

The Airway Carnival: New Techniques for the Challenging Airway

Remifentanil for Awake Intubation

Techniques:

- Establish intravenous access and apply monitors, premedicate with 1-2 mg Midazolam if vitals are stable and patient can tolerate. Glycopyrrolate or other anticholinergic will dry secretions to facilitate onset of block (and possibly avoid bradycardia).
- Establish a pump for Remifentanil and start infusion at 0.05ug/kg/min while continuing to observe patient's vital signs. Remifentanil's rapid but gradual onset by infusion minimizes the risk of apnea. Its short duration allows return of respiration after the infusion is stopped. In addition, Naloxone allows prompt reversal of opioid effects.
- The patient should be placed in a semi-upright or sitting position with firm support behind the head to avoid involuntary motor withdrawal.
- In addition to sedation and analgesia, topicalization of the airway is the second component to awake intubation.
 1. Nasal airway is topicalized with cotton pledgetts soaked with anesthetic solution and introduced through the nares along the turbinates all the way to posterior end of nasal passage.
 - a. Second set of pledgetts is introduced with cephalad angulation to follow middle turbinate back to mucosa overlying the sphenoid bone to block the sphenopalatine ganglia branches. Bilateral blockade of sphenopalatine nerve will also produce posterior pharyngeal anesthesia.
 - b. Allow pledgett to remain in contact with mucosa for 2-3 minutes.
 - c. 4% cocaine solution has traditionally been the anesthetic of choice due to its vasoconstrictive properties. Alternatives today are 3-4% Lidocaine with 0.25-0.5% Phenylephrine or 1:200,000 Epinephrine.
 2. The posterior pharynx is topicalized with commercial spray or atomizer with 4% Lidocaine (high concentration of local anesthetic is required to penetrate mucosal membranes).
 - a. First stage is to spray the tongue with local anesthetics and ask the patient to gargle and swallow the residual liquid in the mouth.
 - b. Second stage is to further introduce local anesthetic by gradually applying additional agent using a tongue blade to open the mouth and test areas that have become anesthetized. Alternately, one can apply 5% Lidocaine to a tongue blade and have the patient enjoy it like a lollipop.
 - c. Beware of copious secretions, which decrease the effect of the local anesthetics. Additionally, suction excess anesthetic to avoid overdose.

- Superior laryngeal nerve blockade, glossopharyngeal nerve blockade and tracheal anesthesia are OPTIONAL in conjunction with Remifentanyl. (An informal poll among colleagues who utilize Remifentanyl for awake intubation indicates that they have never applied a needle to patient's head and neck.) However, conditions for intubation are optimal when local anesthetic is used.
 1. Superior laryngeal nerve blockade:
 - a. Bilaterally identify the ala of thyroid cartilage (inferior to posterior portion of hyoid bone on each side).
 - b. Prepare 5 ml syringe of 1-2% Lidocaine with 23 gauge 1.75cm needle.
 - c. Retract the skin with index finger of one hand caudad down over thyroid cartilage.
 - d. Insert needle until it rests on the superior margin of the cartilage.
 - e. Pass the needle through the thyroid membrane and aspirate.
 - f. If aspirate is negative, inject 2.5 ml of prepared solution into the space below the membrane.
 - g. Repeat each step on the opposite side.
 2. Glossopharyngeal nerve blockade:
 - a. Retract tongue medially with gloved finger; expose base of anterior pillar.
 - b. Insert 25 gauge (spinal) needle 0.5 cm subcutaneously, aspirate, inject 2 ml of 1.5% lidocaine.
 - c. Repeat the above on the opposite side
 3. Tracheal anesthesia:
 - a. Raise small skin wheal over cricothyroid membrane (optional).
 - b. Gently insert 20 gauge intravenous catheter with needle through the wheal and cricothyroid membrane. (Or utilize a short 22-23 gauge needle.)
 - c. Aspirate first (the aspirate should be air), remove the steel stylet (needle), leave the plastic catheter in place.
 - d. Attach 2-4 ml of 4% Lidocaine to the catheter (some add 1% Tetracaine to mixture).
 - e. Spray the anesthetic solution during inspiration to allow the liquid to travel distally. Patient usually coughs.
 - f. If anesthetic solution is injected while patient forcibly exhales, the trachea, the larynx and the posterior pharynx may be adequately anesthetized and the superior laryngeal block is unnecessary.
- Insertion of airway devices: LMA, Flexible/Rigid Fiberscope, Lightwand, or Intubating LMA as described in previous sections.

References:

1. Egan TD. "Remifentanil Pharmacokinetics and Pharmacodynamics. A Preliminary Appraisal." Clin. Pharmacokinet 29(1995), pp80-94.
2. Reed AP. "Preparation for Intubation of the Awake Patient." Mt. Sinai J Med 62(1995), pp10-20.
3. Amin HM, Spochak AM, Esposito BF, et al. "Naloxone-induced and Spontaneous Reversal of Depressed Ventilatory Responses to Hypoxia During and After Continuous Infusion of Remifentanil or Alfentanil." J Pharmacol Exp Ther 274(1995), pp34-39.
4. Barash PG, et al. Clinical Anesthesia. 3rd Edition, Lippincott William & Wilkins, 1996, pp676-678.
5. Gross JB, et al. "A Suitable Substitute for 4% Cocaine Before Blind Nasotracheal Intubation: 3% Lidocaine-0.25% Phenylephrine Nasal Spray." Anesth Analog 63(1984), p915.
6. Egan TD. "Remifentanil for Conscious Sedation and Analgesia During Awake Fiberoptic Tracheal Intubation: A Case Report with Pharmacokinetic Simulations." J Clin Anesth 11(1999), pp64-68.

Mask Induction with Sevoflurane**Gradual induction:**

- Best for adult patients
- Enhanced by nitrous oxide- 50-70%
- Patient breathes with gradually increasing concentrations of Sevoflurane
- Adequate anesthetic depth occurs in 60-90 seconds with a minimum inspired concentration of 7%

Single breath induction (pediatric patients):

- Best for pediatric patients
- Vital capacity induction
- Prime the circuit with 7.5-8% Sevoflurane
- Minimal airway irritation
- Faster induction than Halothane, Isoflurane, or Enflurane

Desflurane with the Laryngeal Mask Airway

Techniques:

- After induction and insertion of LMA, administer Desflurane anesthesia at gradually increasing concentrations.
- Maintain adequate depth for surgical stimulation.
- Allow spontaneous or controlled ventilation as needed for the procedure.
- Reverse muscle relaxants before allowing return of spontaneous ventilation.
- Provide appropriate analgesia before emergence.
- Discontinue Desflurane at the end of the case.
- Remove LMA when the patient opens mouth to command or demonstrates return of airway reflexes.