**SNS COLLEGE OF ALLIED HEALTH SCIENCES**

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**DEPARTMENT :** PHYSICIAN ASSISTANT

**COURSE NAME :** PHARMACOLOGY

**UNIT :** DRUGS ACTING ON MUSCULOSKELETAL SYSTEM

**TOPICS :** MUSCLE RELAXANTS - DEPOLARISING, NON DEPOLARISING

# DEPOLARISING - SUXAMETHONIUM

- Suxamethonium, also known as succinylcholine, is a depolarizing neuromuscular blocking agent.

- It is used in anesthesia to induce short-term muscle relaxation, particularly during surgical procedures and tracheal intubation.

# MECHANISM OF ACTION

- Suxamethonium acts by mimicking the action of acetylcholine at the neuromuscular junction.
- It binds to the nicotinic acetylcholine receptors on the motor endplate, leading to depolarization.
- Unlike acetylcholine, suxamethonium is resistant to degradation by acetylcholinesterase, resulting in a prolonged depolarization.

# PHARMACODYNAMICS

- Rapid onset of action: Suxamethonium induces muscle paralysis within seconds.

- Short duration of action: Its effects are relatively brief due to rapid metabolism.

# PHARMACOKINETICS

- Metabolism: Suxamethonium is rapidly metabolized by plasma pseudocholinesterase (also known as butyrylcholinesterase).

- Duration of action can be influenced by factors such as genetic variations in pseudocholinesterase activity.

# INDICATIONS

- Suxamethonium is primarily used for short-term muscle relaxation during surgical procedures.

- It is commonly employed to facilitate rapid tracheal intubation during the induction phase of general anesthesia.

# CONTRAINDICATIONS

- Malignant hyperthermia: Suxamethonium can trigger a potentially life-threatening reaction in individuals susceptible to malignant hyperthermia.

- Genetic deficiency in pseudocholinesterase: Patients with a known or suspected deficiency may experience prolonged effects.

# SIDE EFFECTS

- Increased intracranial pressure: Caution is warranted in patients with head injuries.
- Hyperkalemia: Particularly concerning in patients with burns, trauma, or neuromuscular disorders.
- Muscular pain: Commonly observed in the jaw, neck, and postoperative muscle soreness.
- Bradycardia: Especially noted in pediatric patients.

# NON DEPOLARISING - PANCURONIUM

- Pancuronium is a non-depolarizing neuromuscular blocking agent used in anesthesia. It belongs to the aminosteroid class of muscle relaxants. Pancuronium works by competitively binding to the nicotinic acetylcholine receptors at the neuromuscular junction, leading to muscle paralysis.

- It is commonly used to facilitate endotracheal intubation and provide muscle relaxation during surgical procedures.

# MECHANISM OF ACTION

- Pancuronium is a non-depolarizing neuromuscular blocking agent.

- It competitively binds to nicotinic acetylcholine receptors at the motor endplate, preventing acetylcholine from binding.

# PHARMACODYNAMICS

- Intermediate onset of action (2-3 minutes) and a relatively long duration.

- Achieves 70-90% neuromuscular blockade.

# PHARMACOKINETICS

- Hepatic metabolism.
- Excretion primarily in the urine.

# INDICATIONS

- Used to provide muscle relaxation during surgery and mechanical ventilation.

- Often chosen for longer surgical procedures.

# CONTRAINDICATIONS

- Hypersensitivity to pancuronium.
- Caution in patients with cardiovascular diseases due to potential tachycardia and hypotension.

# SIDE EFFECTS

- Tachycardia and hypertension (due to vagal blockade).
- Prolonged neuromuscular blockade.
- Possible histamine release.

# ATRACURIUM

- Atracurium is a non-depolarizing neuromuscular blocking agent used in anesthesia. It falls into the benzylisoquinolinium class. Atracurium acts as a competitive antagonist at the nicotinic acetylcholine receptors, leading to muscle relaxation.

- It is commonly employed for muscle relaxation during surgery and intubation.

# MECHANISM OF ACTION

- Atracurium is a non-depolarizing neuromuscular blocking agent, competitively blocking acetylcholine receptors.

# PHARMACODYNAMICS

- Intermediate onset (2-5 minutes) and duration.
- Spontaneously degraded by Hoffman elimination.

# PHARMACOKINETICS

- Metabolized by non-specific ester hydrolysis.
- Independent of liver or kidney function.

# INDICATIONS

- Used for muscle relaxation during surgery and intubation.
- Suitable for patients with hepatic or renal dysfunction.

# CONTRAINDICATIONS

- Hypersensitivity to atracurium.

# SIDE EFFECTS

- Hypotension.
- Bronchospasm.
- Histamine release.

# VECURONIUM

- Vecuronium is a non-depolarizing neuromuscular blocking agent used in anesthesia. It is classified as a steroidal muscle relaxant. Vecuronium works by competitively inhibiting the action of acetylcholine at the neuromuscular junction, resulting in muscle paralysis.
- It is frequently used for muscle relaxation during surgical procedures and for facilitating mechanical ventilation.

# MECHANISM OF ACTION

- Vecuronium is a non-depolarizing neuromuscular blocking agent, competitively blocking acetylcholine receptors.

# PHARMACODYNAMICS

- Intermediate onset (1-3 minutes) and duration.
- Achieves 90% blockade within 3-5 minutes.

# PHARMACOKINETICS

- Hepatic metabolism.
- Elimination mainly via the biliary system.

# INDICATIONS

- Used for muscle relaxation during surgery and mechanical ventilation.
- Suitable for prolonged procedures.

# CONTRAINDICATIONS

- Hypersensitivity to vecuronium.

# SIDE EFFECTS

- Hypotension.
- Bronchospasm.
- Prolonged neuromuscular blockade.

# ROCURONIUM

- Rocuronium is a non-depolarizing neuromuscular blocking agent used in anesthesia. It is a steroidal muscle relaxant. Rocuronium acts as a competitive antagonist at the nicotinic acetylcholine receptors, resulting in muscle paralysis.
- It is known for its rapid onset of action, making it suitable for procedures that require quick muscle relaxation. Rocuronium is often used for endotracheal intubation and during surgical procedures.

# MECHANISM OF ACTION

- Rocuronium is a non-depolarizing neuromuscular blocking agent, acting as a competitive antagonist at acetylcholine receptors.

# PHARMACODYNAMICS

- Rapid onset (1-2 minutes) and intermediate duration.
- Provides good intubating conditions within 60-90 seconds.

# PHARMACOKINETICS

- Hepatic metabolism.
- Excretion primarily in the bile.

# INDICATIONS

- Used for endotracheal intubation and muscle relaxation during surgery.

- Rapid onset makes it suitable for emergency intubations.

# CONTRAINDICATIONS

- Hypersensitivity to rocuronium.

# SIDE EFFECTS

- Hypotension.
- Bronchospasm.
- Prolonged neuromuscular blockade.

# TECHNICIAN ROLE

- Neuromuscular Monitoring
- Train-of-Four (TOF) Ratio
- Continuous monitoring helps prevent over-paralysis.
- Clinical Monitoring
- Electrocardiogram (ECG) Monitoring
- Temperature Monitoring
- Renal and Hepatic Function Monitoring
- Monitoring for Allergic Reactions

# ASSESSMENT

- What is Depolarising Muscle Relaxants ?
- What is Non Depolarising Muscle Relaxants ?