S. RAPID SEQUENCE INTUBATION – PHARMACOLOGY (NEW '20)

1. ETOMIDATE (AMIDATE)

a) Pharmacology
Hypnotic

b) Pharmacokinetics
A short-acting nonbarbiturate hypnotic agent without analgesic properties

c) Indications
Pre-sedation of responsive patients prior to administration of neuromuscular blocking agents

d) Contraindications
Known hypersensitivity to etomidate

e) Adverse Effects
(1) Respiratory depression or apnea
(2) Hypotension (infrequent)
(3) Involuntary myoclonus
(4) Adrenal suppression (possible with repeated dosing)

f) Precautions
(1) The effects of etomidate can be accentuated by CNS depressants such as opioids and alcohol.
(2) Myoclonic movements are common and should not be confused for fasciculations due to a depolarizing neuromuscular blocking agent or seizure activity.

g) Dosage
(1) Adult:

Administer 0.3 mg/kg IVP over 30–60 seconds.
If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP over 30–60 seconds.
Ventilatory Difficulty Secondary to Bucking or Combativeness in Intubated Patients:
Administer 0.3 mg/kg IVP over 30–60 seconds. If the patient is hypotensive or the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP over 30–60 seconds.
May repeat 0.15 mg/kg IVP every 15 minutes to a total of three doses.

Pediatric:

Administer 0.3 mg/kg IVP over 30–60 seconds.
If the clinician suspects hypovolemia, the initial dose will be 0.15 mg/kg IVP over 30–60 seconds. May repeat 0.15 mg/kg IVP after succinylcholine effects resolve and patient is bucking or combative. May repeat 0.15 mg/kg IVP every 15 minutes to a total of three doses.


Additional doses require medical consultation.

2. KETAMINE (KETANEST®, KETASET®, KETALAR®)

a) Pharmacology
Hypnotic Analgesic

b) Pharmacokinetics
A rapid-acting hypnotic analgesic agent characterized by normal pharyngeal-laryngeal reflexes, normal or enhanced skeletal muscle tone, and possible cardiovascular and respiratory stimulation.

c) Indications
(1) Pre-sedation of responsive patients prior to administration of neuromuscular blocking agents
(2) Sedation of intubated patients with ventilatory difficulty secondary to bucking or combativeness

d) Contraindications
Known hypersensitivity to ketamine

e) Adverse Effects
(1) Although respiration is frequently stimulated, respiratory depression may occur with rapid IV administration. Laryngospasm has been known to occur.
(2) Although hypotension may occur, blood pressure and heart rate are frequently stimulated.
(3) Involuntary myoclonus that may mimic seizure activity
(4) Possible enhanced secretions
(5) Possible unpleasant dreams and delirium upon emergence from sedation

f) Precautions
(1) The likelihood of respiratory depression and undesired pressor effects is increased by too rapid IV administration.
(2) Myoclonic movements are possible and should not be confused for fasciculations due to a depolarizing neuromuscular blocking agent, seizure activity, or emergence from sedation.

g) Dosage
(1) Adult:
Administer 2 mg/kg IVP over 60 seconds.
May repeat 2 mg/kg IVP after succinylcholine effects resolve if patient is bucking or combative.
May repeat 1 mg/kg for IVP every 10–15 minutes to a total of 3 doses, as necessary.

Additional doses require medical consultation.

(2) Pediatric:
Administer 2 mg/kg IVP over 60 seconds.
May repeat 2 mg/kg IVP after succinylcholine effects resolve if patient is bucking or combative.
May repeat 1 mg/kg for IVP every 10–15 minutes to a total of three doses as necessary.

Additional doses require medical consultation.

3. MIDAZOLAM (VERSED®)

a) Pharmacology
(1) Sedative
(2) Hypnotic

b) Pharmacokinetics
A short-acting benzodiazepine with strong hypnotic and amnestic properties

c) Indications
(1) Pre-sedation of responsive patients prior to administration of neuro-muscular blocking agents
(2) Sedation of intubated patients with ventilatory difficulty secondary to bucking or combativeness

d) Contraindications
(1) Hypotension
(2) Acute narrow-angle glaucoma
(3) Known hypersensitivity to midazolam

e) Adverse Effects
(1) Respiratory depression or apnea
(2) Hypotension
(3) Amnesia

f) Precautions
The effects of midazolam can be accentuated by CNS depressants such as opioids and alcohol

g) Dosage
(1) Adult:
Administer 0.1 mg/kg, SLOW IVP over 1–2 minutes, while maintaining systolic BP greater than 90 mmHg (110 mmHg if injuries include a suspected head injury). Maximum single dose is 5 mg.
(2) Pediatric:
Administer 0.05 mg/kg SLOW IVP over 1–2 minutes, while maintaining systolic BP greater than 60 in neonates, 70 in infants,
[70 + (2 x years) = systolic BP] for patients greater than 1 year of age. Maximum single dose is 5 mg.

ADMINISTER UP TO 0.05 MG/KG IV WHEN TREATING ENDOTRACHEAL TUBE BUCKING, STOPPING ONCE BUCKING HAS RESOLVED AND VENTILATION IS RELAXED.

4. SUCCINYLCHOLINE (ANECTINE®)

a) Pharmacology
Neuromuscular blocking agent (depolarizing)

b) Pharmacokinetics
Paralyzes skeletal muscles, including respiratory muscles, and removes gag reflex

c) Indications
To achieve paralysis to facilitate endotracheal intubation in patients as per Rapid Sequence Intubation Protocol

d) Contraindications
(1) Conditions that may cause hyperkalemia:
  (a) Burns greater than 24 hours old
  (b) Spinal cord injury greater than 24 hours old
  (c) Known neuromuscular disease (Guillain-Barré syndrome, myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy)
  (d) Chronic renal failure on hemodialysis or presence of hemodialysis access
(2) History of malignant hyperthermia
(3) Patients with known hypersensitivity to the drug

e) Adverse Effects
(1) Bradycardia
(2) Prolonged paralysis

f) Precautions
Paralysis occurs in 1–2 minutes and generally lasts 4–6 minutes.

g) Dosage/Route
(1) Adult:
Administer 1.5 mg/kg rapid IVP to a maximum single dose of 200 mg. If relaxation is inadequate after 2–3 minutes, a repeat dose of 1 mg/kg rapid IVP may be given to a maximum single dose of 200 mg.
(2) Pediatric:
Administer 1.5 mg/kg rapid IVP to a maximum dose of 200 mg. If relaxation is inadequate after 2–3 minutes, a repeat dose of 1 mg/kg rapid IVP may be given to a maximum dose of 200 mg.

5. VECURONIUM (NORCURON®)

a) Pharmacology
Neuromuscular blocking agent (non-depolarizing)

b) Pharmacokinetics
(1) Paralyzes skeletal muscles, including respiratory muscles

c) Indications
(1) For treatment of ventilatory difficulty secondary to bucking or combativeness in intubated patients
(2) Patients with a history of malignant hyperthermia or contraindications to succinylcholine **(NEW ’20)**

d) Contraindications
(1) Patients with known hypersensitivity to the drug

e) Adverse Effects
(1) Bradycardia
(2) Prolonged paralysis

f) Precautions
(1) Sedation must be provided prior to administering vecuronium when administered to a patient who is either responsive to stimulus or who may become responsive to stimulus during neuromuscular blockade.
(2) Paralysis occurs within 2–4 minutes and generally lasts 25–40 minutes.

g) Dosage/Route
(1) RSI procedure **(NEW ’20)**
Adult:
(a)  0.1 mg/kg IVP/IO; if inadequate paralysis after 2-3 minutes, verify IV/IO patency. Repeat vecuronium 0.05 mg/kg IVP/IO.
(2) Ventilatory bucking or combativeness
Adult:
(a) Administer vecuronium 0.05 mg/kg IVP. Maximum single dose is 10 mg.
(b) Dose may be repeated once in 2-3 minutes, if necessary.
(3) Pediatric:
(a) Administer vecuronium 0.05 mg/kg IVP (may not be used for patients with needle cricothyroidotomy because of inability to monitor breath to breath $ETCO_2$). Maximum single dose is 10 mg.
(b) Dose may be repeated once in 2-3 minutes, if necessary.