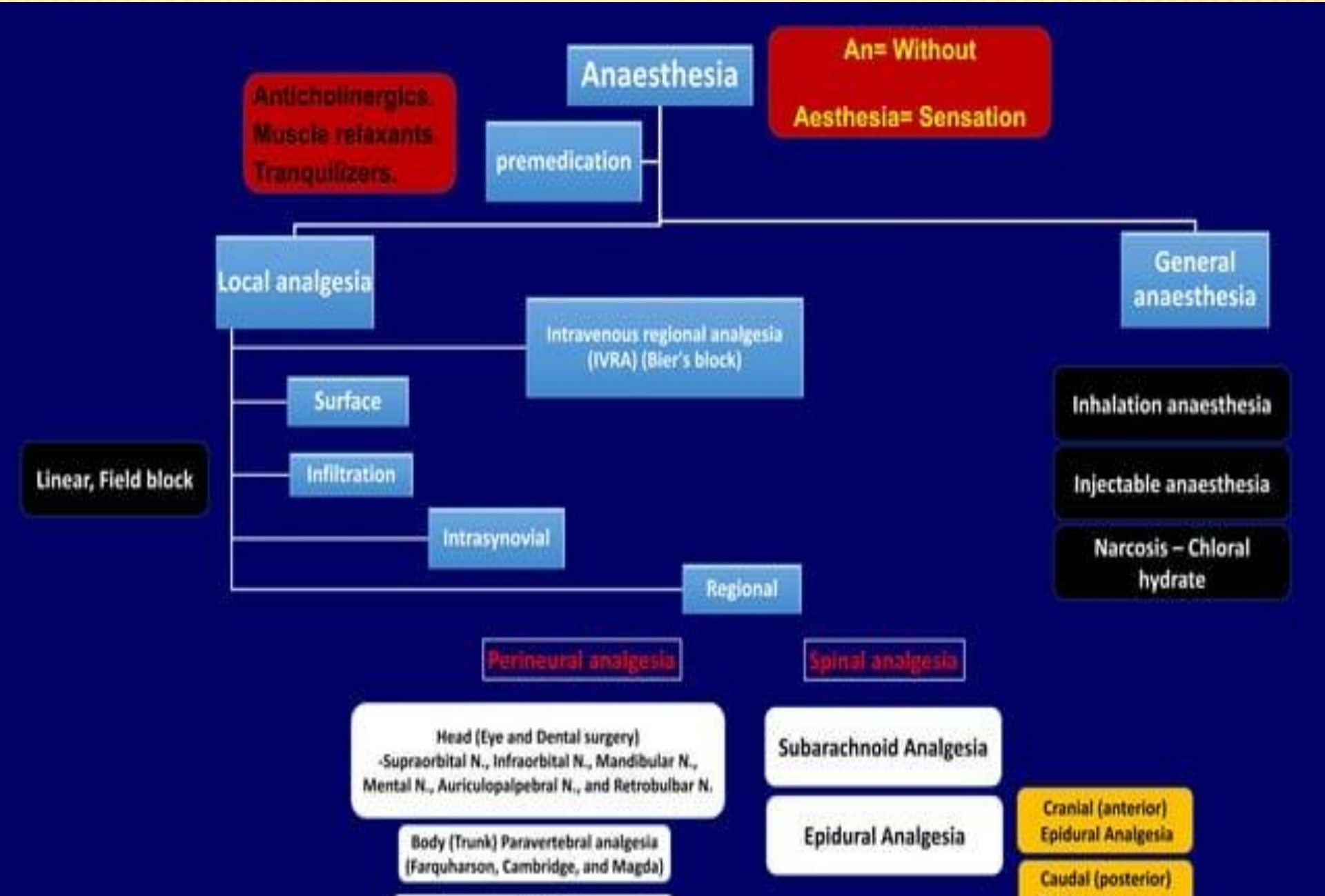
Gallamine is given intravenously in doses of :

Dogs: 1.0 mg/kg.
Horses: 0.5 mg/kg.
Cats: 1.0 mg/kg.
Young lambs and calves: 0.5-1.0 mg/kg.

Pigs are very resistant to Gallamine and doses of 4mg/kg are needed to produce complete relaxation.

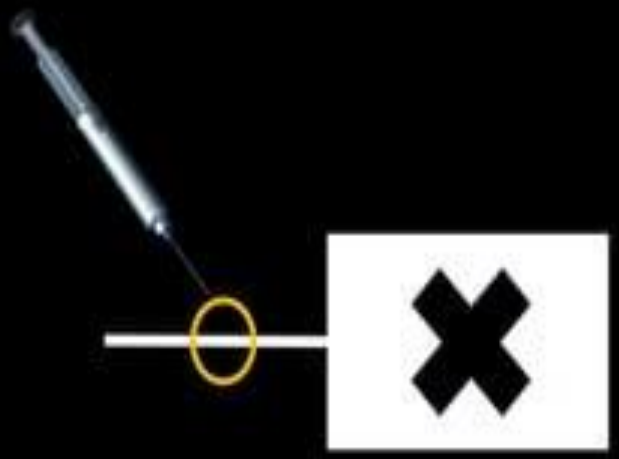
Forms of anaesthesia:

1. Local---- nerve endings.
2. Regional---- nerve trunk.
3. General---- CNS.


Anaesthesia
An= Without
Aesthesia= Sensation
Anticholinergics
Muscle relaxants
Tranquilizers.
premedication
Local analgesia
General anaesthesia
Intravenous regional analgesia (IVRA) (Bier's block)
Surface
Infiltration
Linear, Field block
Intrasynovial
Regional
Inhalation anaesthesia
Injectable anaesthesia
Narcosis – Chloral hydrate
Perineural analgesia
Spinal analgesia
Head (Eye and Dental surgery)
-Supraorbital N., Infraorbital N., Mandibular N., Mental N., Auriculopalpebral N., and Retrobulbar N.
Body (Trunk) Paravertebral analgesia (Farquharson, Cambridge, and Magda)
Subarachnoid Analgesia
Epidural Analgesia
Cranial (anterior) Epidural Analgesia
Caudal (posterior)

Perineural analgesia of head (Nerve Block)

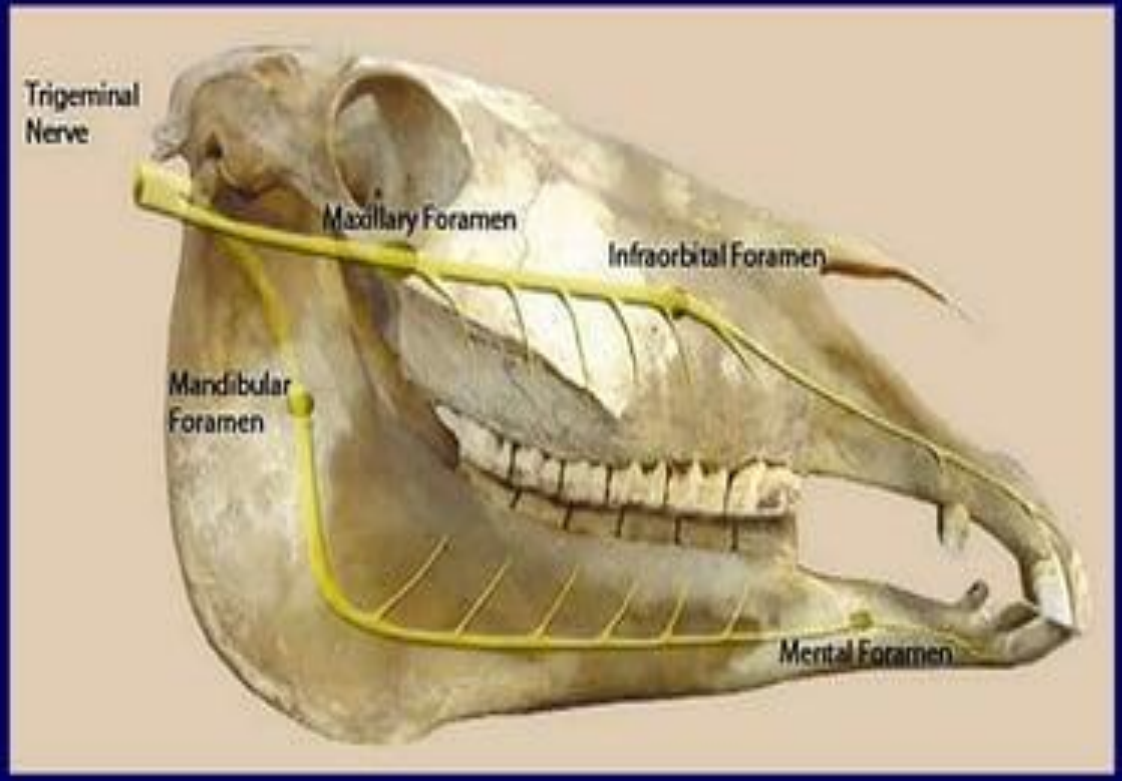
Definition of nerve block



- Nerve course & type.
- Supplying area.
- Site of injection.
- Technique of injection.
- Indication(s).

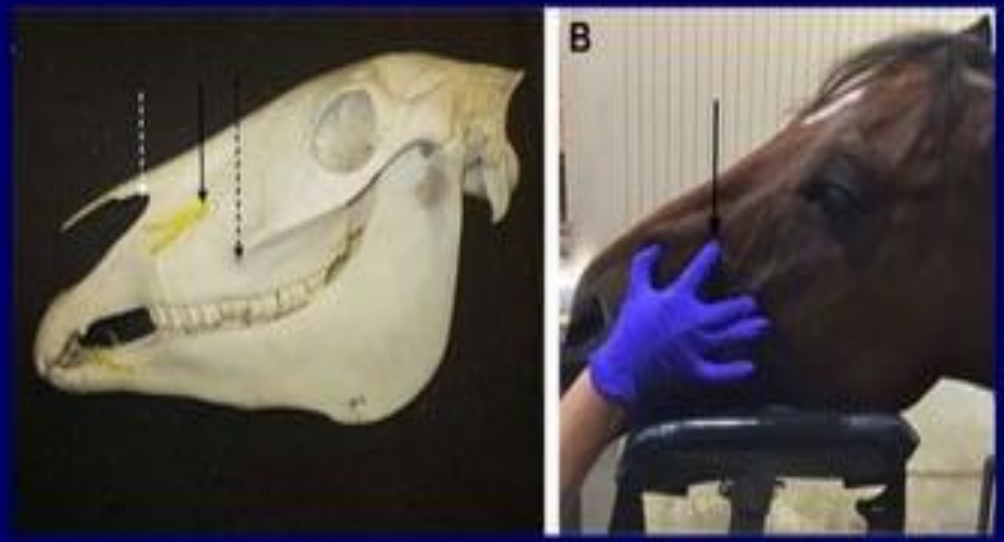
Applied anatomy of trigeminal nerve (5th cranial nerve)

- Ophthalmic
- Maxillary
- Mandibular



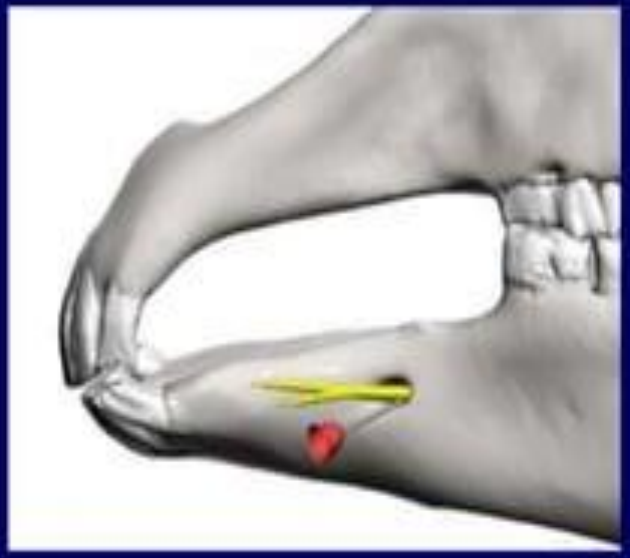
1- Supra-orbital nerve block

2- Infra-orbital nerve block

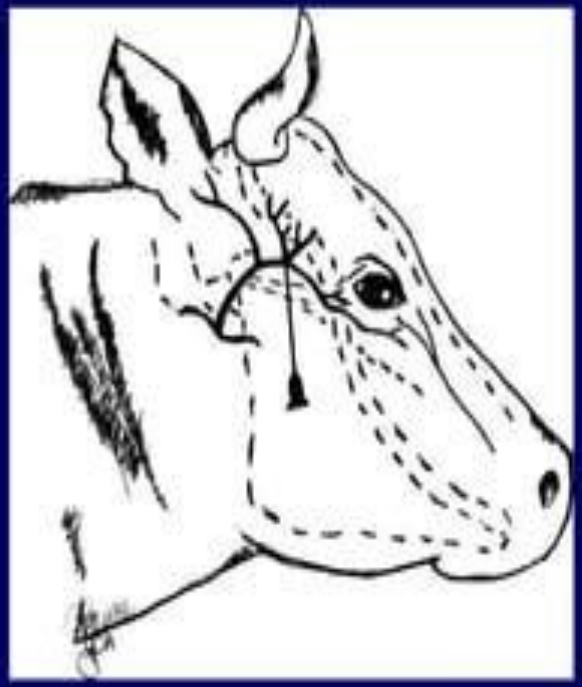


3- Mandibular nerve block

4- Mental nerve block

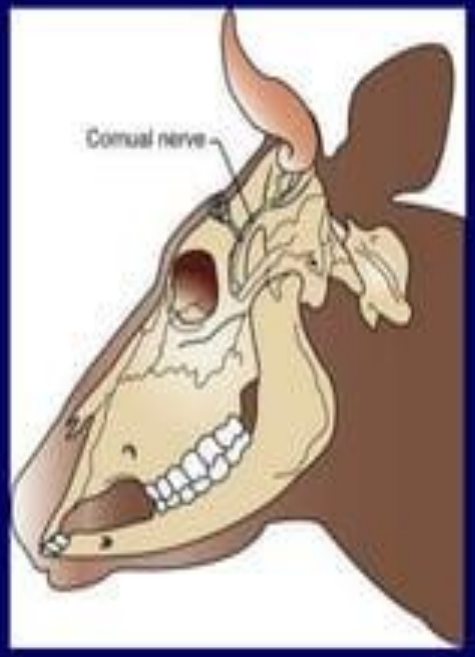


5- Auriculopalpebral nerve block



6- Retrobulbar nerve block

7- Cornual nerve block



A, Cornual branch of the lacrimal nerve.
B, Cornual branch of the infratrochlear nerve.

Local Analgesia

Injection of the local analgesic drug at the area of the surgical field through desensitization of the nerve endings.

Advantages of local analgesia

* Many operations can be performed in standing positions.
* Easy to learn this technique.
* No need for any assistance.
* Local analgesia can be useful to reduce depth of anesthesia.
* Quick safe recovery.
* Economic.

Ideal characters of local analgesic drugs

- Stable in solution.
- Rapid onset of action
- Prolonged duration of action
- Minimal irritation and swelling especially in horses.
- Low toxicity.
- Spreading properties.
- Easy to be sterilized without any toxic changes.
- Economic.

NO ONE meets all required characters

Adjunctive agents:

These agents may Increase anesthetic effect and/or duration of action of local anesthetic.

1. **Hyaluronidase:** allow the anaesthetics for better diffusion. Its concentration (1500 IU/100 ml). Adding enzyme to a local anesthetic solution to break down hyaluronic acid which functions as extracellular matrix of the tissue and leading to increase tissue penetration in the region of infiltration and hasten the onset of action.

2. **Epinephrine:** resulting vasoconstriction increase anesthetic residence time in the infiltrated area (1:100000 and 1:200000). These effects of epinephrine will be delay absorption, increase safety margin, reduced toxicity. While, **it is contra-indicated for its using in case of** ?

Classification of analgesic drugs

- Short (30-45min): Procaine.
- Intermediate (1-2h): Lignocaine, Mepivacaine.
- Long (3-6h): Bupivacaine.

Examples of the local analgesic drugs:

Procaine Hcl (Novocaine)

Proparacaine Hcl

Lidocaine Hcl (lignocaine): →

- Extreme stability.
- More rapid diffusion.
- Somewhat longer duration of action.
- Good surface analgesia on mucous membranes and cornea.
- Economic

Mepivacaine Hcl

Bupivacaine Hcl

Systemic and toxic effect of local analgesic drugs:

- Accidental I/V administration of the local anesthetics is the most common cause of adverse reaction associated with local anesthetic administration. In severe cases, it can cause cardiac arrest.

For avoidance false I/V injection, syringe aspiration must be performed before injection of the local anaesthetics.

- Signs of overdose are seizures, convulsions, coma, and death.
- Some respiratory depression.
- Using of excessive amounts of anesthetics with vasoconstrictors in wounded area may **delay healing**.
- Bupivacaine is more **cardiotoxic** than lidocaine.

How to avoid toxicity

- Limiting the total quantity of drugs.
- Dilute solution.
- Retarding absorption.
- Repeated aspiration before injection.

Methods of Producing local analgesia

- Surface (Topical).
- Intrasynovial.
- Infiltration.
- Intravenous regional local anaesthesia (Bier's block).

- **Surface (Topical) analgesia**

Simple from ----- Ice , volatile substances such as ethyl chloride and carbonic acid snow.

The drug of choice for topical corneal analgesia is **Proxymetacaine Hcl (Proparacaine) (ophthaine)**

- **Intrasynovial analgesia.**

Used for diagnosis of lameness and relief of the pain

Mepivacaine is the drug of choice for intra-articular injection.

Intra articular injection of radiocarpal & intercarpal joints

Technique:

- Aseptic preparation of the site of injection.
- Insertion of the needle intra-articularly.
- Aspiration of the excessive synovial fluid.
- Local analgesic is injected into synovial cavity, then dispersed throughout the cavity by manipulation of the limb.

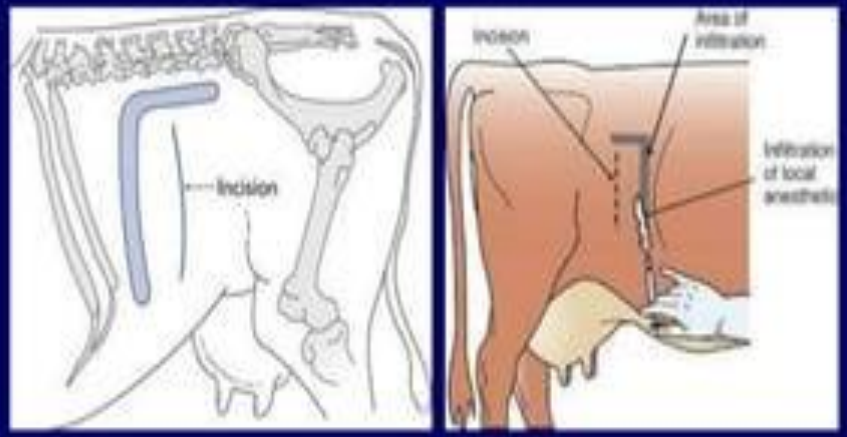
Infiltration analgesia

A. Linear infiltration. Injection site is the same incision site.

Before injection of local analgesic drug, aspiration must be attempted to ascertain needle point not entered blood vessel. If blood is aspirated into the syringe, the needle is partially withdrawn and reinserted in slightly different direction.

B. Field block.

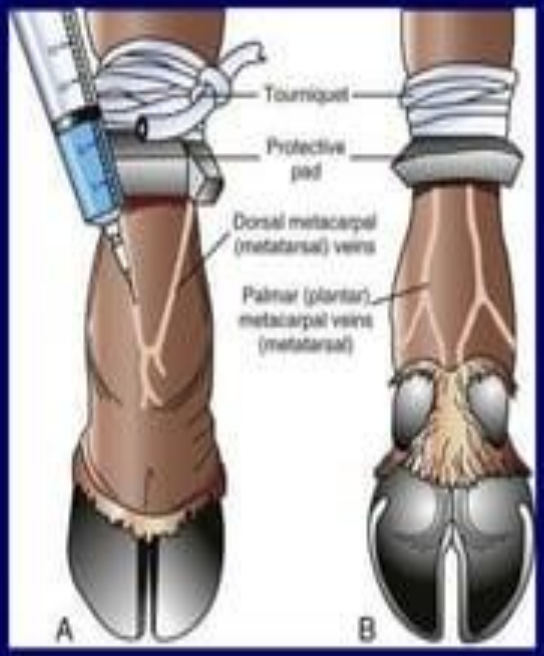
- *Inverted L (7 block).*
- *Circular block.*
- *Ring block.*

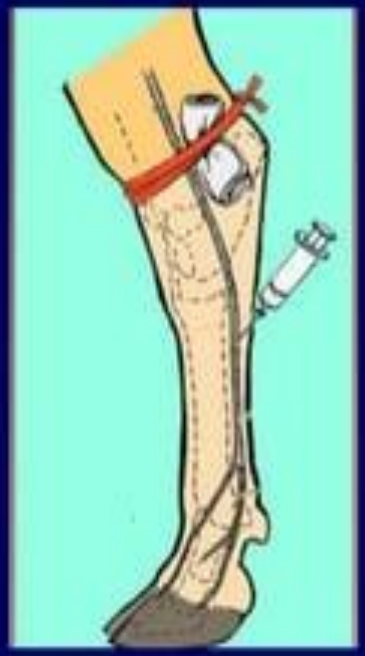


Intravenous regional local anaesthesia (Bier's block).

In the thoracic limb ---- common dorsal metacarpal vein on the dorsal surface, palmar metacarpal vein on the palmar surface, and radial vein on the medial surface.

In the pelvic limb ---- cranial branch of the lateral saphenous vein and lateral plantar digital vein.





Perineural analgesia of the body

Paravertebral analgesia

Paravertebral anesthesia refers to the perineural injection of local anesthesia about the spinal nerves as they emerge from the vertebral canal through the intervertebral foraminae.

Indications:

- This block is done to enable a surgical incision in the paralumbar fossa (flank) of a standing animal (laparotomy).

- Caesarean section.
- Rumenotomy.
- Abomasal displacement.

Advantages:

- Easy to perform operations in standing position.
- Induce complete uniformly desensitization of the flank region.
- Relaxation of the abdominal wall of the flank region.
- Safe and easy to be performed.

Applied anatomy of the paralumbar fossa:

- ✓ Boundaries.
- ✓ Layers of the flank region.
- ✓ Nerve supply. (last thoracic, 1st , 2nd lumbar nerve.)

Techniques of paravertebral analgesia:

- Farquharson.
- Cambridge.
- Magda.

Perineural analgesia of the limb

Incision = otomy -------- Surgical opening.

Ostomy ------ Permenant fistula.

Excision= ectomy ------- Surgical removal.

Examples:

Rumenotomy ----- Opening of the rumen.
Enterotomy ------- Opening of the intestine.
Neurectomy ------ Removal of the nerve.

General indications:

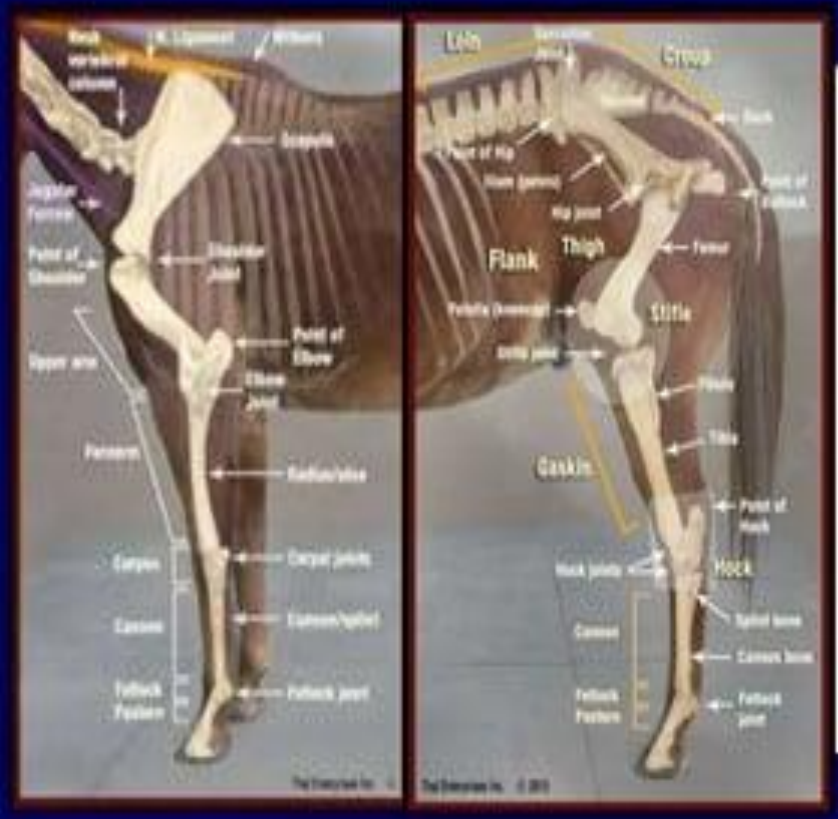
- Operative surgery in the desensitized area.
- Diagnosis of lameness.
- Before neurectomy.

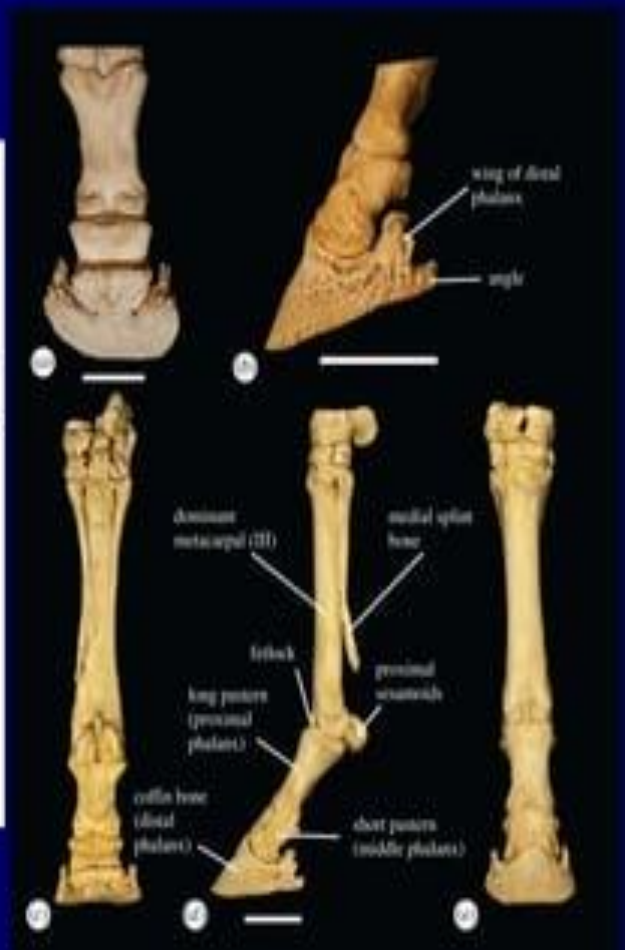
I. Fore limb — Median, Ulnar, and musculocutaneous nerve block.

II. Hind limb — Tibial, Superficial and deep perineal nerve block.

- ✓ Palmar/plantar nerve block.
- ✓ Abaxial nerve block.
- ✓ Palmar/ plantar digital nerve block.

Applied anatomy of the limb:





Median, Ulnar, and musculocutaneous nerve block.

- Volume & Needle
  - 10cc, 1.5inch 22 gauge
- Technique
  - Median nerve: inject 5cm distal to the elbow joint, on the medial aspect of the limb. The needle is walked off the caudal aspect of the radius.
  - Ulnar nerve: inject 10cm proximal to the accessory carpal bone, between the flexor carpi ulnaris muscle and ulnaris lateralis muscle.

- Blocks entire limb from distal radius down, including the carpus.

Tibial, Superficial and deep perineal nerve block.

- Volume: 10 - 20cc
- Needle: 1.5 inch, 22 gauge
- Technique:
  - Deep and superficial peroneal nerve: is anesthetized on the lateral aspect of the limb, 10cm proximal to the point of the hock, in a groove created by the long and lateral digital extensor muscles.
  - Tibial nerve: is blocked 10cm proximal to the calcaneus, between the gastrocnemius tendon & superficial digital flexor tendon.
    - Nerve lies closer to medial aspect of the limb

- Blocks entire limb from distal tibia down, including the tarsus.

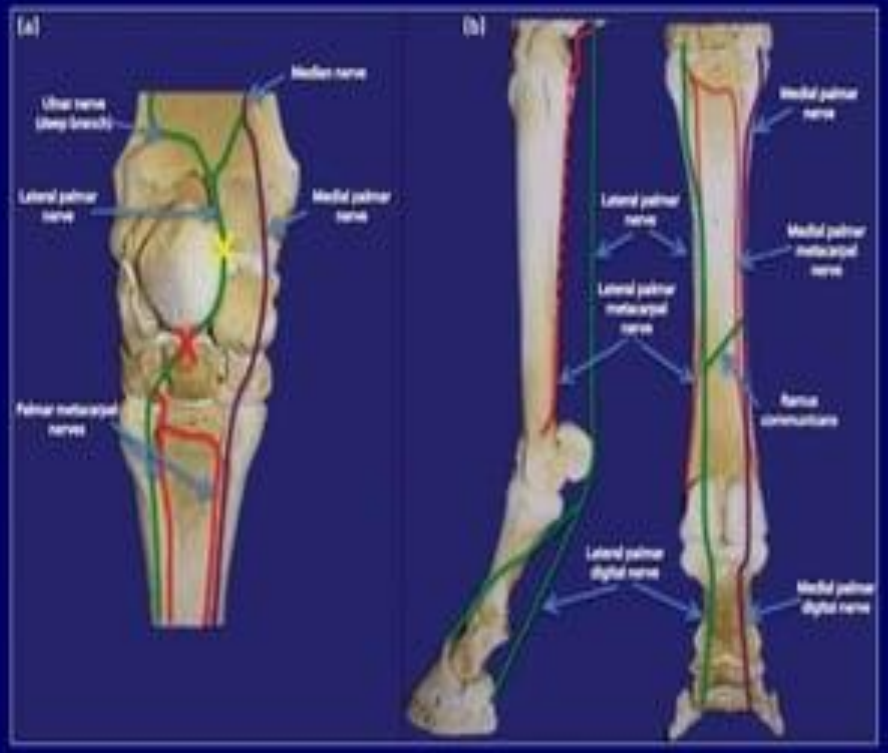
High Palmar/ plantar nerve block

Medial and lateral palmar/ plantar nerves.

Medial & lateral palmar metacarpal/ plantar metatarsal nerves.

Proximal Metacarpal/tarsal

- Blocks all structures distal to the carpus, including the proximal suspensory ligament.



Low Palmar/ plantar nerve block

Low Four & Six Point Nerve Block

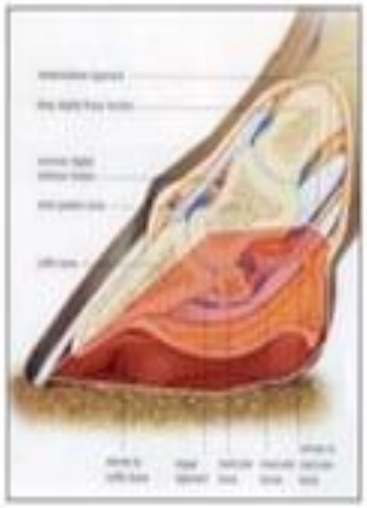
- Blocks fetlock joint and all structures below
  - DDFT/SDFT up to level of block
  - Insertion/branches of suspensory ligament

Abaxial Nerve Block

- Blocks everything below the level of the fetlock
  - Foot
  - Coffin joint
  - Pastern Joint
  - P1/P2/P3
  - Distal DDFT
  - Distal Extensor Tendons
  - Distal Sesamoidean Ligaments

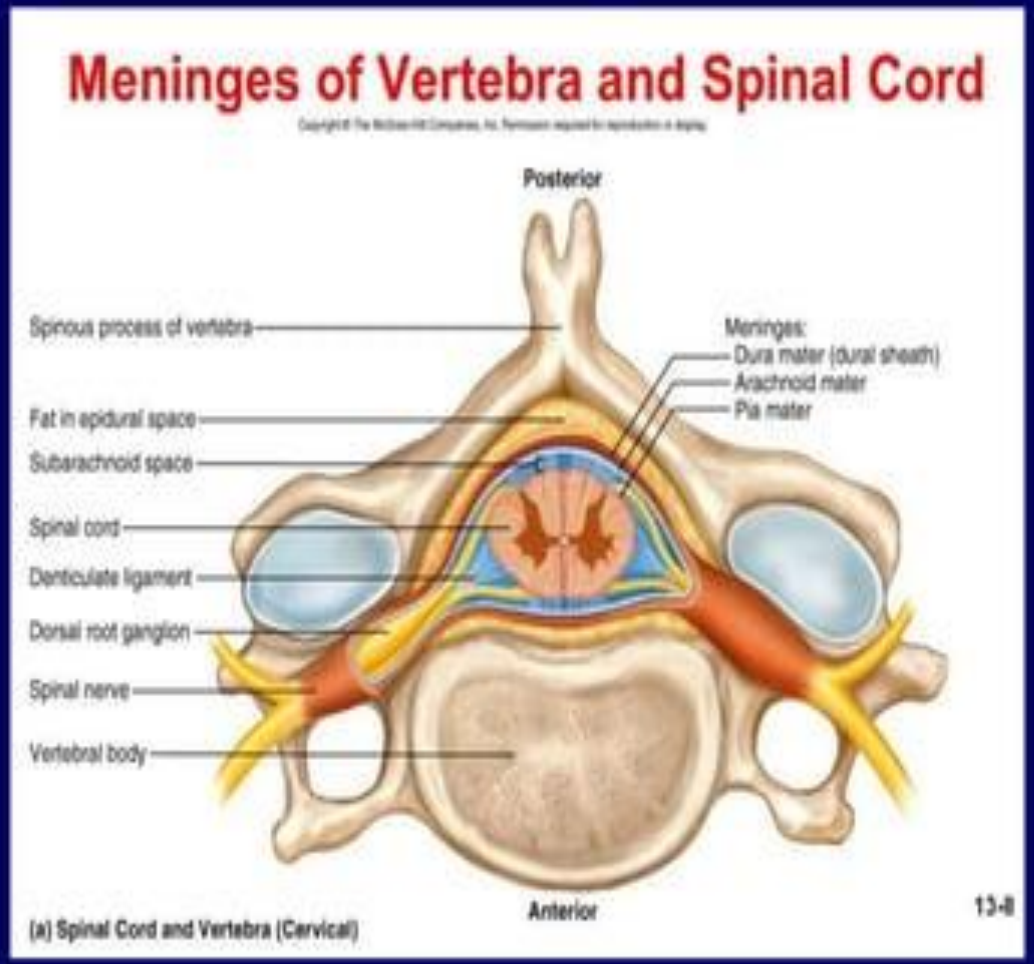
Palmar / Plantar Digital Nerve Block

- Blocks palmar/plantar third of foot & the sole
  - Navicular bone
  - Navicular bursa
  - Digital cushion
  - Distal aspect of DDFT
  - Wings of P3
  - Sole, bars, heels, frog
  - (occasionally) coffin joint



Epidural analgesia

- Definition.
- Anatomy.
- Types.
- Common sites.
- Desensitized area.
- Indications.
- Techniques.
- Complications.



Spinal Cord is a cylinder of nerve tissue within the vertebral canal.

(Function: locomotion, conduction)

3 meninges:

- ✓ Pia mater
- ✓ Arachnoid
- ✓ Dura mater

• Spinal anesthesia is the injection of local anesthetic around the spinal cord.

Types:

1.Caudal (posterior) epidural analgesia: it is the preferred and most commonly used technique in the horse as it is easier and safer to perform, resulted in analgesia of the perineal region without risk of the spinal injection. It can performed through either sacrococcygeal, 1st intercaudal or 2nd intercaudal space.

1.Cranial (anterior) epidural analgesia: Injection of local analgesic drug through lumbosacral, sacrococcygeal, and intercaudal space, with increasing anaesthetic dose in comparison with caudal analgesia to facilitate its rostral spread inside spinal canal with affecting motor function of the hind limb.

	Termination of spinal cord	Common sites	Doses
Dogs & Cats	In dogs L6/L7 junction - In cats S3	L7-S1 Lumbosacral space for anterior epidural.	1ml/ 4.5 kg Post.
Equine	S2 – midsacrum	Sacrococcygeal / 1st-2nd intercaudal space	10ml 2% lignocaine, 5ml 2% mepivacaine, Post.
Cattle	Last lumber – S1	S5-Co1 Sacrococcygeal /First intercaudal space	5-10ml Post. & 100-120ml Ant.
Small ruminants	S1	S4-Co1 Sacrococcygeal / First intercaudal space	1ml/7kg

Dangers of spinal and epidural block

- Infection- Careful sterile precautions (**good clipping and scrubbing**)
- Irritation causing spinal damage (most likely with subarachnoid).
- Hind limb motor paralysis (problem in large animals, acceptable in small).
- Respiratory paralysis (only if massive overdose of local analgesic used).

Desensitized area of caudal epidural analgesia:

It is performed to produce regional anaesthesia of the pelvic viscera, genitalia, perineum, urethra, tail, anus and rectum in standing position.

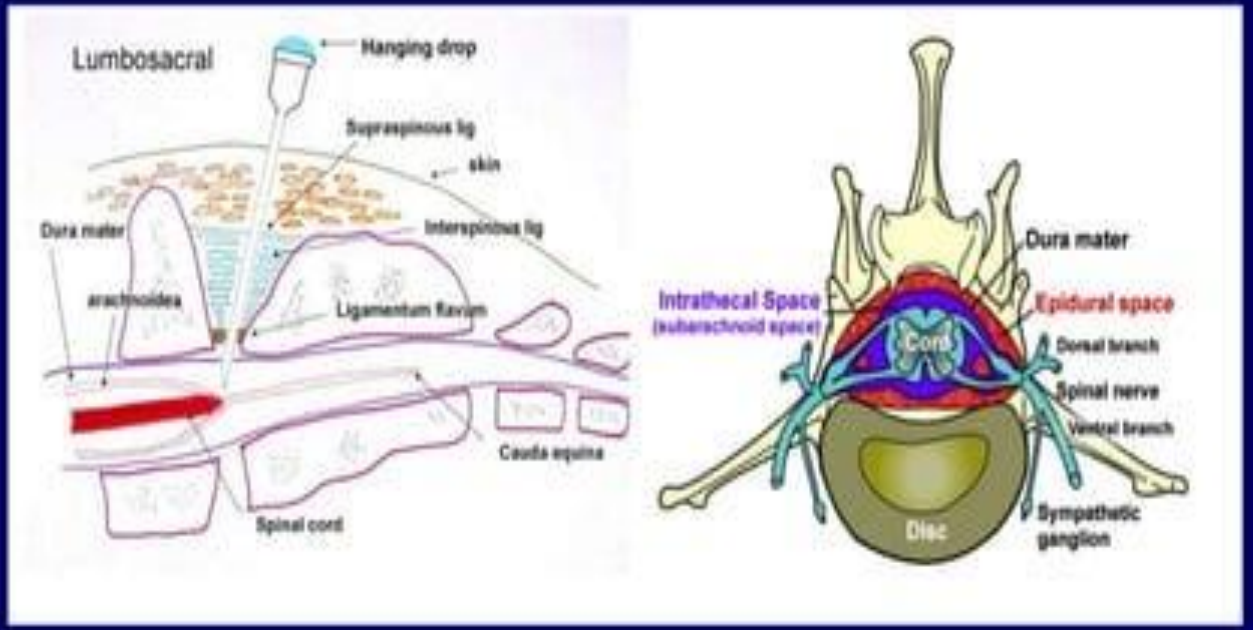
Desensitized area of cranial epidural analgesia:

It desensitizes the hind limbs, mammary tissue, flank region, and abdominal wall till navel region.

Indications:

Rectal prolapse, perineal laceration, urethrostomy, tail docking, atresia ani, relief of tenesmus, fetotomy, correction of the uterine torsion, and any operation at the desensitized area can be performed. In case of anterior analgesia, abdominal and pelvic surgery especially for small ruminants.

Techniques:


Lumbosacral
Hanging drop
Supraspinous lig
skin
Dura mater
Interspinous lig
arachnoidea
Ligamentum flavum
Cauda equina
Spinal cord
Dura mater
Intrathecal Space
(subarachnoid space)
Epidural space
Cord
Dorsal branch
Spinal nerve
Ventral branch
Disc
Sympathetic ganglion