



Deep Extubations

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Indications

1. Minimize risk of bronchospasm
2. Minimize coughing and bucking on ETT
 - (a) → Increased intracranial pressure → intracerebral hemorrhage
 - (b) → Increased intraocular pressure → globe (re-)rupture
 - (c) → Increased oral/nasal venous pressure → bleeding after ENT surgery/ESS/etc.
 - (d) → Increased intra-abdominal pressure → suture tear, bowel (re-)herniation
3. Enable gentle, smooth emergence in an anxious patient

Contraindications

1. Difficult intubation
2. Full stomach/high risk of aspiration
 - (a) NPO status
 - (b) Pregnant
 - (c) Morbidly obese
 - (d) Diabetic, gastroparesis
 - (e) Bowel obstruction
3. Blood in the stomach or oropharynx
 - (a) ENT/neurosurgery – operating on the mouth or nose, must be completely “dry” if attempting deep extubation to avoid risk of vocal cord irritation/laryngospasm/aspiration
 - (b) Highly recommend passing OG tube to suction blood from stomach

Technique

1. Patient must be spontaneously ventilating off the ventilator with appropriate respiratory rate, tidal volume, and ETCO_2 .
2. Anesthetic: 1 full mean alveolar concentration (MAC) of volatile anesthetic, 100% FiO_2 .
3. Place oral airway and/or nasal trumpet prior to extubation. Important to avoid obstruction after extubation as it is very stimulating to airway and increases risk of laryngospasm.
4. Suction the oropharynx very well. Secretions = laryngospasm.
5. Position patient in optimal position prior to extubation.
6. Prepare all emergency airway backup equipment. Must be available within arms' reach, especially if you're by yourself.
 - (a) Propofol 20 cc \times 1
 - (b) Succinylcholine 10 cc \times 1
 - (c) Oral airway
 - (d) Face mask
 - (e) Blade and tube for reintubation
7. Verify whether patient is deeply anesthetized
 - (a) Methods of stimulation:
 - (i) Suction oropharynx deep
 - (ii) Jiggle the ETT
 - (iii) Bilateral jaw thrust
 - (b) No cough or gag reflex
 - (c) No change in respiratory pattern (e.g., breath holding) with stimulation
 - (i) Sometimes the cough or gag reflex is delayed, and patient only demonstrates a change in ventilatory pattern
8. How to deepen the patient to assist with deep extubation
 - (a) 1 full MAC of volatile anesthetic
 - (b) Fentanyl
 - (c) Dexmedetomidine
 - (d) Propofol
 - (e) Lidocaine
9. When ready for deep extubation...
10. Extubate on 100% FiO_2 , 10 L/min O_2 , 1 MAC volatile anesthetic (*note that deep extubation can also be accomplished from a Total Intravenous Anesthetic (TIVA))
11. Suction oropharynx again.
12. Ensure oral airway and/or nasal trumpet in place.
13. Place face mask on patient immediately.
14. Provide chin lift and jaw thrust. Tight seal with face mask.
15. Confirm whether patient is still spontaneously ventilating by checking ETCO_2 capnogram.
16. Look for signs of airway obstruction or laryngospasm:

- (a) Audible inspiratory stridor
 - (b) Pulling at sternal notch and supraclavicular area
 - (c) Paradoxical abdominal movements (abdomen pushes out with inspiration)
 - (d) Absence of fogging of face mask
 - (e) Absence of ETCO_2
17. IF ventilating well, turn off sevoflurane completely. Continue 100% FiO_2 , 10 L/min O_2 .
- (a) Option 1: Gradually release chin lift and jaw thrust to see if patient ventilates without manual assistance.
 - (b) Option 2: Continue to hold chin lift and jaw thrust until patient has gone through stage 2. Preventing any degree of airway obstruction can help decrease stimulation of the larynx which may cause laryngospasm.
18. IF there is airway obstruction:
- (a) Do NOT leave the OR
 - (b) Assistive maneuvers
 - (i) Chin lift
 - (ii) Jaw thrust
 - (iii) Head extension/shoulder roll
 - (c) Airway adjuncts
 - (i) Nasal trumpet $\times 2$
 - (ii) Oral airway
19. IF there is laryngospasm
- (a) Do NOT leave the OR. Consider calling for help.
 - (b) All patients
 - (i) Tight face mask seal
 - (ii) Assistive maneuvers + airway adjuncts
 - (c) First line: Positive pressure breaths to manually break the laryngospasm and open vocal cords.
 - (d) Second line: Deepen with propofol 20–30 mg or re-paralyze with succinylcholine 10–20 mg.
 - (i) The exact dosing of propofol and/or succinylcholine depends on the severity of the laryngospasm.
 - (ii) In general, the goal is to deepen the patient fast enough which may require you to mask ventilate them briefly.
 - (iii) If deepening the patient with propofol does not open the vocal cords right away, you will need to administer paralytic quickly. Succinylcholine 10–20 mg may suffice, or higher doses at 1–2 mg/kg may be required if the laryngospasm is severe and you are heading toward reintubation.
 - (iv) It is important to have propofol and succinylcholine syringes already drawn up and easily accessible in the event of laryngospasm. You need to work quickly to avoid negative pressure pulmonary edema and hypoxia from a patient spontaneously ventilating against closed vocal cords.
 - (e) Third line: reintubate

20. Stage 2 and emergence

- (a) Emerge in OR
 - (i) Safest location
 - (ii) If there are any concerns with airway during or after deep extubation, allow patient to awaken in OR.
- (b) Transporting to PACU (only if smooth extubation/good airway in OR)
 - (i) Bring a mapleson and face mask so that in case of emergency, you can take over positive pressure ventilation.
 - (ii) Keep a stick of propofol and a stick of succinylcholine in your pocket.
 - (iii) When in doubt, return to the OR.
- (c) Emerge in PACU
 - (i) Strongly advised not to leave a patient in PACU until they have emerged from stage 2.
 - (ii) Remain with patient and continue to observe carefully for signs of airway obstruction.