



Tikrit University  
College of Veterinary Medicine

# Lecture Title

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Subject name: **Local and Regional Anesthesia or Analgesia**

Subject year: **surgery \ 4<sup>th</sup> stage**

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Lecturers link

## Local and Regional Anesthesia or Analgesia

### Local anesthesia:-

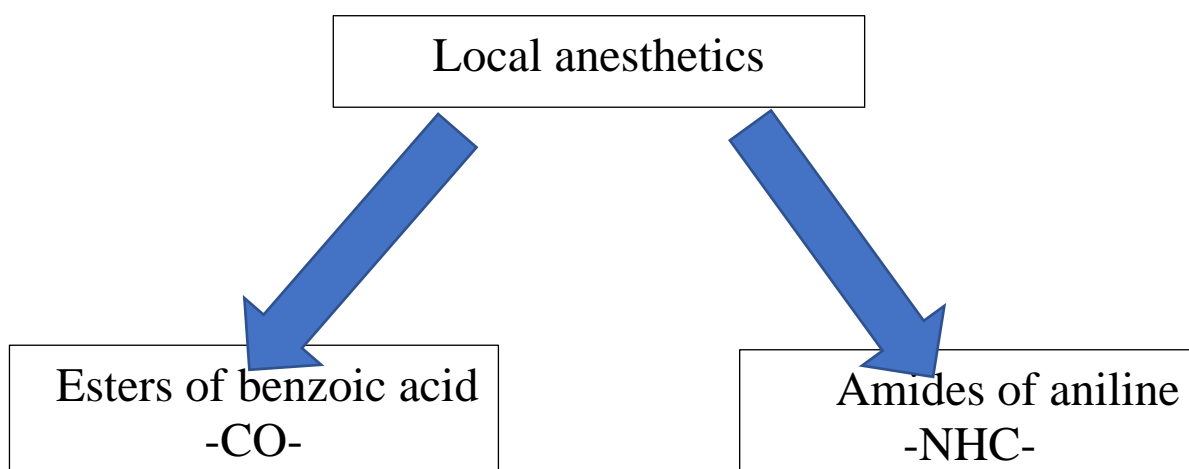
are Define as the use of chemical agents on sensory neurons to produce disruption of neuron impulses transmission, leading to a temporary loss of sensation. Just in a small area of body where a minor procedure is to be done.

### Regional anesthesia:-

Define as the loss of sensation in a large area but still in a limited part of body. It does not make the patient unconscious .The spinal & perineural anesthesia examples of regional anesthesia.

### Structure activity relationships:-

Local anesthetics (LAs) consist of a lipophilic & a hydrophilic portion separated by a connecting hydrocarbon chain . Depending on the structure of the molecule`s intermediate chain.



Some examples are:-

Esters  $\longrightarrow$  procaine, cocaine, chlorprocaine, piperacaine & tetracaine.

Amides  $\longrightarrow$  Lidocaine & Bupivacaine.

Amides drugs have "*i*" in generic prefix before "*caine*" exception is Piperacaine an ester drug

### ***Characters of the local anesthetic agent:-***

- 1-good penetrating qualities in the body tissue.
- 2-high potency so low concentration can be used.
- 3-rapid onset of action.
- 4-long duration of action.
- 5-low systemic reaction.
- 6-reversible action.
- 7-It should be not irritant, not painful, and not cause tissue damage.
- 8-ease of sterilization.
- 9-It should be compatible with adrenaline.

### ***Classification of local anesthetic drugs:-***

- 1-**Procaine & chlorprocaine** are of low potency and have a short duration of action.
- 2-**Mepivacaine, prilocaine & lidocaine** are of intermediate potency and duration.
- 3-**Tetracaine, bupivacaine, etidocaine & ropivacaine** are of high potency & duration.

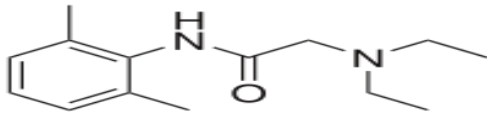
### ***Local anesthetics in common veterinary use:-***

#### **1-Lidocaine:-**

- 1-The first modern local anesthetic agent was (trade name **Xylocaine®**, **Lignocaine®**).
- 2-This is the most widely used general-purpose local anesthetic in veterinary use. It possesses reasonably rapid onset of action, with good spreading properties, being a good 'all round' useful local anesthetic.
- 3-It may cause some local irritation and swelling, which is particularly a problem in the horse. It is available in a variety of concentrations or injection; with and without epinephrine; and in the form of solutions, creams, jellies, sprays..... etc.

4-Duration of action is variable (depending on uptake) but will be around 1 hour without epinephrine, and 2 hours with epinephrine.

5-It sets quickly and when combined with a small amount of *epinephrine (adrenalin)*, it produces profound anesthesia for several hours.



### ***Adrenaline:-***

some times added to the local anesthetics formulation for:-

- 1-Prolong duration of action.
- 2-To reduce systemic absorption.
- 3-To reduce surgical bleeding.

### ***Adrenaline (epinephrine):-***

By using epinephrine (adrenaline) in low concentration (1:100 000) or (1:200 000) (5 micrograms/ml). That will lead to vasoconstriction and lead to slows rate of absorption of drug and prolonged its local effect and reduce its toxicity. In same time the epinephrine reduces the bleeding during operation.

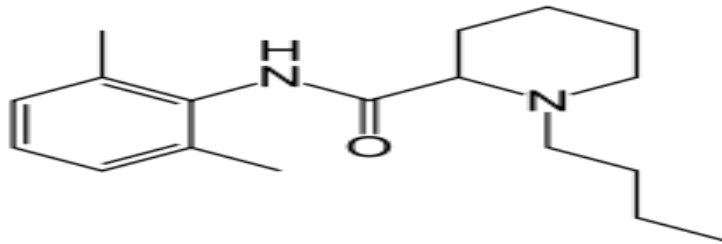
**Note:** epinephrine should not be given with a local anesthetics in digits and appendages because it may produce ischemic necrosis.

### **2-Bupivacaine:-**

- 1-This drug has a prolonged duration of action ; up to 8 hr. when combind with epinephrine.
- 2-It is therefore used whenever long action is required ( post-operative analgesia; prolonged surgery.....etc.).
- 3- Bupivacaine is approximately four times as potent as lignocaine; hence a 0.5% solution is equivalent in nerve-blocking activity to a 2% solution of lignocaine.

4-bupivacaine provides a period of analgesia at least twice as long as that of lignocaine.

5-Due to these properties it is increasingly used today as a component of regimens providing postoperative analgesia.



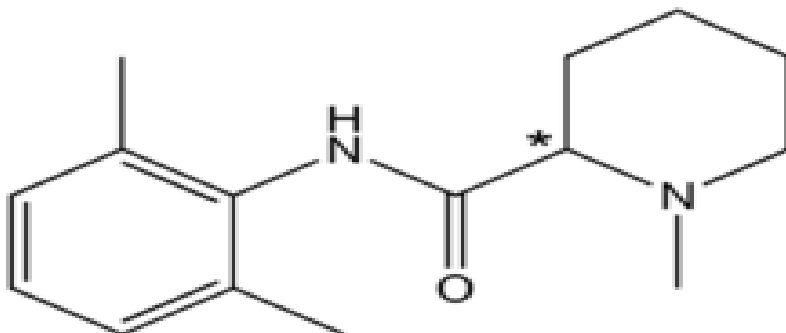
### **3-Mepivacaine:-**

\*1-Have much less vasodilative qualities and hence can be used without the epinephrine vasoconstrictor.

2-This compound (Carbocaine) closely resembles lignocaine hydrochloride but is slightly less toxic.

\*3-It is especially useful for the nerve blocks used in the diagnosis of equine lameness because there is less post-injection oedema than with lignocaine.

4-Duration of action 1-3 h.



### ***Other local anesthetics:-***

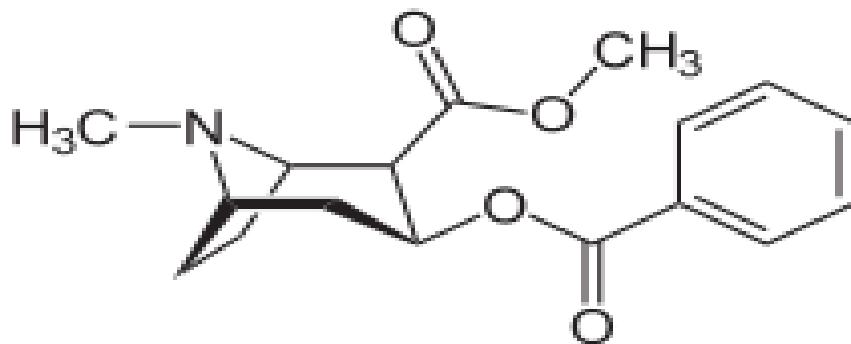
#### **1-Cocaine:-**

1-The original local anesthetic is the only one to cause vasoconstriction.

2-It is now not used as a local anesthetic because of its potential for abuse.

3-Has the disadvantage of being toxic to the tissue when injected; therefore newer less toxic, synthetic caines have supplanted its use.

4-It produce good surface anesthesia of cornea and conjunctiva.



#### **2-Procaine:-**

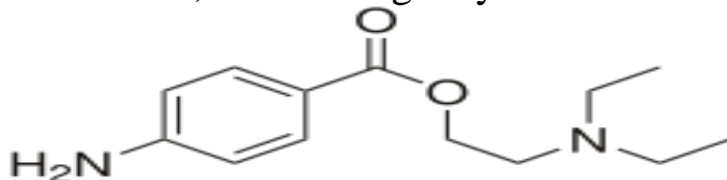
1-Older drug slow onset of action.

2-First synthetic local anesthetic drug to be used clinically

3-It is an ester linked local anesthetic drug

4-Procaine hydrochloride is white, crystalline water soluble powder  
Solution are relatively stable can be sterilized repeatedly by boiling.

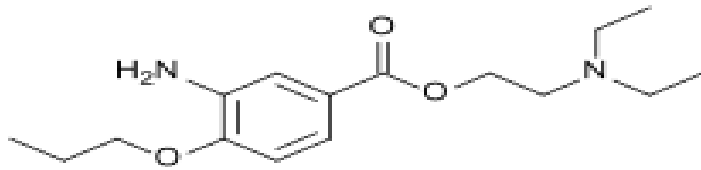
5-Procaine hydrochloride solutions have a pH of approximately 6.0 when fresh; on standing they became more acidic.



#### **3-Proparacaine:-**

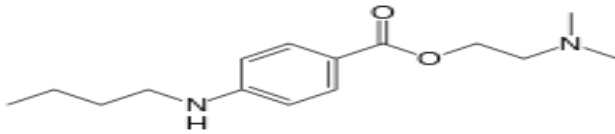
Is used to anesthetize the cornea of the eye. When dropped on the cornea it has a rapid onset of action (within 1 minute) and lasts for

about 15-30 minutes. It is nonirritant, and does not affect the size of the pupil.



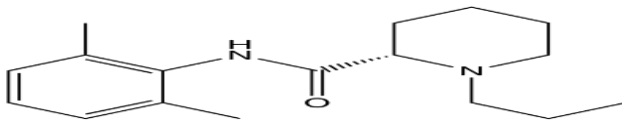
#### **4-Amethocaine (Tetracaine):-**

Is well absorbed by surfaces and is used on mucous membranes.

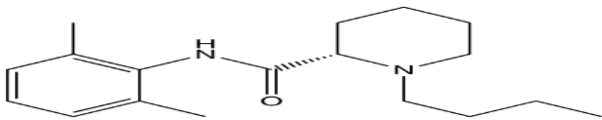


#### **5-Ropivacaine or Levobupivacaine:-**

Newer long acting local anesthetics with less cardio-toxicity.



#### ***Ropivacaine***



#### ***Levobupivacaine***

#### ***6-Tutocaine:-***

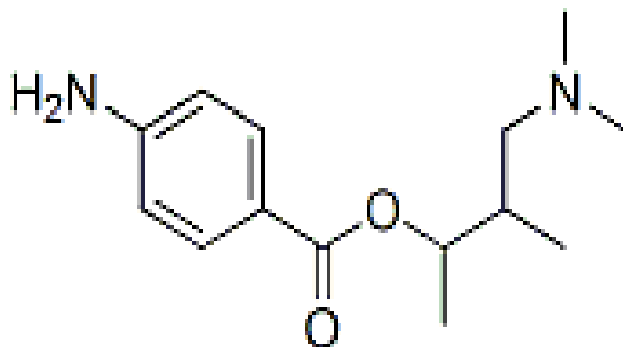
1-It is readily soluble in water and solution withstands boiling for a short period.

2-The aqueous solution of tutocaine hydrochloride is stable.

3-It is considered to be more potent infiltration anesthesia than procaine. However, it is twice as toxic as procaine. Tutocaine hydrochloride is suitably used for infiltration anesthesia as 2 to 4 % solution.

4-The toxic properties of tutocaine hydrochloride have discouraged its use in veterinary practice.

5-The action of tutocaine starts within 3 to 5 minutes after injection and persists nearly for 1 to 1 1/2 hours.



***Common methods of producing local anesthesia:-***

- 1-Surface (topical) anesthesia.
- 2-Intrasynovial anesthesia.
- 3-Infiltration anesthesia.
- 4-Intravenous regional anesthesia.
- 5-Regional anesthesia.

Divided into:-

- I-Spinal regional anesthesia.
- II-Perineural regional anesthesia.

***1-Surface (topical) anesthesia:-***

This refers to the use of local anesthetics in solution sprays as well as in various creams and ointments, on mucous membranes; drops into the eyes, sprays or brush in laryngeal area, infuse into the nostrils, urethra, or rectum.

***Cryoanesthetics:-***

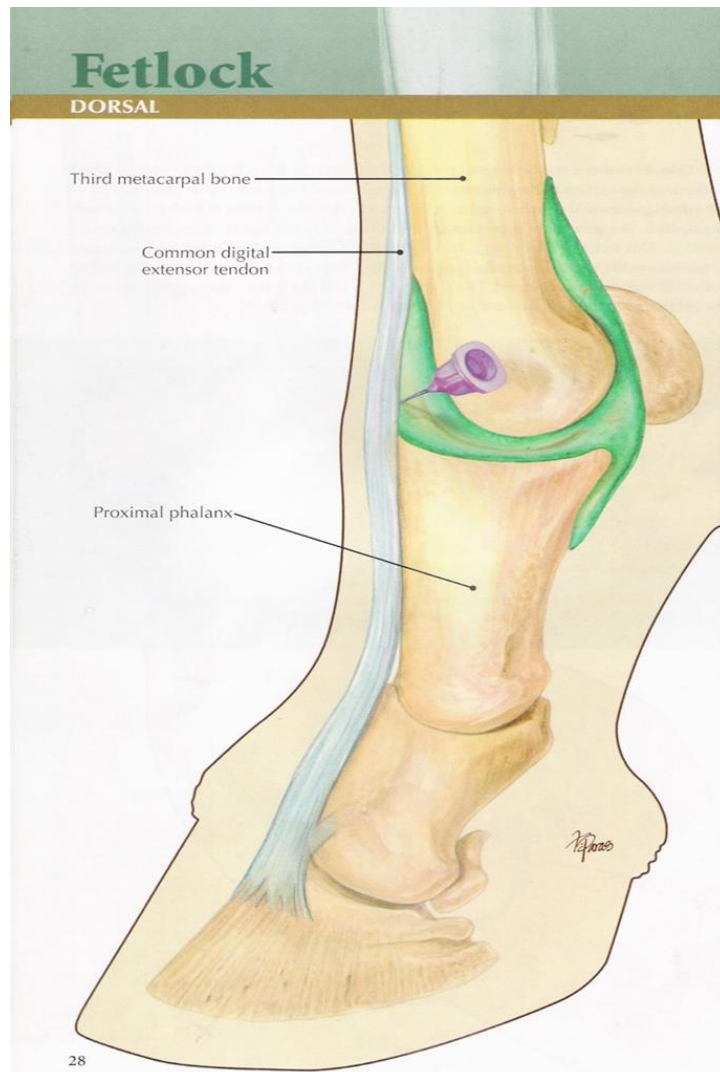
It refers to the external application of cold to the skin to produce numbness. This may be acceptable for quick biopsy or provides superficial short duration anesthesia sufficient for pain relief such as: - Ice refrigerant spray, liquid nitrogen, ether spray, ethyl chloride spray and carbonic acid snow.

***2-Intrasynovial anesthesia:-***

- 1-Injection of local anesthetics in joints, bursa, and tendon sheaths.
- 2-Useful for both diagnosis of lameness, and for general pain relief.



3-The local anesthetic chosen must cause minimal irritation, and great care in sterility is necessary as infection in these sites occurs easily.



### **3-Infiltration anesthesia:-**

**1-Linear infiltration:-** In this method the nerve endings are affected at the actual site of operation. Most minor surgery can be done by this technique. But there is Multiple Problems may occur by this method such as irritation, distortion of the wound, swelling and some delay in post-operative healing. (Never inject local analgesic through infected tissues).

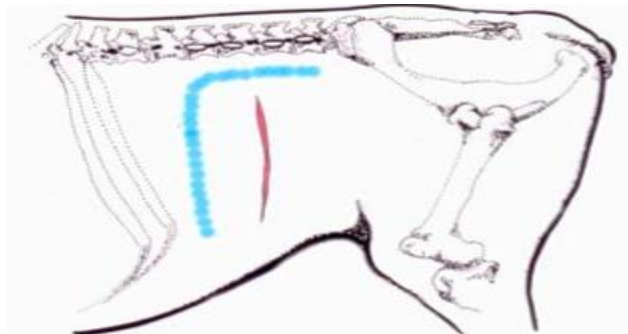
**2-Field anesthesia:-** Is an infiltration anesthesia designed to minimize Multiple Problems that accompanied with linear

infiltration. In this technique walls of anesthesia are made by infiltrating the anesthetics around the surgical site.

***Advantages of field anesthesia include:-***

- 1-Absence of distortion of the anatomical features in the line of incision.
- 2-Muscle relaxation.
- 3-No interference to healing.

***3-Inverted L infiltration:-*** is an example of a field anesthesia technique which is widely used in cattle for anesthesia of the abdominal fossa.



***4-Ring blocks infiltration:-*** is another form of field anesthesia in this technique the tissue all around a distal organ is infiltrated with local anesthetic, this technique is used in the teats or around the limb of cattle (**do not use epinephrine here**, as vasoconstriction could lead to ischemic necrosis and sloughing of tissue).

