Moderate (Conscious) Sedation Protocol

Prepared by
Dept of Anesthesiology
Jamie Doyle, MD
Gene Tom, MD

Objectives

- Sedation definitions
- Pre-operative evaluation
- Drugs utilized
- Airway management

Minimal Sedation

- Does not mandate implementation of Conscious Sedation Policy
- Patient maintains
  - Normal respiration
  - Normal eye movement
  - Normal response to command, and
  - Normal or baseline mental orientation

Moderate Sedation

- Protective reflexes are intact
- Airway remains patent
- Spontaneous ventilation is adequate
- Patient responds to physical stimulation or verbal command
- No adverse effect on cardiorespiratory function

Deep Sedation

- Use of medication to induce a level of depressed consciousness from which the patient is not easily aroused
- Can result in partial or complete loss of protective airway reflexes
- Need for airway support
- Beyond the scope of this policy

Pre-Operative Evaluation of Cardiopulmonary Diseases

- Patients with moderate to severe heart or lung disease will have decreased ability to tolerate deviations from normal levels of consciousness
- They can easily decompensate during mild hypoxia or hypercarbia
- Consider Anesthesiology consult for such patients

American Society of Anesthesiologists Classification

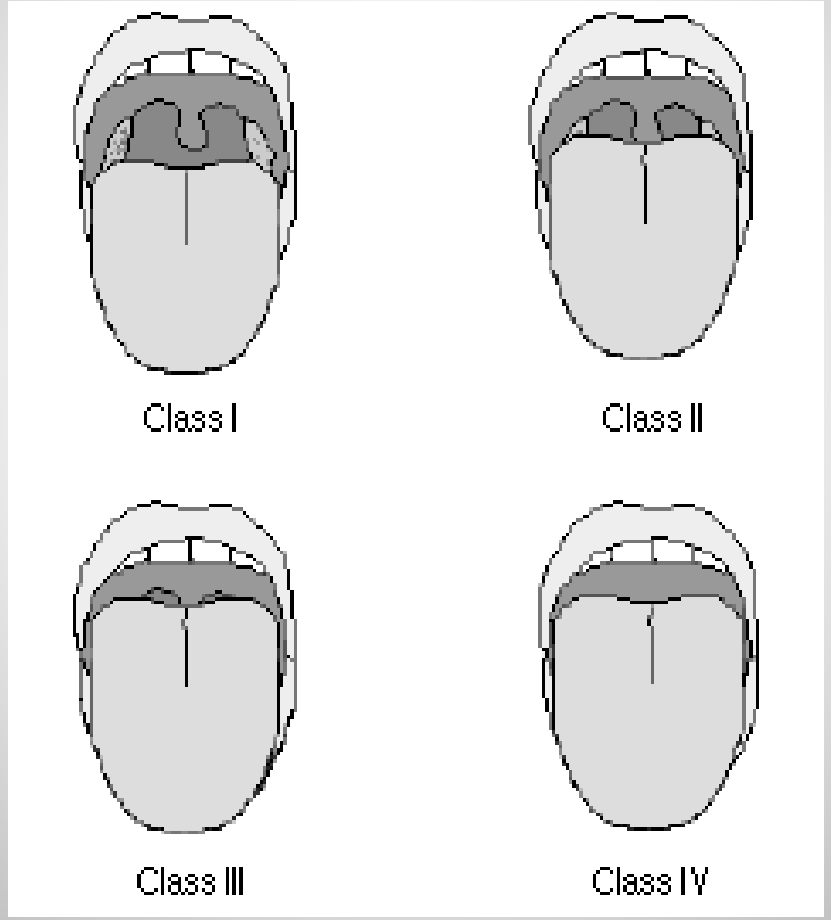
- ASA 1 : No health problems.
- ASA 2 : Mild to moderate systemic disease
- ASA 3 : Severe systemic disease
- ASA 4: Severe systemic disease that is a constant threat to life
- ASA 5: Moribund patient not expected to survive without procedure

Airway Assessment

- Mallampati class
- Difficult airway anatomy
- History of difficult intubation
- Disease states associated with a difficult airway

Mallampati Classification

Class I: can see soft palate, entire uvula, tonsils, & posterior pharynx



Class II: can see soft palate, part of uvula, & posterior pharynx

Class III: can see soft palate & base of uvula

Class IV: can see hard palate only

Class III or IV suggests a difficult intubation

Diseases with Difficult Airways

- Acquired
  - Obesity/Sleep apnea
  - Rheumatoid arthritis
  - Ankylosing spondylitis
  - Airway tumors
  - Airway infections
  - Acromegaly
  - Burn patients
- Congenital
  - Pierre Robin
  - Treacher Collins
  - Down's syndrome
  - Goldenhar's

Difficult Airway Anatomy

- Short/fat neck
- Decreased mobility of the airway joints
- Dental overbite or small mandible
- Large tongue
- Distortion in the airway (extrinsic or intrinsic)

Difficult anatomy may make mask/bag ventilation difficult or impossible

NPO Guidelines

Age	Solids/Breast Milk/Formula	Clear Liquids
0-6 months	4 hours	2 hours
6 months-adult	6 hours	2 hours

Possible Anesthesiology Consults

- Patient has failed conscious sedation in past
- Medically or psychologically unstable (ASA class III, IV, V)
- Complicated airway (MP class III or IV, difficult anatomy)
- Patients with recent oral intake
- Pregnant patients

Moderate Sedation Risks

- Respiratory depression
- Loss of airway
- Vomiting/aspiration
- Arrhythmias

Arrhythmias

- Sinus bradycardia: sedation may cause a drop in heart rate
- Sinus tachycardia: may due to pain, hypoxia, or hypercarbia
- PVCs: may be due to hypoxia or hypercarbia
- SVT

Equipment needed

- Pulse oximeter
- Oxygen source
- Ambu-bag with mask and oral airway
- Laryngoscopes with Miller and Mac blades
- Endotracheal tubes with stylet
- Functioning suction with Yankauer tip
- ECG monitor

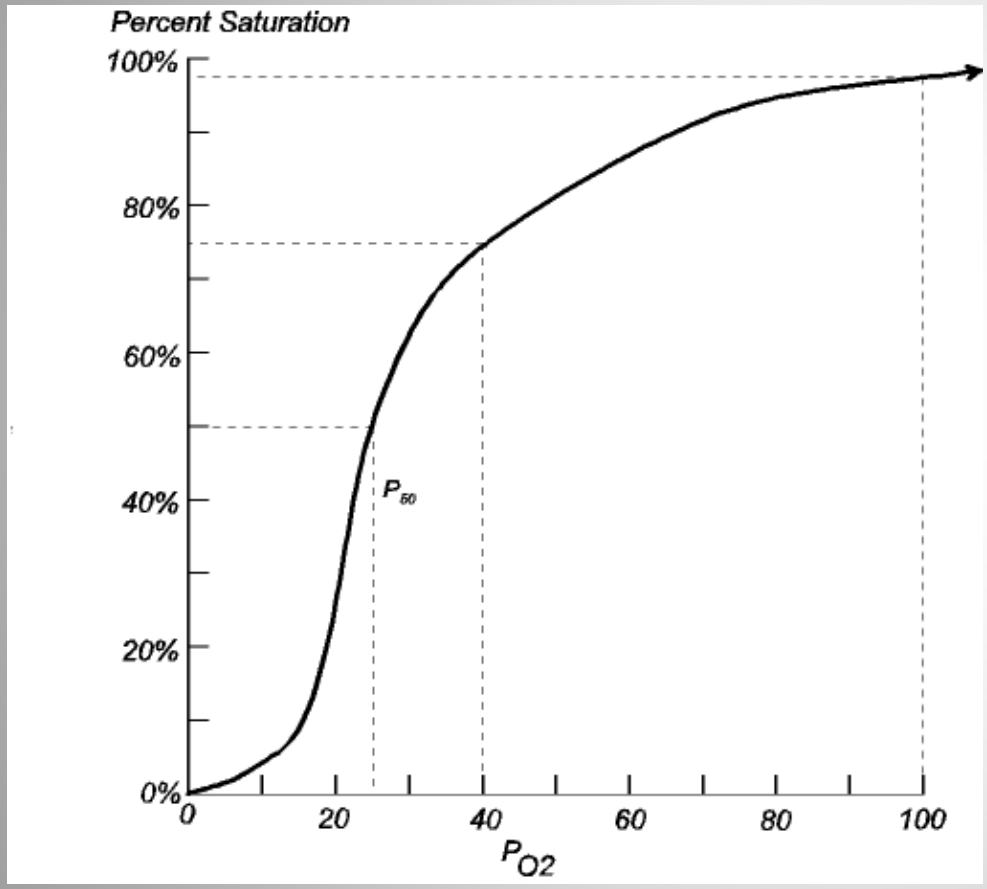
Equipment needed

- Emergency “Code Alpha” Cart w/defibrillator
- Standard resuscitative drugs
- Anesthesia emergency drugs
  - Narcan (naloxone)
  - Romazicon (flumazenil)
  - Succinylcholine (Anectine)

Intra-procedure monitoring

- SaO_2 (via pulse oximetry)
- Blood pressure
- EKG monitor (rhythm & rate)
- Respirations
- Level of consciousness

Oxygen Saturation Curve



PaO_2 (mmHg)	O_2 saturation (%)
30	60%
40	75%
60	90%

The steep part of curve occurs at 90% O_2 sat. resulting in a rapid drop in O_2 sat.

Intra-procedure

- Patient should be responsive to physical and verbal stimuli at all times
- If unresponsive, patient has become deeply sedated
- Stop procedure
- Initiate appropriate airway management
- Defer further administration of sedatives until patient returns to moderate sedation

Airway Obstruction

Loss of airway muscle tone in anesthesized patient leads to obstruction

Airway Obstruction: Recognition

- Respirations
  - Labored
  - Paradoxical chest movement
  - Tachypnea
  - Inspiratory stridor
  - Snoring (partial), No breath sounds (complete)
  - Decreased O_2 sats

Airway Obstruction: Recognition

- Neuro: Restlessness, decreased mental status, unconscious
- Skin: Cyanosis
- Vitals: Tachycardia, bradycardia, hypertension

One-handed Mask Technique

For airway maintenance consider:

-raising head position

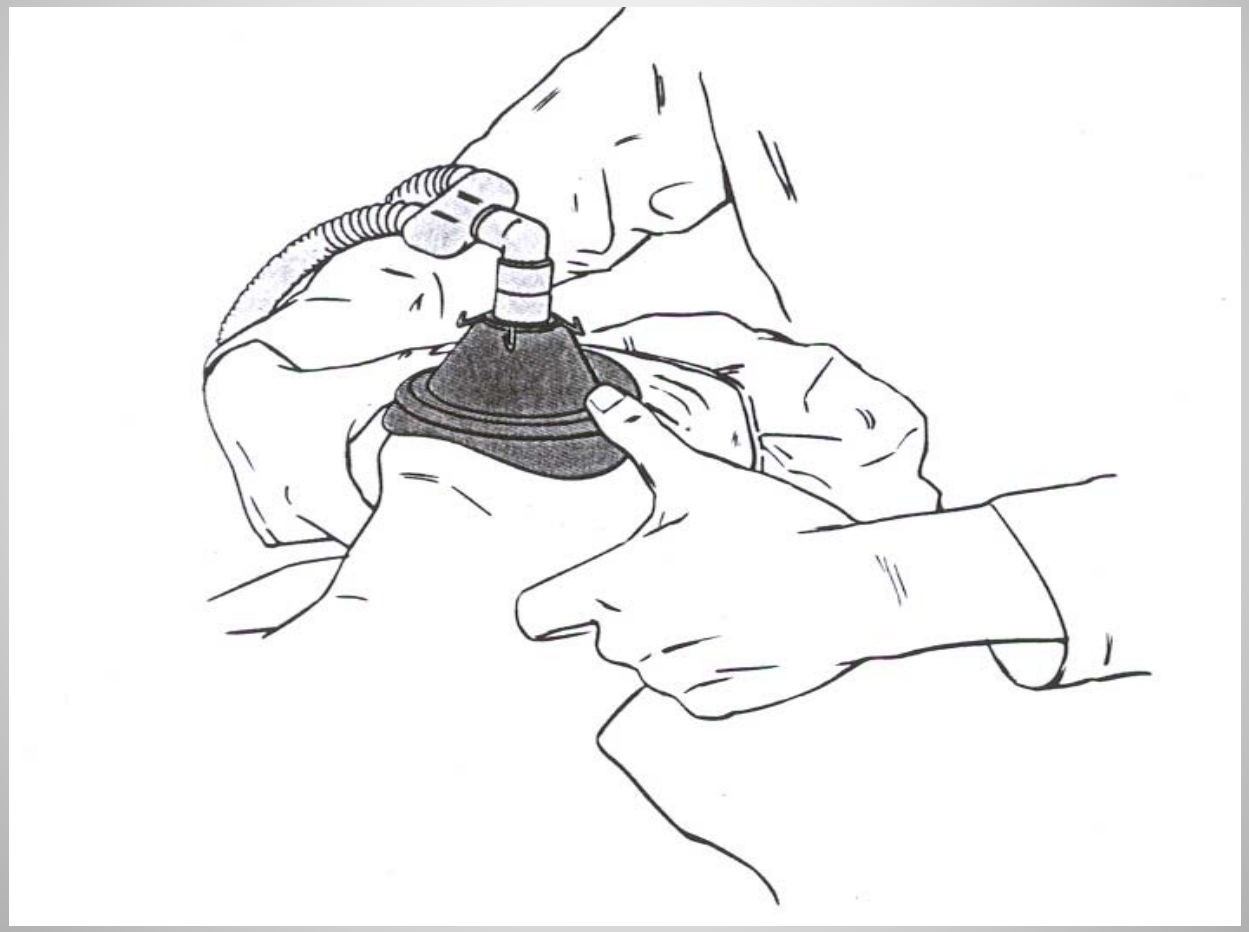
-head extension/chin lift

-jaw thrust

-oral or nasal airway placement

Two-handed Mask Technique

(When patient is difficult to mask/bag ventilate)



With one person to squeeze ventilation bag and the other to obtain proper mask fit

Benzodiazepines

- Produce amnesia, sedation, anxiolysis
- Anticonvulsants
- Minimal effects on circulation
- Diazepam (Valium) – $T_{1/2}$ is 25–30 hours
- Lorazepam (Ativan) – $T_{1/2}$ is 10–20 hours
- Midazolam (Versed) – $T_{1/2}$ is 1–4 hours

Midazolam (Versed)

- Dosing: 0.02–0.03 mg/kg…max 0.1 mg/kg
- For 70 kg patient: 2 mg incrementally; max of 7 mg
- 1–3 minutes onset; Clinical duration: ~ 20 - 40 minutes
- No pain on injection

Romazicon (flumazenil)

- A benzodiazepine receptor antagonist
- Treat overdoses of benzodiazepines with 0.2 mg IV per minute (maximum single dose is 1 mg)
- Rapid reversal with large boluses may result in arrhythmias, hypertension, aggitation or seizures

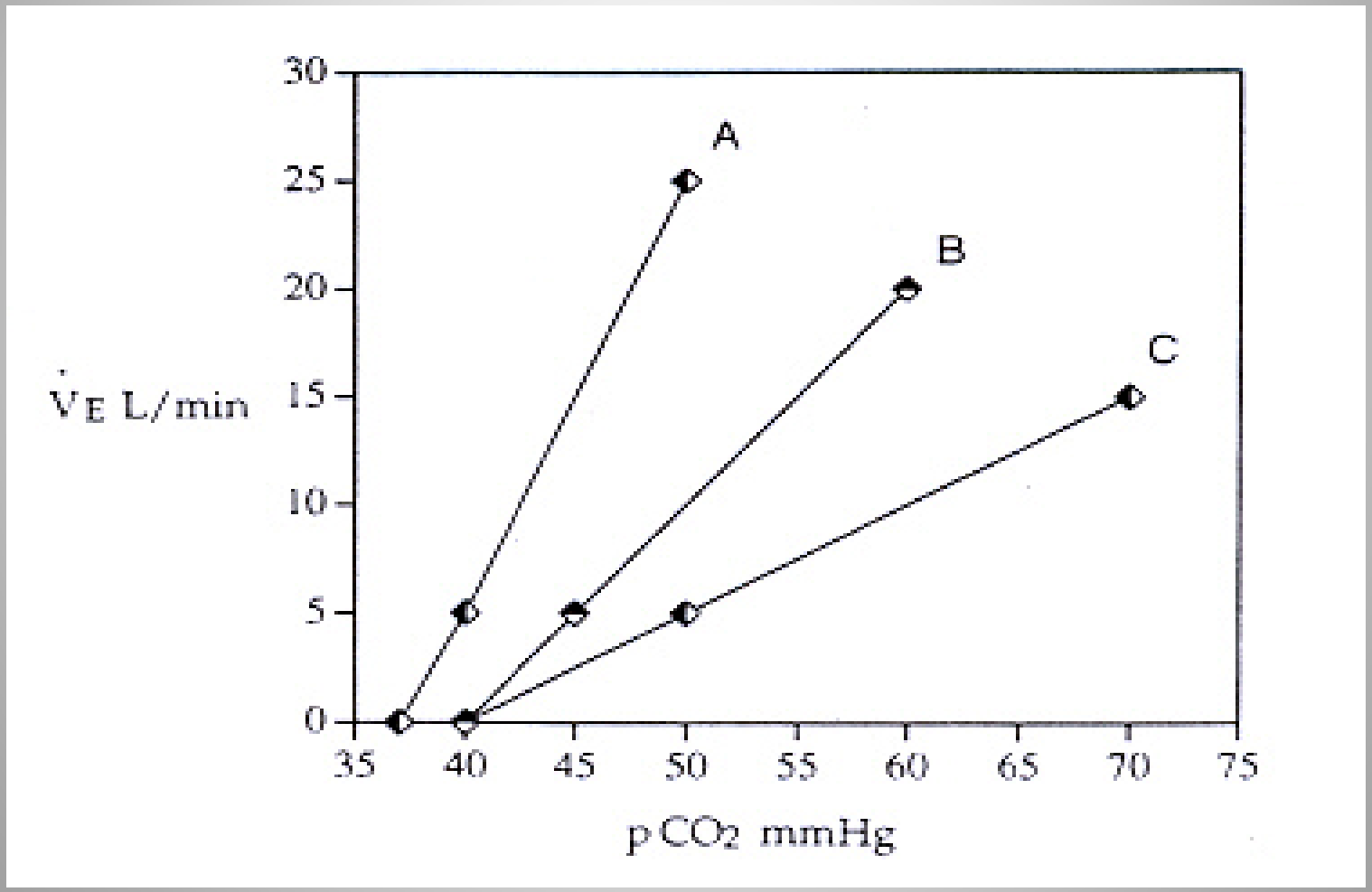
Opioids

- Drugs that bind to opioid receptors and produce
  - Analgesia – desired effect
  - Euphoria – clinically useful but potentially dangerous
  - Respiratory depression – depresses medullary ventilation centers.
  - Other side effects: Nausea, pruritis, orthostatic hypotension.

Opioids

- Opioids (morphine, Demerol, fentanyl) produce a rapid and sustained dose-dependent depression of ventilation. They depress the medullary respiratory drive centers' response to CO_2.
- The CO_2 response curve is shifted to the right, ie, a higher CO_2 is required to stimulate ventilation.

CO2 Response Curve to Narcotics



Factors that Potentiate Respiratory Depression

- Drugs
- COPD
- Obesity
- Obstructive Sleep Apnea

Opioids

- Opioids do not reliably produce unconsciousness but they can make a semi-conscious patient apneic.
- It is possible to have a patient that responds to stimuli (voices, sternal rub) but will not breath.

Opioids : Some I.V. dosing Guidelines

- Morphine : 0.025–0.05 mg/kg max of 0.1 mg / kg

  i.e. 70 Kg patient : 1.75–3.5 mg, max of 7 mg
- Mederidine (Demerol): 0.5–1.0 mg / mg, Max 50–100 mg
- Fentanyl : 1–2 mcg / kg, max 3 mcg / kg

Opioids : Agonist / Antagonists

- Nubain partially stimulates some opioid receptors and inhibits others.
- There should be a “ceiling” on the analgesia and respiratory depression, i.e. after 0.15 mg / Kg (max 10mg) is administered, no further analgesia nor respiratory depression **SHOULD** occur. However, clinically significant respiratory depression **CAN OCCUR**.
- Can precipitate severe withdrawal symptoms or a pain crisis (if on chronic pain meds)

Naloxone (Narcan)

- A pure narcotic agonist that reverses the respiratory depression caused by narcotics
- Reverses respiratory depression AND analgesic effects of opioids
- Rapid reversal with a large bolus is undesirable
- Titrate 0.05 mg – 0.1 mg to effect
- Half-life about 30 min
- Pulmonary edema, narcotic withdrawal symptoms, and pain crisis (if on chronic opioids) are possible

Opioids with Benzodiazepines

- Versed and Fentanyl together with have a synergistic effect on sedation and respiratory depression.
- Use extreme caution when using these two drug families together !!!!!

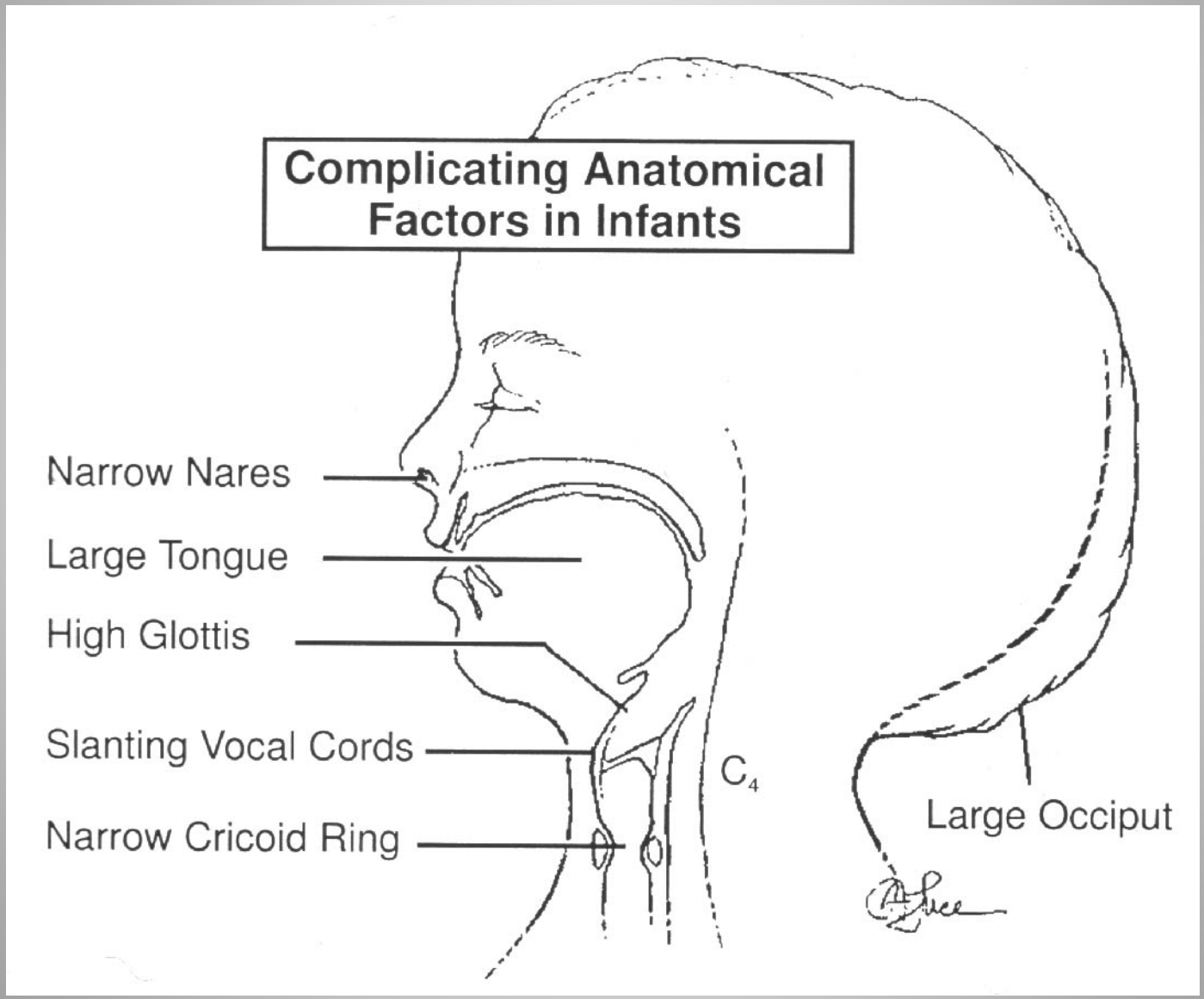
Local anesthetics for infiltration

- Bupivicaine
  - Max dose 3 mg/kg (max total = 250 mg)
  - Increased cardiac toxicity vs other local anesthetics
- Lidocaine
  - Max dose : 3-4 mg / kg without epinephrine
  - When injected with epinephrine : 5-7 mg / kg
  - Max dose = 500 mg

Pediatrics - Anatomical Airway Differences

- Large head
- Large tongue
- Short neck
- Larynx more cephalad
- Epiglottis long and stiff
- Cricoid is narrowest part of airway
  - ETT may pass larynx but not trachea
- Narrow trachea

Pediatric Airway



Why am I a difficult airway?

Pediatric Sedatives

- Oral Agents
  - Chloral Hydrate: This drug should NOT be given at home.
    - Initial Dose 25–75 mg/kg.
    - Max dose 100 mg/kg.
    - Do not exceed 2 gm. In neonates, do not exceed 50 mg/kg
    - Onset: 20-30 minutes
    - Duration: 30-60 minutes

Pediatric Sedatives

- Oral Agents
  - Midazolam (Versed): 0.5 mg/kg mixed with 5cc or less of flavored tylenol elixir up to a max of 10 mg of Versed.
  - Onset: 15-20 minutes
  - Duration: 60-90 minutes

Pediatric Sedatives

- Nasal Versed: 0.3 mg/kg drawn up in a 1cc syringe.
- Drip (without needle) into the nose with child lying down and head back. (Beware this may agitate patient)
- May administer slowly to improve uptake but works fine when squirted all at once.
- Useful for children too young, or unwilling, to drink.

Pediatric Sedatives

- Intramuscular Agents; Ketamine mixed with Atropine
  - Atropine: 0.02 mg/kg mixed with ketamine.
  - Ketamine: Stimulates salivary and tracheobronchial secretions. This may cause laryngospasm. Therefore, always administered mixed with atropine.
  - Ketamine may cause hallucinating emergence reactions and “nightmares” in children over 6 years of age.

Pediatric Sedatives

- Intramuscular Ketamine: About 2mg/kg IM for moderately painful procedures.
- May repeat dose AFTER waiting 10-15 minutes for MAX of 4 mg/kg.
- Onset: 5–20 minutes
- Duration: 20–30 minutes.

Pediatric Sedatives: Intravenous Agents

- Midazolam (Versed): 0.05 mg/kg, Max 0.1 mg/kg
- Onset: 2-3 minutes
- Duration: 20-40 minutes

Pediatric Sedatives: Intravenous Agents

- Morphine: 0.05–0.1 mg/kg, Max dose 0.2 mg/kg
- Onset 2-3 minutes
- Duration 30-180 minutes
- Caution: Asthmatics – Histamine release
- Caution: Respiratory depression – especially in neonates

Pediatric Sedatives: Intravenous Agents

- Fentanyl: 1–2 mcg/kg, Max 3 mcg/kg
- Onset: 1–3 minutes
- Duration: 30–180 minutes
- Caution: Very potent respiratory depressant
- Caution: May cause chest wall rigidity

Pediatric Sedative Reversal Agents

- Flumazenil (Romazicon): Reverses midazolam
  - 0.01 mg/kg, repeated Q minute up to 1 mg
  - Onset: 1–2 minutes
  - Duration: 15–90 minutes
  - Caution: Re-sedation may occur due to short half life: Avoid premature discharge

Pediatric Sedative Reversal Agents

- Naloxone (Narcan): Reverses opioids
- 1–2 mcg/kg, repeated Q 1 minute (up to 10 mcg/kg) if no effect.
- Caution: Re-sedation may occur due to short half life: Avoid premature discharge