Skeletal Muscle Relaxants
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Skeletal Muscle contraction
Mechanism of action of Neuromuscular Blockers
Competitive Antagonists
(Non-depolarizing Blockers)
(Non-depolarizing blockers)
Long-acting: d-tubocurarine, pancuronium
Intermediate: atracurium, vecuronium, rocuronium
Short-acting: mivacurium
Mechanism of Action

Competitive Antagonism

Actions

Muscle weakness $\rightarrow$ Flaccid paralysis

Order of muscle affected:
- Extrinsic eye muscles, muscles of finger
- Neck muscles (muscles of phonation and swallowing)
  - Face
  - Hands,
  - Feet
  - Trunk
- Respiratory muscles (intercostal and diaphragm)

Recovery in the reverse order

Consciousness, appreciation of pain not affected
Actions
Autonomic ganglion blocking property
Histamine release (by d-tubocurarine)
CVS
Significant fall in BP
Increase in Heart rate
Vagal gangionic blockade (also ‘ve’ and ‘pan’)
Newer competitive blockers:
Negligible effect on BP and HR
Adverse effects
Hypotension
Tachycardia
Respiratory paralysis
Bronchospasm
Aspiration of gastric contents
Advantages of synthetic (Newer) competitive blockers

Less histamine release

Do not block autonomic ganglia

Spontaneous recovery with most of drugs

Rapacuronium & rocuronium have rapid onset
Atracuronium: Hoffmans elimination
Mivacurium short acting
Uses
As an adjunct to general anaesthesia
For producing satisfactory skeletal muscle relaxation
For facilitating endotracheal intubation, Rocuronium is preferred due to its rapid onset of action. Succinylcholine is better due to its short lasting duration.
(Non-competitive Antagonist)
Succinyl Choline

Mechanism of action

Actions
Small rapidly moving muscles (eye, jaw, larynx) relax before those of limbs and trunks. Ultimately intercostals and finally diaphragm paralysis occur → respiratory paralysis.
Recovery in the reverse order.

Muscle relaxation: Onset: within 1 min; peak: 2 min, duration: 5 min; longer duration relaxation requires continued IV infusion.

Uses
Suitable for short-term procedures
Rapid endotracheal intubation during induction of anaesthesia
During Electro-Convulsive shock Therapy (ECT)
To prevent injury
Adverse Effects
Transient ↑ Intraocular Tension
Hyperkalemia:
Fasciculations release potassium in blood
Succinylcholine apnoea
Malignant hyperthermia: when used along with halothane in general anaesthesia
Treatment is by rapid cooling of patient & dantrolene i.v.

Muscle pain
Treatment of succinylcholine apnoea
No antidote is available

Fresh frozen plasma should be infused
Patient should be ventilated artificially until full recovery.

Comparison of Competitive and Depolarizing Blocking Agents

Dantrolene

Directly acting skeletal Muscle relaxant

Inhibits depolarization induced calcium release from sarcoplasmic
reticulum by acting on ryanodine receptors
Drug of choice in malignant hyperthermia
Drug interactions
Non depolarizing blockers
Anticholine-esterases (Neostigmine)
Reverse the action of only non depolarizing blockers
Halothane, Aminoglycoside antibiotic like gentamicin & calcium channel blockers like nifedipine
Enhances the neuromuscular blockade
Depolarizing blockers
Halothane can cause malignant hyperthermia

Ganglion blockers
Competitive blockers
Hexamethonium
Trimethaphan
Mecamylamine
Persistant depolarizing
Nicotine large dose
Actions & Adverse effects of ganglion blockers