SNS COLLEGE OF ALLIED HEALTH SCIENCE

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT OF OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY - II YEAR

COURSE NAME: PHARMACOLOGY

TOPIC - REVERSAL AGENTS

MRS.GAYATHIRI.K
Lecturer

REVERSAL AGENTS

• Reversal Agents: Drugs used to counteract or reverse the effects of anesthetics, neuromuscular blockers, or sedatives, restoring normal physiological function post-anesthesia

REVERSAL AGENTS

NEOSTIGMINE

Class: Acetylcholinesterase inhibitor, reversal agent

Mechanism: Inhibits acetylcholinesterase, increasing acetylcholine at neuromuscular junction, reversing non-depolarizing neuromuscular blockers (e.g., rocuronium, vecuronium).

Pharmacodynamics: Enhances cholinergic activity, reverses muscle paralysis, stimulates muscarinic receptors (bradycardia, salivation, bronchoconstriction).

Pharmacokinetics: IV, onset 5–10 min, peak 10–30 min, duration 1–2 h, metabolized by plasma esterases, 50 – Dosage: 0.03–0.07 mg/kg IV (max 5 mg), co-administered with atropine/glycopyrrola1

Adverse Effects: Bradycardia, hypotension, nausea, vomiting, bronchospasm, increased secretions.

Contraindications: Mechanical intestinal/urinary obstruction, asthma, bradycardia, hypersensitivity.

Reversal Role: Primary agent for reversing non-depolarizing neuromuscular blockers.

REVERSAL AGENTS

Glycopyrrolate

Class: Antimuscarinic (quaternary ammonium), reversal adjunct

Mechanism: Blocks muscarinic receptors, preventing cholinergic effects (e.g., bradycardia, salivation) of neostigmine.

Pharmacodynamics: Reduces secretions, prevents bradycardia, minimal CNS effects (no BBB crossing), bronchodilation.

Pharmacokinetics: IV/IM, onset 1–2 min (IV), duration 2–4 h, 80 – Dosage: 0.01–0.02 mg/kg IV with neostigmine (1:5 ratio), max 1 mg.

Adverse Effects: Dry mouth, blurred vision, tachycardia, urinary retention, constipation.

Contraindications: Glaucoma, myasthenia gravis, obstructive uropathy, hypersensitivity.

Reversal Role: Counters muscarinic side effects of neostigmine.

REVERSAL AGENTS

ATROPINE

Class: Antimuscarinic (tertiary amine), reversal adjunct

Mechanism: Competitive muscarinic receptor antagonist, prevents cholinergic effects of neostigmine (e.g., bradycardia, secretions).

Pharmacodynamics: Increases heart rate, reduces secretions, relaxes smooth muscles, CNS effects (crosses BBB).

Pharmacokinetics: IV/IM/PO, onset 1–2 min (IV), duration 4–6 h

Dosage: 0.01–0.02 mg/kg IV with neostigmine (1:2.5 ratio), max 3 mg.

Uses: Adjunct with neostigmine, pre-anesthetic to reduce secretions, treat bradycardia, organophosphate poisoning.

Adverse Effects: Tachycardia, dry mouth, blurred vision, delirium, hyperthermia, urinary retention.

Contraindications: Glaucoma, obstructive uropathy, myasthenia gravis, hyperthyroidism.

Reversal Role: Counters muscarinic side effects of neostigmine, alternative to glycopyrrolate.

REVERSAL AGENTS

NALORPHINE

Class: Opioid partial agonist/antagonist, reversal agent

Mechanism: Partial agonist at mu-opioid receptors, antagonizes opioid effects, reverses respiratory depression from opioids (e.g., morphine).

Pharmacodynamics: Reverses opioid-induced respiratory depression, sedation; partial agonist activity may cause opioid effects at high doses.

Pharmacokinetics: IV/IM, onset 2–5 min, duration 1–4 h, metabolized in liver, excreted in urine.

– Dosage: 5–10 mg IV, repeated every 10–15 min (max 40 mg).

Uses: Reversal of opioid overdose (historical), less common due to naloxone's superiority. –

Adverse Effects: Dysphoria, hallucinations, respiratory depression (high doses), withdrawal in opioid-dependent patients.

Contraindications: Opioid-dependent patients (precipitates withdrawal), hypersensitivity.

–**Reversal Role:** Reverses opioid effects, less preferred than naloxone.

REVERSAL AGENTS

NALOXONE

Class: Pure opioid antagonist, reversal agent

Mechanism: Competitive antagonist at mu, kappa, delta opioid receptors, rapidly reverses opioid effects (e.g., respiratory depression, sedation).

Pharmacodynamics: Reverses opioid-induced respiratory depression, sedation, analgesia; no intrinsic opioid activity.

Pharmacokinetics: IV/IM/SC, onset 1–2 min (IV), duration 30–60 min, metabolized in liver (glucuronidation), excreted in urine.

Dosage: 0.4–2 mg IV, repeated every 2–3 min (max 10 mg).

Uses: Opioid overdose reversal, postoperative opioid reversal, neonatal opioid depression.

Adverse Effects: Withdrawal symptoms in opioid-dependent patients, tachycardia, hypertension, nausea.

Contraindications: Hypersensitivity, cautious use in opioid-dependent patients.

Reversal Role: Primary agent for rapid opioid effect reversal.

REVERSAL AGENTS

FLUMAZENIL

Class: Benzodiazepine antagonist, reversal agent

Mechanism: Competitive antagonist at GABA-A receptor benzodiazepine site, reverses benzodiazepine effects (e.g., diazepam, midazolam sedation).

Pharmacodynamics: Reverses sedation, respiratory depression, amnesia caused by benzodiazepines; no effect on other CNS depressants.

Pharmacokinetics: IV, onset 1–3 min, duration 5–10 min, metabolized by liver, excreted in urine.

Dosage: 0.2 mg IV over 30 sec, repeated every 60 sec (max 1 mg).

Uses: Reversal of benzodiazepine overdose, postoperative sedation.

Adverse Effects: Seizures (in benzodiazepine-dependent patients), agitation, dizziness, nausea

Contraindications: Benzodiazepine-dependent patients, mixed overdose with seizure risk, hypersensitivity.

Reversal Role: Specific reversal of benzodiazepine effects (e.g., for diazepam).

REVERSAL AGENTS

1. Neostigmine: Mechanism, uses, and therapeutic uses (August 2014, 5 marks; February 2017, 5 marks).
2. Glycopyrrolate: Role as antisialagogue, reversal adjunct (August 2014, 3 marks; April 2024, 3 marks).
3. Atropine: Toxicity, uses, pre-anesthetic role (February 2013, 5 marks; August 2015, 5 marks; February 2016, 5 marks; April 2016, 5 marks; March 2021, 3 marks).
4. Naloxone: Opioid reversal (February 2017, 5 marks, opioid antagonists; implied in narcotic contexts, e.g., August 2017, 10 marks).
5. Narcotics and Antagonists: Naloxone/Nalorphine relevant (February 2017, 5 marks; August 2017, 10 marks).

THANK YOU