Tikrit University
College of Veterinary Medicine

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Subject name: **Muscle Relaxant**

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MUSCLE RELAXANTS

Muscle Relaxant:-

Drugs other than general anesthetic agents, or local analgesic agents which are used to produce relaxation or paralysis of voluntary striated muscles of the body.

Muscle relaxant agents exert their effects by either their action upon the synapses in the spinal cord, or upon the neuromuscular junction.

Types of muscle relaxation:-

1-Drugs acting on the CNS:-

Causes depression of the CNS and decreases the activity of the cells in the spinal cord, and thus producing muscle relaxation. e.g., potent narcotic drugs and general anesthetic drugs.

2-Locally acting drugs:-

When local analgesics are injected directly into a muscle mass or around nerve fibers or nerve endings. The transmission of impulses is blocked and the muscle fibers are actively isolated from nervous influences, e.g., Paravertebral nerve block, and Epidural analgesia.

3-Drugs acting on neuromuscular junction:-

These known as " Muscle Relaxants".

Classification of Neuromuscular blockade:-

1-Prejunctional blockade:-

d- Tubocuraine chloride (Curare)

2-Post junctional blockade:-

A-Non-depolarizing M.R:-

e.g., Gallamin triethiodide (Flaxedil), Pancuronium bromide (Pavulon)

B-Depolarizing M.R.:-

e.g/ Suxamethonium (Scoline, Succinylcholine).

C- Intracellular M.R. drugs:-

e.g., Dantrolene Sodium.

D- Interneuronal M.R. drugs:-

e.g., Mephensine.

Indications for the uses of M.R. agents in veterinary anesthesia and clinical practice:-

1-To relax the skeletal muscles for easier surgical access.
2-To facilitate control of respiration during intrathoracic surgery.
3-To assist the reduction of fractured bones and dislocation of the joints during surgery.
4-To facilitate the performance of endotracheal tubes and endoscopy.
5-Reduce the doses of anesthetic agents, and ease smooth induction of anesthesia particularly in horses.
6-To reduce muscle damage in certain diseases, e.g., Tetanus, Strychnine poisoning.

Muscle Relaxant Agents:-

A- Depolarizing Muscle Relaxants:-

1-Succinylcholine (Scoline, Suxamethonium):-

It produces muscle paralysis by its mode of action at the neuromuscular junction, by its transient stimulation of muscle fibers. The drug causes a marked muscle fasciculation, and in man, these causes muscle pain the day after operation. The drug administered by i.v. route. Doses in different animal species are:-

Horses:- (0.08-0.1 mg/kg), produces paralysis of the head and neck and limbs, lasts for(5 min) without paralysis of the diaphragm.
Sheep and Cattle:- (0.02 mg/kg)
Dogs:-(0.3 mg/kg) produce total paralysis of(15- 20 min) duration.
Cat:- (3-5 mg/kg) produce total paralysis for (15-20 min).

B- The Non-depolarizing Muscle relaxants:-

1-d- Tubocuraine chloride (Curare)

Producing relaxation of the voluntary striated muscle by preventing the transmission of the motor nerve impulse across myoneural junction. The drug isolated from curare. It is a white powder, fairly soluble in water, but more so in normal saline.

Doses:-

Dogs:- (0.4 mg/kg)
Calves:- (0.06 mg/kg)
Horses:- (0.2mg/kg).

2-Gallamine Triethiodide (Flaxedil):-

Doses:-

Dogs and Cats: (1mg/kg) i.v., causes complete paralysis within (2 min), persists for (10-20 min).

Horses:(0.5-1 mg/kg).

3-Pancuronium Bromide:-

It is a new potent amino steroid, neuromuscular blocking agent. During light plain of anesthesia, doses of (0.06 mg/kg) produce complete muscle relaxation with apnea for about (20 min).

C- Centrally Acting Muscle Relaxants:-

These drugs exerts their effects by depressing the polysynaptic reflexes in the spinal cord at the internuncial neurons.

1-Mephenesin:-

Clinically this drug is used to antagonize the muscle spasms seen in strychnine poisoning and to relax tetanus victims.

2-Guaiphenesin (guaiacol glycerine ether):-

It is employed in equine anesthesia as a 5% solution, (3-4 g/50 kg) given by i.v. route to produce useful degrees of abdominal relaxation lasting (10-15 min), without at the same time causing significant respiratory depression. Relaxation of the pharyngeal and laryngeal muscles is sufficient to facilitate endotracheal intubation

Antidotes for Muscle Relaxants

There are no effective antidotes to those agents which are acting by depolarization. But, Neostigmine is an effective antidote to the non-depolarizing relaxants and at least a partial one in the phase 2 block following the use of Suxamethonium.

Uses of Neostagmine:-

1-To restore full respiratory activity at the end of an operation

2-To antagonize the effects of non-depolarizing agents after short operation.

3-To abolish the occasional long-lasting effects of curarization
4-Neostagmine should never be given until there is some signs of spontaneous respiratory activity.
5-Atropine should be given to counteract the muscarinic effects of neostagmine (bradycardia, salivation, defecation and urination).