Practical note

Anesthesiology

By Staff Members

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Anesthesiology

Local Analgesics

A-Minor local Analgesics: -

1-Ethyl Chloride: -

It is a topical local analgesic, marketed under pressure in containers with a fine capillary nozzle and a control valve that allows the liquid to be sprayed. It has a very superficial and transient analgesic action, and when it is sprayed on the skin, it evaporates leading to freezing of the skin (-20˚C) with induction of surface analgesia for 30-60 seconds. Its use is limited to simple incisions or punctures such as incision of abscess or hematoma

2-Ethyl alcohol: -

Injection of absolute alcohol around a nerve produces neuritis, degeneration, and sclerosis, however, 30% alcohol temporarily destroys sensory nerves that regenerate again after a variable period, and nerve function will return by then. Duration of block depends on;

1-The size of the nerve

2-Degree of destruction

Small-unsheathed nerves may be permanently destroyed, whereas, large heavily sheathed nerves are only temporarily affected.

B-Major local Analgesics: -

Cocaine was the first available local analgesic, but its toxic effect and addictive properties in human restricted its use and availability. Nodaway, many new generations of local analgesics are available, and they vary according to their potency, toxicity and cost. The present three categories are classified according to duration of analgesic action

	Analgesia duration	Drug	Duration
1	Short	Procaine	30-60 minutes
2	Intermediate	Lidocaine and mepivacaine	90-180 minutes
3	Long	Tetracaine and bupivacaine	180-300 minutes

1-Short duration analgesic: -

Procaine HCl: -

Procaine HCl is a white, crystalline, water-soluble powder

2-Intermediate duration analgesic: -

A-Lignocaine or Lidocaine HCl (Xylocaine® or Debocaine®): -

B-Mepivacaine HCl or Carbocaine (Mepacaine®): -

This compound closely resembles lignocaine HCl, and widely used for human dentistry. It is widely used in the horse as it causes very little swelling and edema in the area of injection, possibly as it lacks vasodilatory action.

3-Long duration analgesic: -

A-Tetracaine HCl (Pontocaine®): -

B-Bupivacaine HCl (Marcaine®)

Local anesthesia

I-Linear infiltration: -

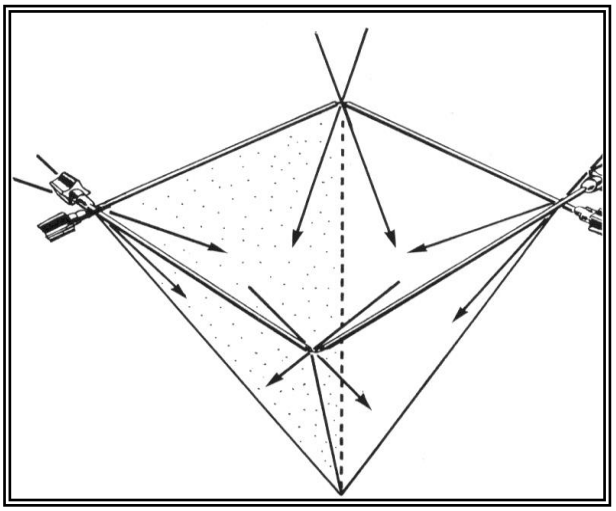
The needle is inserted subcutaneously into two opposite directions to create analgesic, a line of analgesia that has double length of the needle can be created with minimal skin bricking. Usually the drug is injected while the needle is dragged out of the subcutaneous tissue and the amount of required analgesic is 1 ml/cm2

Practice: Stick here picture for lineal analgesia

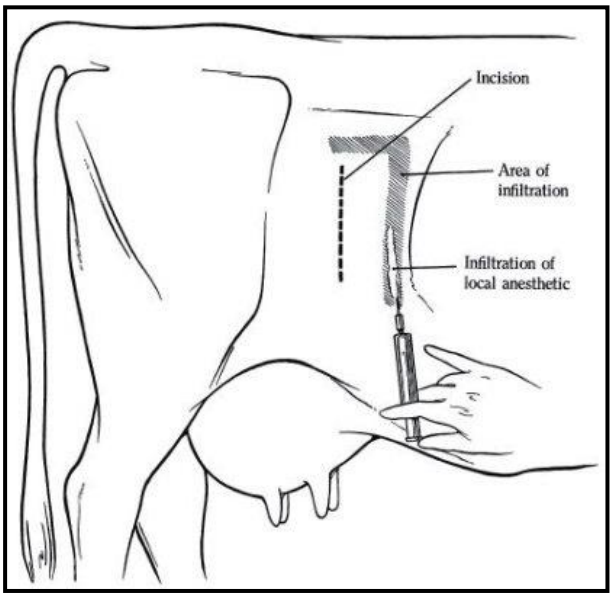
II-Field block analgesia

The nerves entering the surgical field are desensitized

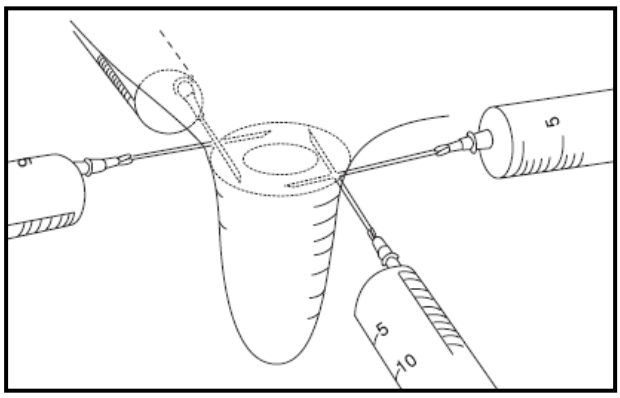
1-Cup shape field block: -



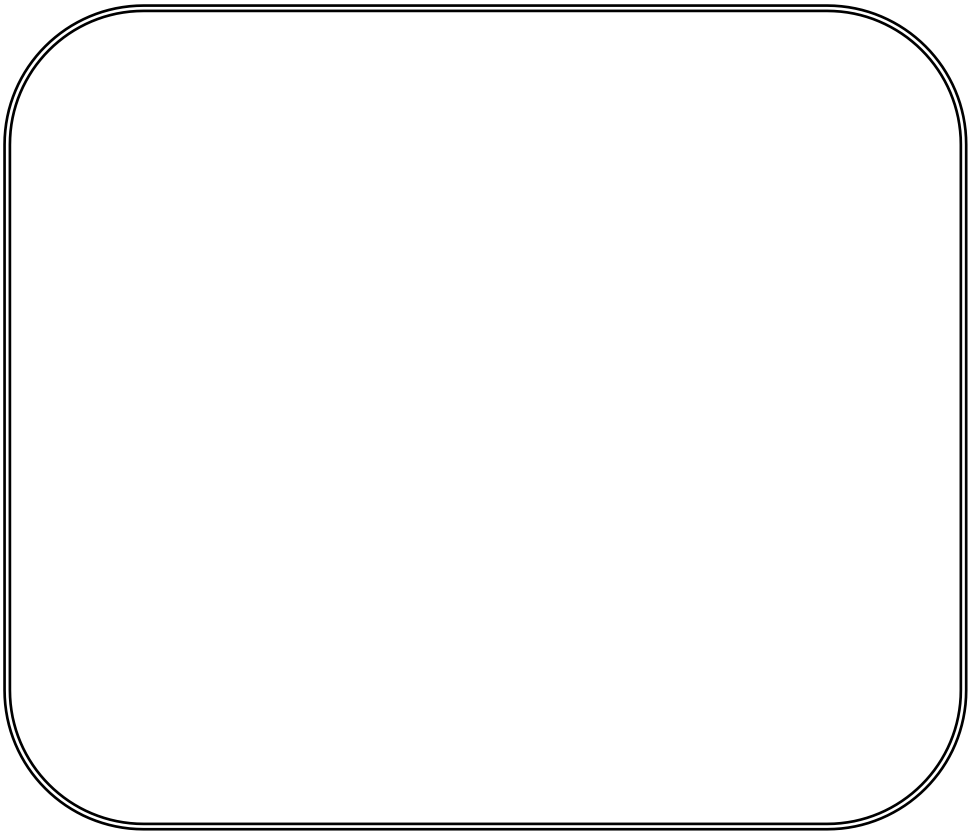
2-Inverted-L block: -



3-Ring block: -



Practice: Stick here picture for inverted-L block



Mention advantages of inverted-L block

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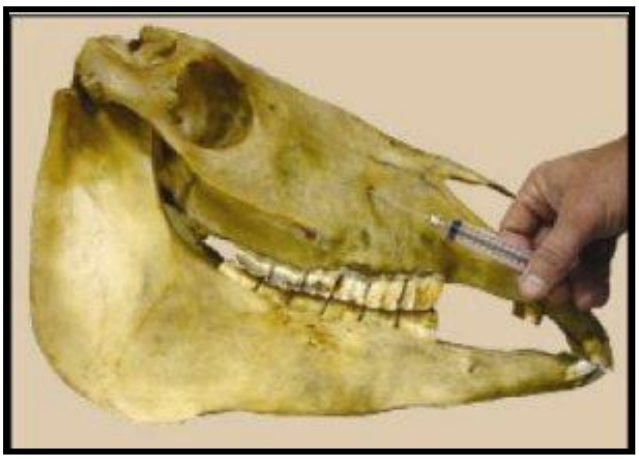
Regional anesthesia
Regional analgesia of the head

1-Infra-orbital nerve block-horse: -

Indications: -

1-Suturing of a wound at the lip or nostril
2-Trephining the facial sinus
3-Tooth extraction (but preferred to be removed under general anesthesia)

Seat of injection, technique of injection and desensitized areas: -



a-After the nerve emerges from the canal: -

The lip of the infra orbital foramen can be felt as bony ridge lying beneath the edge of the flat levator nasolabialis muscle, at midway between fascial crest and nasomaxillary notch.

Desensitized areas are:
1-Skin of the upper lip
2-Skin of the cheek
3-Skin of the nostril
4-Skin of face up to the level of the foramen

b-Within the canal: -

The technique of injection is the same as mentioned in site (a) but the needle should be advanced 2.5 cm up the canal.

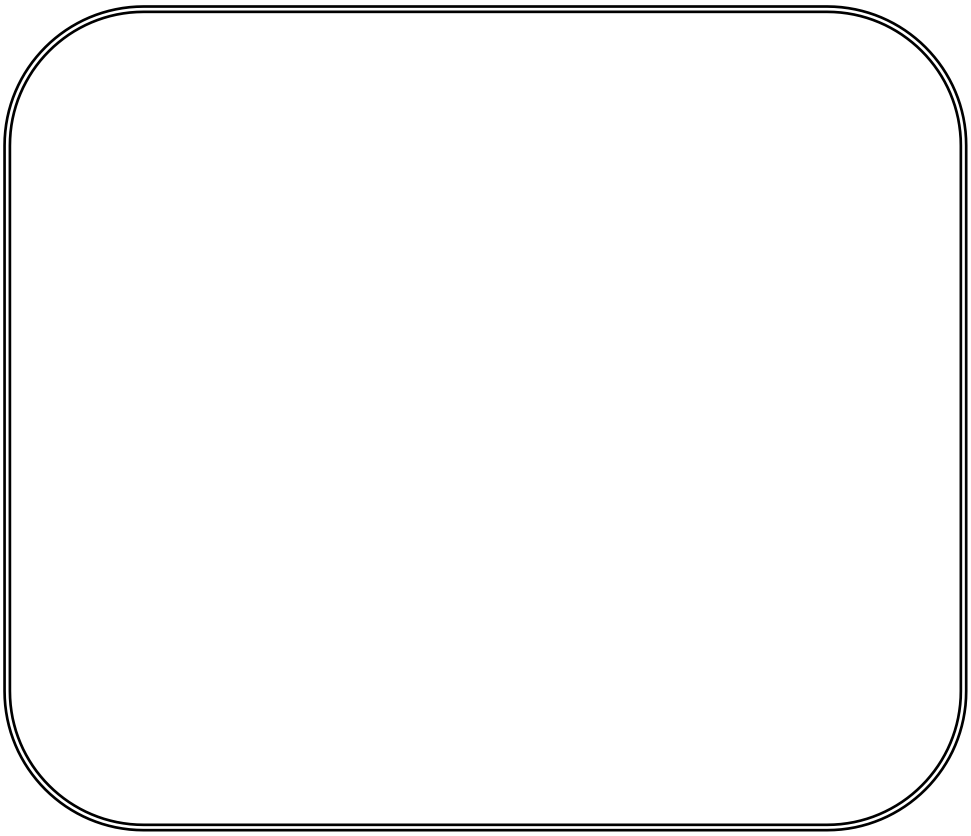
Desensitized areas are: -
1-The incisors
2-The canine
3-The upper 1st and 2nd premolar
4-The skin of the face up to the level of the medial canthus of the eye

c-Within the pterygopalatine fossa: -

With this technique of injection the needle should be inserted at a point on the side of the face opposite to the lateral canthus, inferior to the facial crest, and above transverse facial vessels. The needle is advanced medially, slightly anteriorly to process and drop into the pterygopalatine fossa just

posterior to maxillary tuberosity. The needle should be pushed until it strikes the perpendicular portion of palatine bone in the region of maxillary foramen at a depth of 7 cm but generally it is a dangerous procedure and not recommended to be used

Practice: Stick here picture for Infra-orbital nerve block in horse



Mention indications of Infra-orbital nerve block

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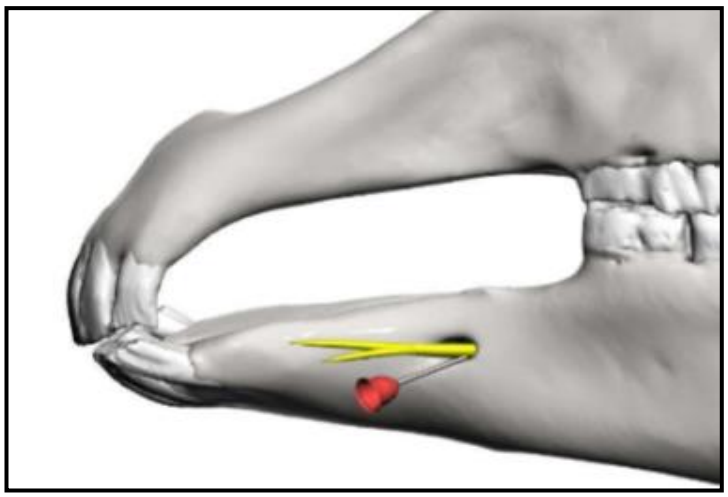
2-Mental nerve block- horse: -

Anatomy: -

The innervation of the incisors and canines arises from the trunk nerve 3-5 cm before it emerges from the mental foramen.



Indications: -

Suturing of wounds of the lower lip

Technique: -

The mental foramen, through which the mental nerve emerges, lies on the lateral aspect of the ramus in the middle of the inter-dental space and covered with the tendon of depressor labii inferioris muscle. Injection of the nerve at this point desensitizes the lower lip only, while advancing the needle 3-5 cm into the canal will desensitize the incisors and canine too.

Practice: Mention indications of Mental nerve block- horse

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Stick here picture for Mental nerve block in horse

3-Supra-orbital (frontal) nerve block- horse: -

Anatomy: -

It emerges from the orbit through the supra-orbital foramen in the supra-orbital process. It innervates the upper eyelid and skin of the fore head.

Indications: -

Operations of the upper eyelid or suturing of wounds

Technique: -

The upper and lower borders of the supra-orbital process, close to its junction to the frontal bone, are palpated, and the foramen is detected midway between the two borders, then the needle is inserted into the foramen and the nerve is blocked.

Practice: Mention indications of Supra-orbital nerve block- horse

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Stick here picture for Supra-orbital (frontal) nerve block- horse

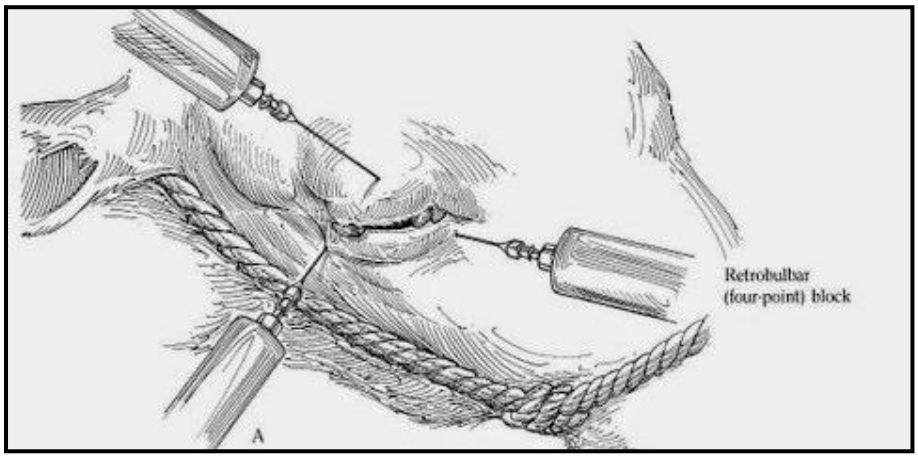
4-Retrobulbar nerve block- cow: -

Indications: -

Induction of analgesia and akinesia of periocular muscles for enucleation of the eyeball.

Technique: -

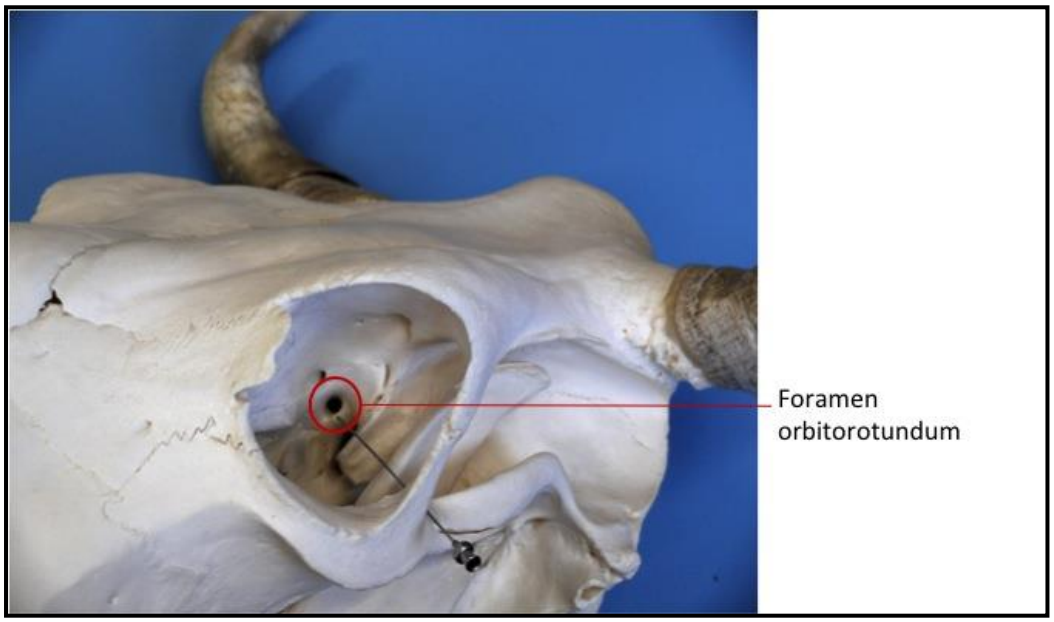
1-Method I (Four-point block): -



The needle is inserted into the orbit at 12:00, 3:00, 7:00 and 9:00 positions (6:00 should be avoided to minimize the chance of damaging the optic nerve). A slight 'pop' is felt as the orbital septum is penetrated; if the needle does not penetrate the septum, anesthetic may migrate subconjunctivally. Deposit 5–10 ml of anesthetic at each site.

2-Method II (Peterson-type block): -

This is a modification of the Peterson deep orbital block used in cattle. A slightly curved 18-gauge 10 cm needle is inserted 1 cm temporal to the temporal canthus and directed inferonasally towards the opposite nasal canthus.



3-Method III (Infiltration anesthesia of the eye): -

It refers to injection of local anesthetic agent into tissue without regard for the course of nerves supplying the area of interest. This technique generally requires larger volumes of anesthetic agent, and can affect tissue architecture if applied overzealously. The needle is inserted 1.5 cm behind the middle of the supra-orbital process and pushed towards the upper molar teeth of the opposite side.

Practice: Mention indications of retro-bulbar block

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Enumerate techniques of retro-bulbar block- cow

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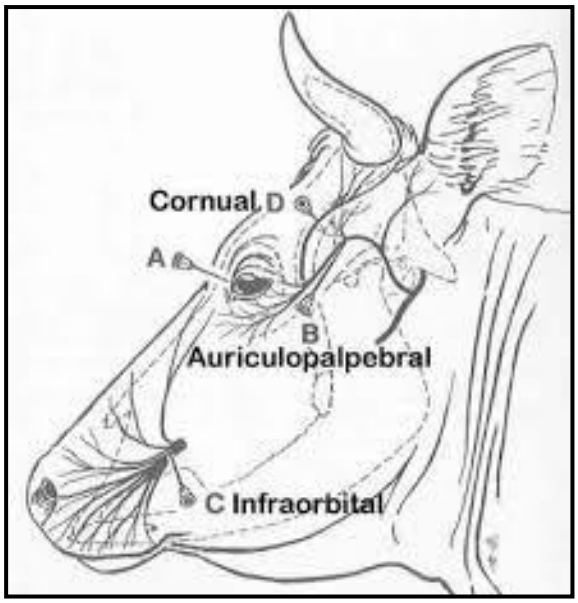
Stick here picture for of Peterson-type block- cow

5-Auriculopalpebral nerve block-all animals: -

Anatomy: -

Its blocking produces paralysis of the upper eyelid without abolishing sensation and it is called akinesia.

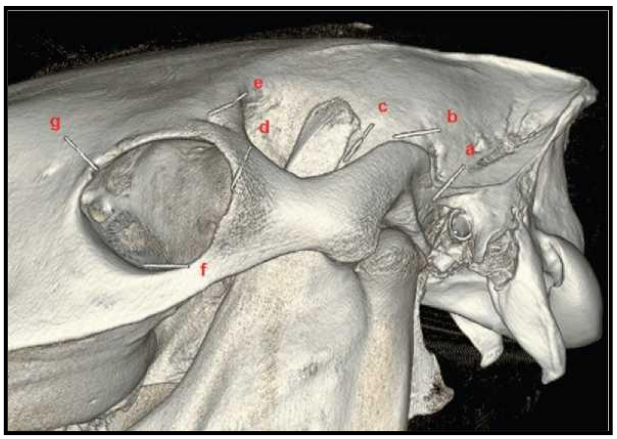


Indications: -

1-Examination of the eye
2-Reliefe of blepharospasm
3-To facilitate sub-conjunctival injection
4-Removal of foreign bodies from the cornea or conjunctive in conjunction with topical analgesia

Technique: -

The nerve can be injected at the highest point of zygomatic arch rostoral to the base of ear (depression on the temporal aspect of zygomatic arch)



Practice: Mention indications of Auriculopalpebral nerve block

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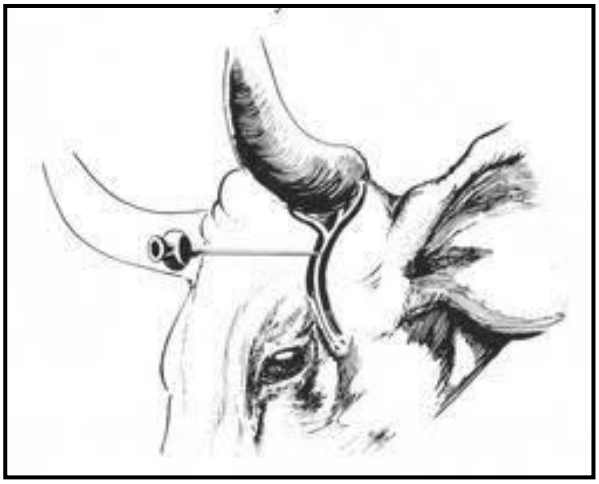
Stick here picture for of Auriculopalpebral nerve block - horse

Stick here picture for Auriculopalpebral nerve block - cow

6-Cornual nerve block (ox): -



Indications: -

1-Surgical intervention for fractured or separated horn
2-Dehorning
3-Disbudding in young calves

Technique: -

The site for injection is the upper third of the temporal ridge, about 2.5 cm below the base of the horn at the midway between lateral base of the horn and lateral canthus of the eye. The needle must not be inserted too deeply, otherwise injection will be made beneath the aponeurosis of the temporal muscle and the method will fail. A second injection should be made about 1 cm behind the first to block the posterior division of the nerve. A third injection may be required in adult cattle with well-developed horns; it is made caudal to the horn base to block the cutaneous branches of cervical nerves.

Practice: Mention indications of Cornual nerve block

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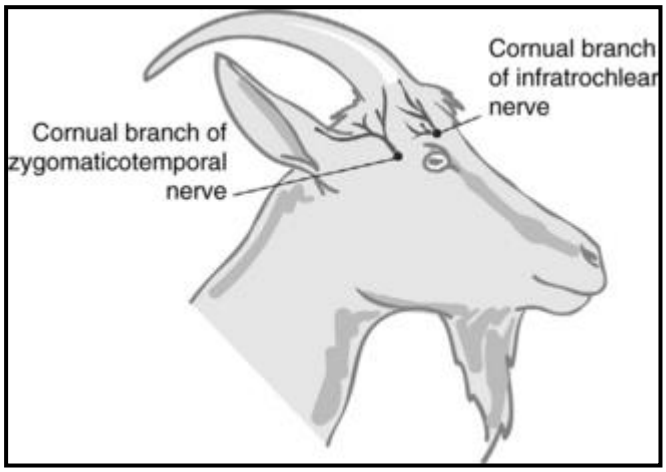
Stick here picture for Cornual nerve block

7-Cornual nerve block (goat):

Technique: -



The cornual branch of zygmaticotemporal (*lacrimal)* nerve is injected close to caudal ridge of the root of the supra-orbital process to a depth of 1.0–1.5 cm in adult goats at the midway between lateral canthus of the eye and lateral base of the horn. The syringe plunger should be withdrawn before injection to check that the tip of the needle has not penetrated the large blood vessel located at this site. The corneal branch of the *infra-trochlear* nerve is injected at the dorsomedial margin of the orbit, 0.5 cm deep midway between medial canthus of the eye and medial base of the horn.

Practice: Mention indications of Cornual nerve block

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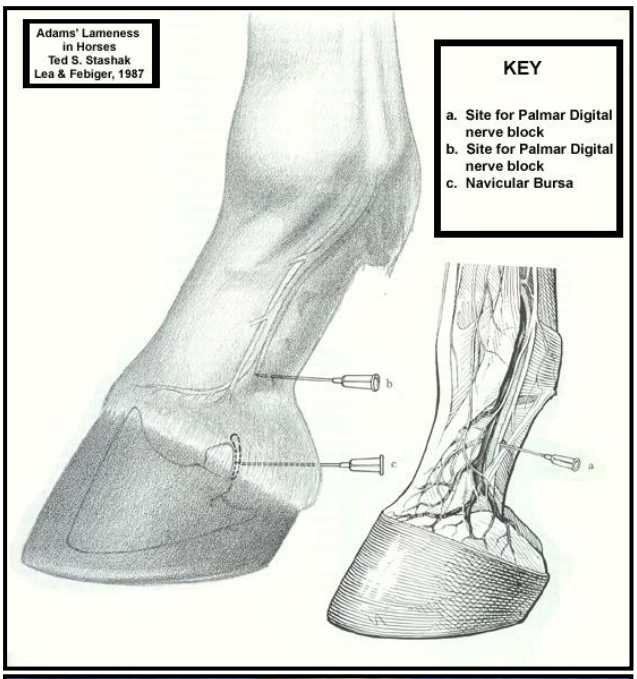
Stick here picture for Cornual nerve block

Regional Analgesia of the Limbs

1-Posterior digital (palmar/plantar) digital nerve block: -

Technique: -

The needle is inserted at the midway between fetlock and coronet in the groove between the 1st phalanx and the flexor tendon with an angle of 15° with the vertical line and directed downward and inward.



Structures Anesthetized: -

1-Navicular bone
2-Navicular bursa
3-Distal sesamoidean ligaments
4-Deep Digital Flexor tendon and sheath
5-Digital cushion
6-Corium of frog
7-Palmar pastern and coffin joints
8-Palmar distal phalanx / wings of coffin bone
9-Palmar Skin

Indications: -

Sensation remains in the anterior and lateral parts of the foot, so it is used mainly for diagnosis of navicular disease

Practice: Mention indications of Posterior digital nerve block

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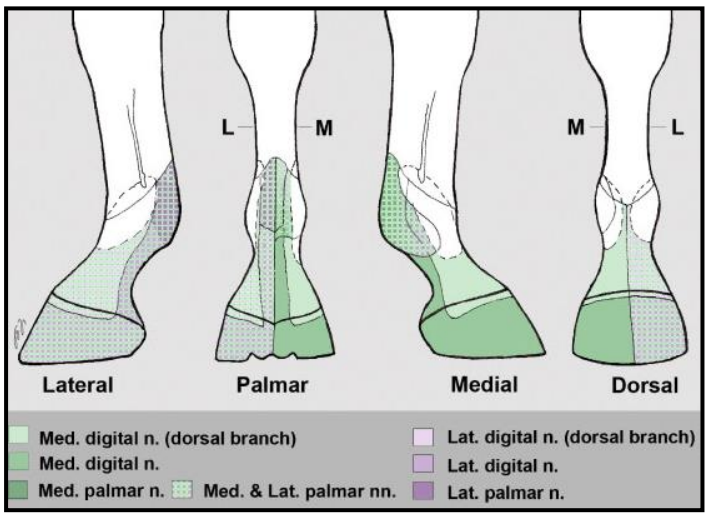
Stick here picture for Posterior digital nerve block

2-High volar (palmar/planter) nerve block: -

1-Technique: -



The site of injection is 5 cm above the fetlock at the level of the distal enlargements of the 2nd and 4th metacarpal or metatarsal bones, in the groove between suspensory ligament and flexor tendons. The needle is inserted with an angle of 15° with the vertical line and directed downward and inward then the drug is injected. The technique should be used for both the medial and lateral branches.

Anesthetized area: -

The same as the previous technique

Indications: -

Desensitization of the limb from the fetlock and downward, including pastern and coffen joints for;

1-Diagnosis of lameness of affected limb and opposite one

2-Relieve of pain

3-Performing operative procedures like neurectomy or operative procedures at the foot.

Practice: Mention indications of High volar nerve block

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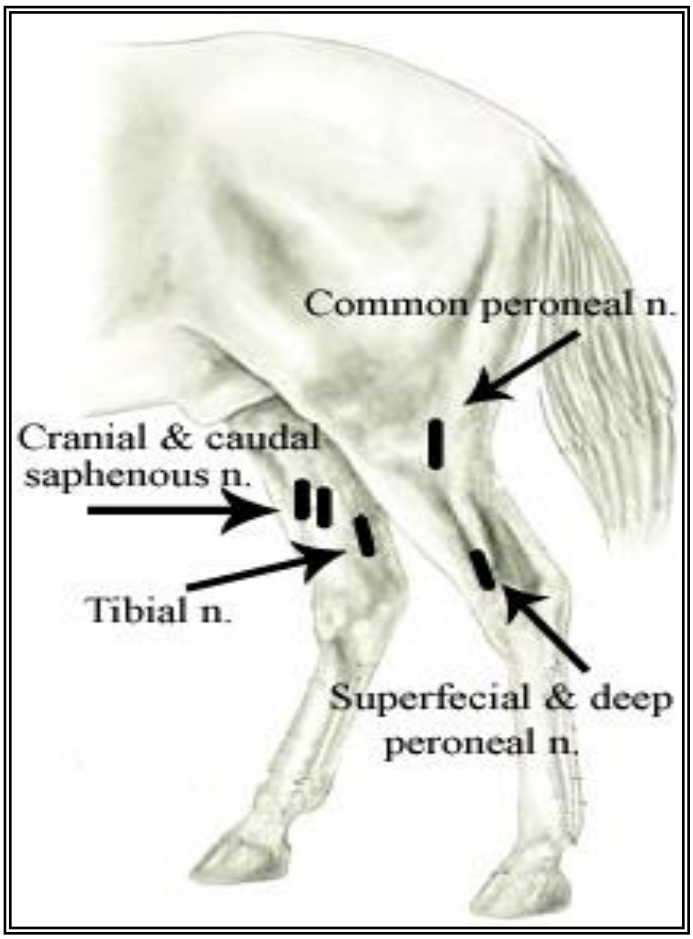
Stick here picture for High volar nerve block

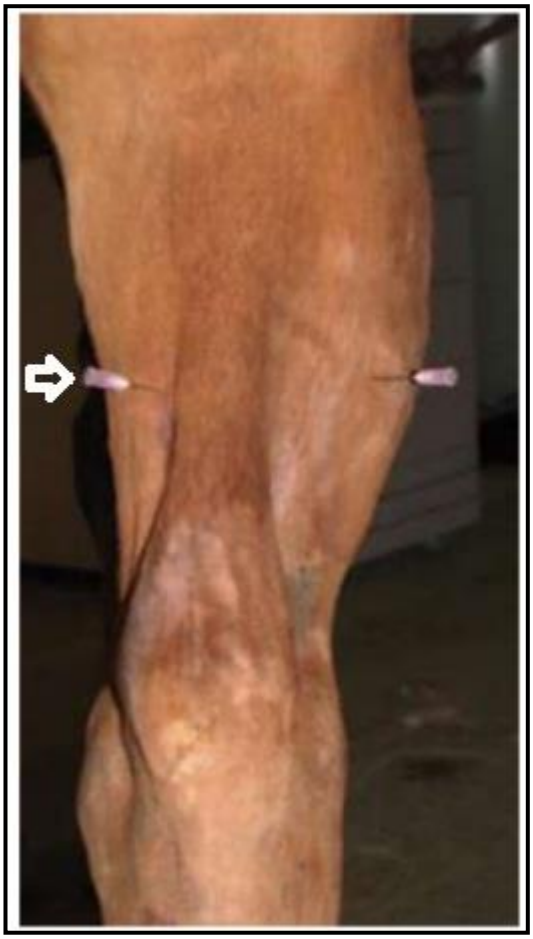
3-Tibial nerve block: -

The tibial nerve lies 15 cm above the point of the hock in the space between Achilles tendon and long digital flexor on the medial aspect of the limb. The nerve becomes palpable closer to the Achilles tendon as the limb is flexed and vice versa. It innervates planter structures of metatarsus and most of the foot.

Indications

Tibial block is used for desensitization of the posterior aspect of metatarsus, the medial and lateral aspects of the fetlock, and the whole digit. For complete analgesia down the hock the saphenous, and superficial and deep peroneal nerves should be blocked





Practice: Mention indications of Tibial nerve block

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Stick here picture for Tibial nerve block

Regional analgesia about the trunk

1-Paravertebral nerve block (ox):

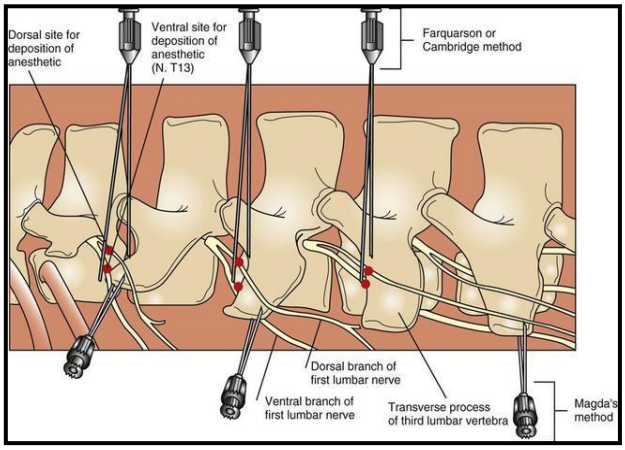
Technique: -

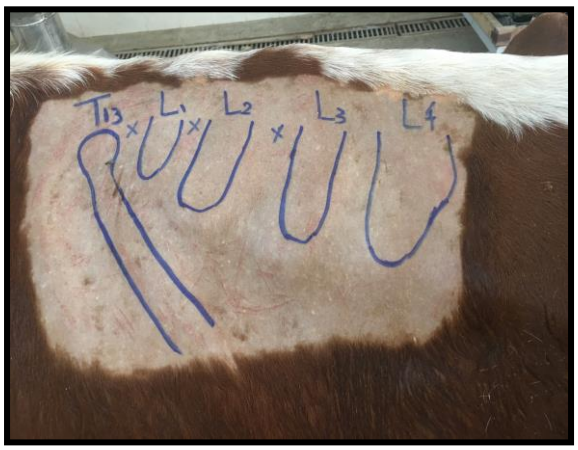
Proximal Paravertebral analgesia

This is commonly performed to desensitize the flank, which requires that the thirteenth thoracic and first two lumbar segments. The proximal technique was first described by **Farquharson**, and was modified by anaesthetists at Liverpool and Cambridge veterinary schools

The more accurate location of the nerves might be obtained by directing the needle towards the cranial border of the transverse process of the vertebra behind the nerve to be blocked. For example, to block the 1st lumbar nerve the needle should be directed to strike the cranial border of the 2nd lumbar vertebra about 5–6 cm from the animal's midline.

To block the thirteenth thoracic and first, second and third lumbar nerves skin weals should be raised in line with the most obvious parts of the transverse processes of the second, third and fourth lumbar vertebrae, 5–6 cm from, the midline of the body. Location of the transverse process of the first lumbar vertebra is usually difficult (particularly in well-muscled or obese animals) so in most cases the site for infiltration around the thirteenth thoracic nerve is found by simple measurement. The distance between the skin weals over the second and third lumbar transverse processes is measured and another skin weal is produced at a distance equal to this, cranial to the anterior weal, to mark the site where the needle is to be introduced to strike the cranial border of the first lumbar transverse process.





Practice: Mention indications of Paravertebral nerve block

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Mention advantages of Paravertebral nerve block

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Stick here picture for Paravertebral nerve block

Epidural analgesia

A-Caudal Epidural

1- (ox):

Seat of injection: -

Seat of injection is the first intercoccygeal space between the 1st and 2nd coccygeal vertebra. The dimensions of the opening in the dorsal wall of the neural canal are 2 cm transversely, 2.5 cm anterior-posteriorly, and 0.5 cm deep. The canal is 2-4 cm deep from the skin surface.

Technique: -

The needle is inserted with 15° degrees with the vertical. When the needle reaches the accurate site, there will be no resistance for injection, and suction of the drug from the hub of the needle can be seen.

1-The tail is gripped 15 cm from its base and raised in pump-handle fashion. Seat of injection is the 1st obvious articulation behind the sacrum.

2. Standing on one side of the animal and observing the line of the croup, the prominence of the sacrum is seen. Moving the eye back towards the tail, the next prominence to be observed is the spine of the first coccygeal bone. The site is the depression immediately behind it.

3.The caudal prominence of the tuberosity of the ischium is palpated and the point selected 10–11 cm in front of it. A line drawn directly over the back from this point passes, in a medium-sized animal, through the depression between the first and second coccygeal spines.

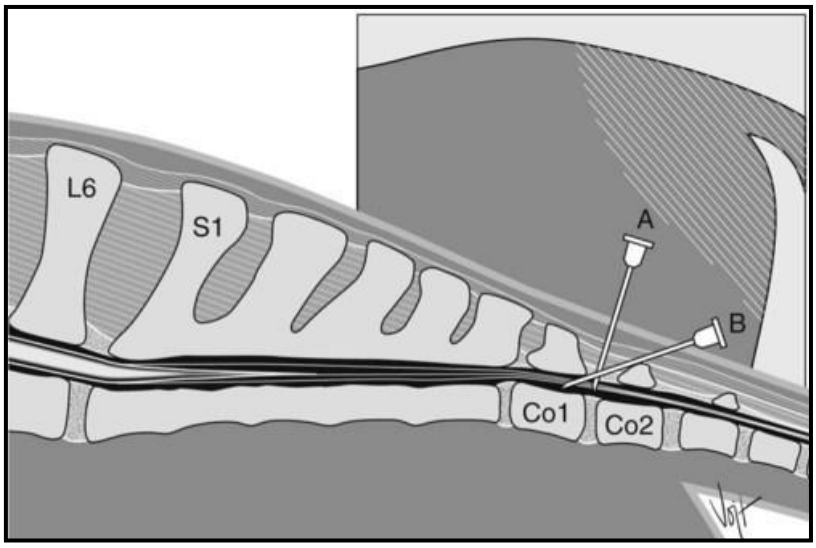
2-The Horse

The technique is not common in equine as in bovine because the indications for such technique in equine are not frequent and the detection of site of injection is more difficult.

Seat of injection: -

Seat of injection is 1st inter-coccygeal space in *horse* and 2nd inter-coccygeal space in *donkey*. The depth of the canal is 4-8 cm.

Technique: -



The needle is inserted forwards and downwards with a right angle with the contour of the croup (30° degrees with the vertical) and this technique (A) is easier than the other technique (B) where the needle is inserted at the posterior part of intercoccygeal space with an angle of 60° with the vertical to permit gliding of the needle along the floor of the neural canal. The intercoccygeal space can be detected by;

1-A line drawn connecting the hip joints and intersects the midline at the level of the sacrococcygeal joint caudal to which the dorsal spine of the 1st coccygeal bone can be felt. The needle inserted into the depression directly caudal to this point.

2-The space is opposite the caudal fold formed on each side of the tail when raised.

B-Lumbar epidural analgesia in Sheep

Seat of injection: -

Lumbosacral space to avoid puncturing of the meninges. It is located just behind the spinous process of last lumbar vertebra that lies at a point of intersection between line drawn to connect the anterior borders of the two illiums and midline.

Technique: -

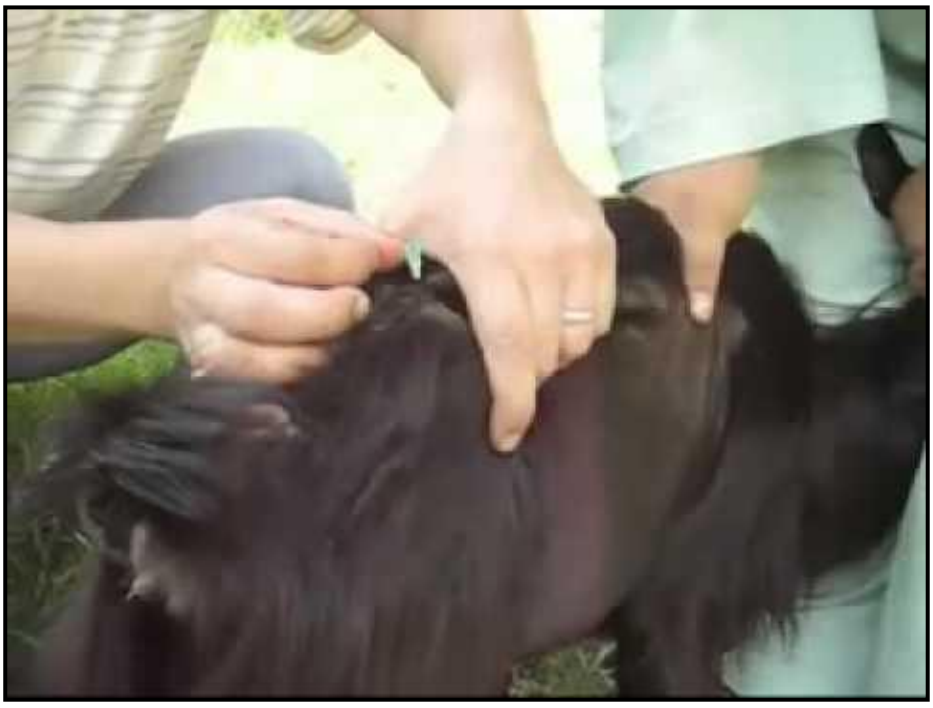
The needle is inserted in the mentioned space with an angle 10° anterior and 15° lateral with the vertical.

Dose: -

8-15 ml Lidocaine 1%

Indication: -

Intra-abdominal, pelvic, or hind limb surgery



Practice: Mention suitable site for epidural analgesia in

Cow……

Horse……..

Buffalo……...

Donkey……..

Sheep……..…

Goat……

Dog……

Stick here picture for site of epidural analgesia in donkey

Stick here picture for site of epidural analgesia in cattle

Stick here picture for site of epidural analgesia in goat

Preanesthetic Medication

1- Atropine sulphate: -

Dose

Animal	1 Kg
Large ruminants	0.005 (up to 0.2-0.8) mg/ Kg B wt.
Equine	0.7 mg/ kg B wt., (up to20-60) mg/ Animal
Small ruminants	0.6 mg/ kg
Dogs	0.04 (0.02-0.1) mg/ Kg B wt.
Cat	1 mg/ kg B wt
Pigs	0.3-1.8 mg/ animal.

2-Tranquilizers (ataractics) and sedatives

They are drugs used to depress the CNS, and are useful in wide verities of conditions in animals like

1-Facilitation of animal examination

2-Depression of CNS that lowers the required dose of anesthesia

3-Reduction of body secretions like saliva to prevent asphyxia during anesthesia

4-Relaxation of muscle to permit easier surgery etc…

A-Weak acting drugs

Like meprobamate derivatives (Equinal) that is used for human only

I-Strong Acting Drugs

1-Phenothiazine Derivatives

A-Acepromazine maleate (Acetylpromazine®)

Uses: -

Acepromazine is approved for use in dogs, cats, and horses.

Dose: -

Large animals 0.1 mg/ Kg B. wt. IM. However in the horse, 0.02 mg/ kg IV or 0.05 mg/kg IM has been used.

Pets 0.1 mg/ Kg B. wt. Slow IV allows 15 minutes for onset of action

B-Chlorpromazine (Largactil® or Neurazine®)

Dose and administration: -

Animal	1 Kg	Rout	
Horse	Not more than 0.2-0.4 mg	IM	Larger doses cause panic state due to muscle weakness and the animal's response may be alarming and difficult to control
Cattle	Not more than 1 mg (Not to lie down)	IM 1 hour before local or regional analgesia	Not recommended prior to general anesthesia due to relaxation of the cardia with increased risk of regurgitation, and delayed recovery, but it can be used with local or regional analgesia
Dog	0.5-1 mg 1 mg 2 mg	IV or IM Oral Rectal	The maximum effect appears after 60-90 mins with IM, and 10-15 mins with IV injection
Cat	Up to 1 mg	IV or IM	

C-Promazine HCl (Sparine® 5%)

Dose and administration: -

Animal	**1 Kg**	**Rout**
Large animals	1 mg	IM only
Pets	5 mg	IM only

D-Propionylpromazine (Combelen® 1%)

Dose: -

The dose ranges from 0.2 - 0.3 mg/ kg

Animal	Weight Kg	Slow IV ml	IM ml
Horse	*100*	*0.5*	*1*
Cattle	*100*	*1* *3 (penile protrusion)*	*2*
Camel	*100*	*2*	*4*
Sheep and goat	*10*		*Up to 1*
Dog	*1*	*0.03*	*0.05*
Cat	*1*		*Up to 0.2*

2-Thiazine Derivative (Sedatives)

A-Detomidine

It is more popular in Europe (cheaper than xylazine) and in contrast to xylazine, the dose is similar to those used in horses 2.5 - 10 mcg/kg IV. Duration of sedation lasts 30-60 mins. 40 mcg/kg IV will produce profound sedation and recumbency.

B-Xylazine HCl (Rompun® or Xylaject®): -

Dose and rout of administration: -

Animal	IV mg/ Kg	IM mg/ Kg
Horse	0.5 mg Onset is almost immediate Lasts 15-20 mins Recovery after 30 mins	2-3 mg Onset over 10-15 Lasts 15-20 mins Recovery after 60-120 mins
	(1.1 mg of 2% sol induce deep sedation for 20-30 min with recovery after 45 mins, and the horse doesn't go down after these doses)	(3 mg of 10% sol produce deep sedation over 10-15 mins for 30-40 mins and recovery occurs after 60-120 mins, and the horse doesn't go down after these doses)
Cattle	0.05 - 0.2 mg Produces profound sedation similar to deep narcosis	0.05-0.1 mg (standing animal) Onset over 8-12 mins Lasts 30 mins 0.2-0.3 mg (recumbency)
Sheep	0.11 mg	0.22 mg
Goat		0.0.5 mg (more sensitive than sheep and sedation may last 12 hours)
Pets		Up 0.2 ml 2%

3-Benzodiazepine derivative

A-Short acting (Valium®, Neuril®, Diazepam® or Valipam®)

Dose and administration: -

Animal	1 Kg	Rout
Large animals	1 mg	IM
Dogs	1 mg 5 mg	IM, pre-anesthetic and for control of restlessness Oral, for control of behavioral problems
Sheep and goat	15 mg	Oral, for wild sheep and aggressive puck
	1-2 mg	IM or slow IV, for radiographic examination or as pre-anesthetic medication

B-Very long acting (Lorazepam)

Practice: Mention doses of Acepromazine maleate

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Mention doses of Chlorpromazine

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Mention doses of Promazine

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Mention doses of Propionylpromazine

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Mention doses of Xylazine HCl

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Mention doses of diazepam

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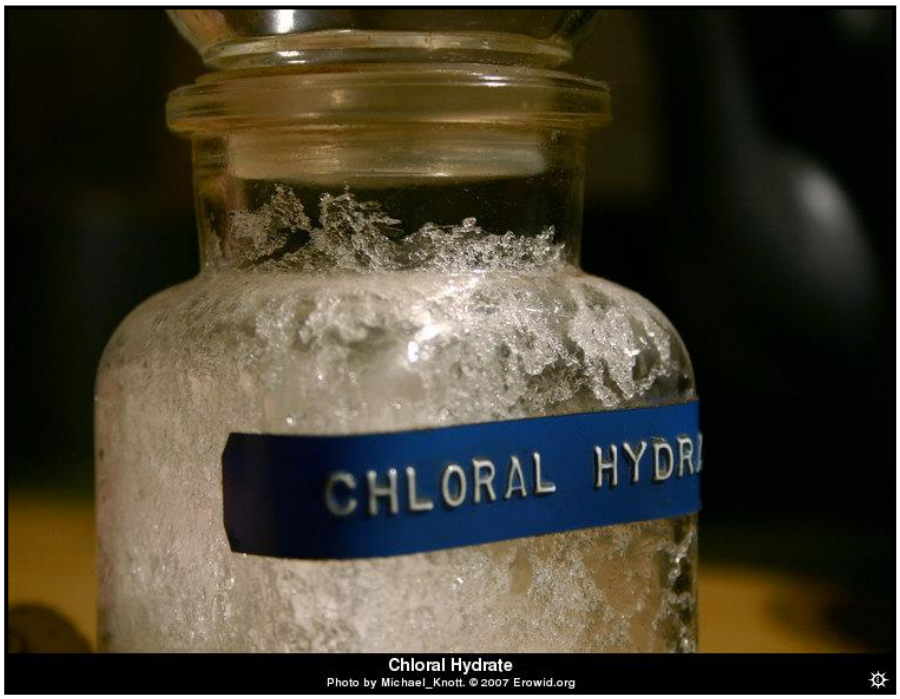
Stick here picture for effect of xylazine HCl in cow

Basal Narcosis

1-Chloral hydrate: -



Stages of narcosis, doses, and effect: -

Stage	Dose / 50 Kg	Conc.	Rout	Effect
Light	3-4 gm	10%	IV	The animal still in standing position with motor in coordination and reduced response to external stimuli, which facilitate examination of the animal.
Medium	4-5 gm	10%	IV	The animal becomes unable to stand, lies down, with reduced response to external stimuli
Deep	5-6 gm	10%	IV	The animal lies down in lateral recumbency, becomes on the border of general anesthesia, with reduced response to external stimuli

Practice: Mention doses of Chloral hydrate

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Stick here picture for effect of Chloral hydrate

Mention the required doses of Chloral hydrate for deep narcosis (300kg horse)

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Case report (Number……)

Date: - ……..

Species: - ……. **Gender: -** ……

Temperature: - …….. **Pregnancy: -** ……..

Complain: -

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Diagnosis: -

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Treatment: -

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