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 → 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 preferred due to rapid onset of action

Succinylcholine is better due to short lasting duration

Depolarizing Blocker

(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 alng 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 untill 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