VANDERBILT UNIVERSITY MEDICAL CENTER

Guideline: RSI and Intubation Guideline

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Content Experts
Christina Hayhurst, MD Associate Professor of Anesthesiology Stephen Gondek, MD Associate Professor of Surgery

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I. Goal

To induce unconsciousness and paralysis to facilitate rapid tracheal intubation

II. Indication

Rapid sequence induction and intubation (RSII) is a technique commonly used to secure the airway quickly and protect against aspiration of gastric contents.

- When residual stomach content is expected
- Other
  - Oral intake within 6 hours
  - Delayed gastric emptying due to gastroparesis, diabetes mellitus, medications (opioids) and/or trauma
  - Gastrointestinal obstruction, e.g. ileus, pyloric or small bowelobstruction, colonic obstruction, large upper GI bleeding
- Other indications
  - Severe hypoxia requiring immediate intubation and mechanical ventilation
  - Evolving airway obstruction, e.g. facial burn and/or progressive stridor

III. Contraindications

Anticipation of a difficult airway (relative contraindication), especially if rescue oxygenation may be difficult or impossible

- Have complete Emergency Airway Kit at bedside. May be immediately outside of room

IV. Medications

- Premedication
- **Preoxygenation**- 100% NRB, bag-assisted ventilation
- **Fentanyl** (1 to 3 µg/kg) – Fast and short acting narcotic, which decreases induction agent requirement, improveshemodynamic stability and blunts airway reflexes to intubation
- **Midazolam** (1-2mg) – Fast acting anxiolytic. Provides amnesia when there are hemodynamic concerns limiting dose of induction agents.
- **Atropine** (0.01 mg/kg) – Helpful in setting of bradycardia or with anticipated bradycardia after inductionof anesthesia. Also, may be helpful in patients with copious secretions. Can substitute with Glycopyrrolate 0.2mg for less profound increase in HR.
- **Phenylephrine** (100-200 mcg) – Give just prior to induction drugs if hypotension is anticipated.
- Induction Medications
  - **Propofol** (1-2 mg/kg) – consider reducing dose if concerned about hemodynamics
  - **Etomidate** (0.1-0.3 mg/kg) – better tolerated in patients with hemodynamic lability/instability
  - **Ketamine** (1-2mg/kg) – Helpful in patients with low EF. It increases sympathetic tone and can augment contractility. Can cause hemodynamic instability if the patient is catecholamine-deplete.

- Neuromuscular Blockers (NMB)
  - **Succinylcholine** (1-2 mg/kg): A depolarizing NMB which ensures adequate intubating condition in 60 seconds and isshort acting (5 min). However, there are many contraindications to its use which dictate the use of non-depolarizing NMBs, e.g.
  - **Contraindication to Succinylcholine**
    - Absolute:
      - Burn patients 24h to 1 year (or until all burns have healed)
      - Increased intraocular pressure
      - Lower motor neuron disease (e.g.paraplegia)
      - Massive trauma/crush injury (rhabdomyolysis)
      - Hyperkalemia, K > 5.5 mEq/L
      - History of MH, muscular dystrophy
  - **Rocuronium** (0.6-1.2mg/kg): Non-depolarizing NMB which produces good intubating conditions in 90 seconds at 1 mg/kg dose
    - Patients with large burns may require a higher dose to achieve intubating conditions within 90 seconds
    - If unable to secure airway or necessary to get immediate post-intubation neuro exam, it can be reversed with 16mg/kg Sugammadex

- Cardiovascular Medications
  - If hemodynamic compromise is anticipated/expected, have thefollowing medications at the bedside
    - **Phenylephrine** 100mcg/ml
    - **Epinephrine** 10mcg/ml
    - **Esmolol** 10mg/ml
    - **IVF's**

V. Equipment

- Emergency Airway Box at bedside, including:
  - Self-inflating bag and mask, connected to oxygen and PEEP valve
  - Yankaur suction connected to working suction source
  - Portable airway equipment in standard Airway Bag (includes: direct laryngoscopes, endotracheal tubes, intubating catheter, stylets, oral and nasal airways, laryngeal mask airway and other backup intubating devices, (e.g. McGrath video laryngoscope)
  - ETCO2 detection
  - Stethoscope
  - If anticipated difficult airway, emergency cricothyroidotomy and/ortracheostomy kit nearby

VI. Personnel and Procedure

- Qualified Personnel
  - Qualified and/or certified to perform endotracheal intubation – Either BICU attending or Airway Response Team. In emergent setting, critical care fellows may intubate.
  - Respiratory Therapist
  - Critical Care Nurse

- Procedure
  - Airway assessment: if condition permits, it is recommended to help with additional equipment and/or personnel who may be needed to insert the ETT. Check for prior intubation notes in chart.
  - Pre-oxygenation (de-nitrogenation): may delay onset of hypoxia when ventilation ceases
  - Pre-induction check:
    - Working IV (not on same side as NIBP cuff)
    - Working NIBP cuff or A-line. If NIBP, set to q2-3 min
    - Working pulse oximetry (not on same side as NIBP), set to QRS volume at least 2
    - All necessary drugs and equipment (as listed above)
    - All necessary personnel
    - Induction of anesthesia: using the chosen medication as outlined above

- Typical RSII:
  - After induction of anesthesia, mask ventilation is avoided
  - CP: Personnel with experience (or with clear instructions) will apply firmpressure with the index finger and thumb on 1st tracheal ring (cricoid) and will continue until ETT placement is confirmed (bilateral auscultation).

- Modified RSII:
  - Mask ventilation after induction: when interruption of ventilation is expected to result in hypoxia due to limited reserve, mask ventilationmay be continued throughout the procedure
  - It will also decrease hypoxia if endotracheal intubation requires longerperiod of time

- Confirmation: using bilateral auscultation, +ETCO2 detection

Background

Rapid sequence induction and intubation (RSII) is designed to expeditiously secure the airway to reduce the incidence of aspiration of gastric content, minimize hypoxia and avoid insufflation ofthe stomach. RSI has been shown to be associated with increased first pass success (ie, successful tracheal tube placement on first attempt) and reduced incidence of complications.

Optimal pharmacokinetic properties for all RSII medications include; rapid onset, short duration of action, negligible hemodynamic effects, minimal side effect profile, and being quickly reversible. While Propofol appears to be the default induction agent in RSII, Etomidate is helpful in patients with unstable hemodynamics. While there is a potential risk of relative adrenal insufficiency in critically ill patients, there is no strong evidence to advocate or to avoid its use. Ketamine is an appropriate choice in many RSII particularly hypotensive patients or those with a poor EF, as it increases sympathetic tone which offset its own myocardial depressant effect. Ketamine induced hypertension and tachycardia may pose problems in patients who are unable to tolerate them, e.g. coronary artery disease and or those at risk for delirium.

Succinylcholine (SCh) may be used as a part of a rapid sequence intubation up to 24 hours following a severe burn, but not thereafter for at least 1 year. Administration of SCh to burn patients after this time carries the risk of acute severe hyperkalemia and life-threatening arrhythmias and cardiac arrest. This is due to upregulation of immature extra-junctional nicotinic acetylcholine receptor (nAChR receptors has been demonstrated as soon as 24 hours after injury in the alpha-7 and gamma gene subunits, and risk is increased in burn patients with infection, sepsis, or immobilization.

Rocuronium, a non-depolarizing NMB that produces good intubating conditions in 90 seconds at higher doses, is used frequently when SCh is contraindicated. However, the duration of action is significantly longer (60-90 min) than that of SCh. Sugammadex can be used to reverse Rocuronium, even right after induction, if necessary.

VII. References

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