

Regional Anesthesia(RA) in Difficult Airway

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Regional Anesthesia(RA) in Difficult Airway

May Consider RA

Superficial surgery

Minimal sedation needed

Local infiltration adequate

Access to the airway

Surgery can be halted at any time

Should not Consider RA

Cavity-invading surgery

Significant sedation needed

Extensive neuroaxial/local anesthetic required or risk of intravascular injection/absorption is high

Poor access to the airway

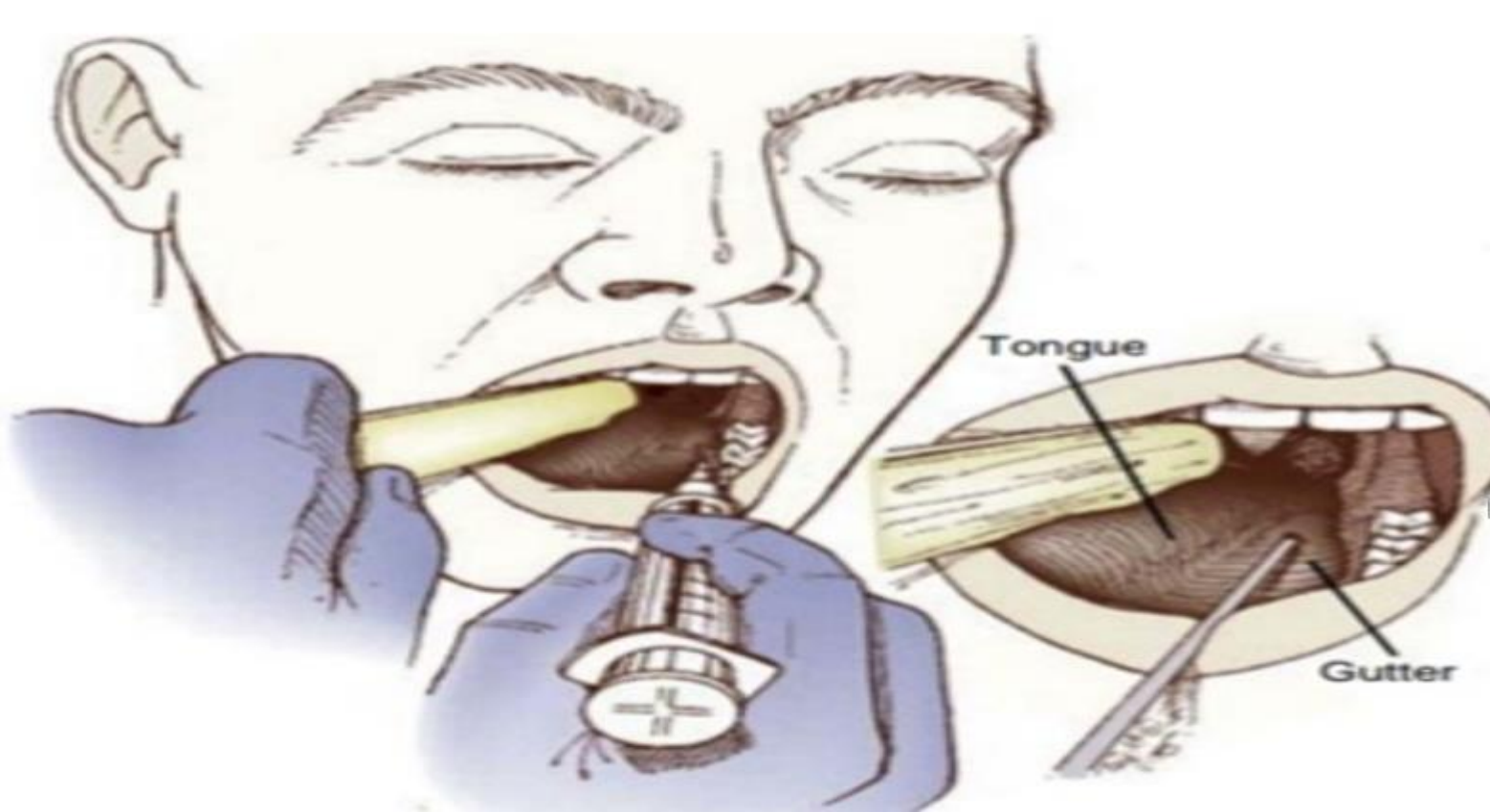
Surgery cannot be stopped once started

IX N Block (Non Invasive Method)



FIGURE 27-23. The palatoglossal arch (*arrow*) is a soft tissue fold that is a continuation of the posterior edge of the soft palate to the base of the tongue. A local anesthetic-soaked swab placed in the gutter along the base of the tongue is left in contact with the fold for 5 to 10 minutes.

Glossopharyngeal Nerve Block



Superior Laryngeal Nerve Block

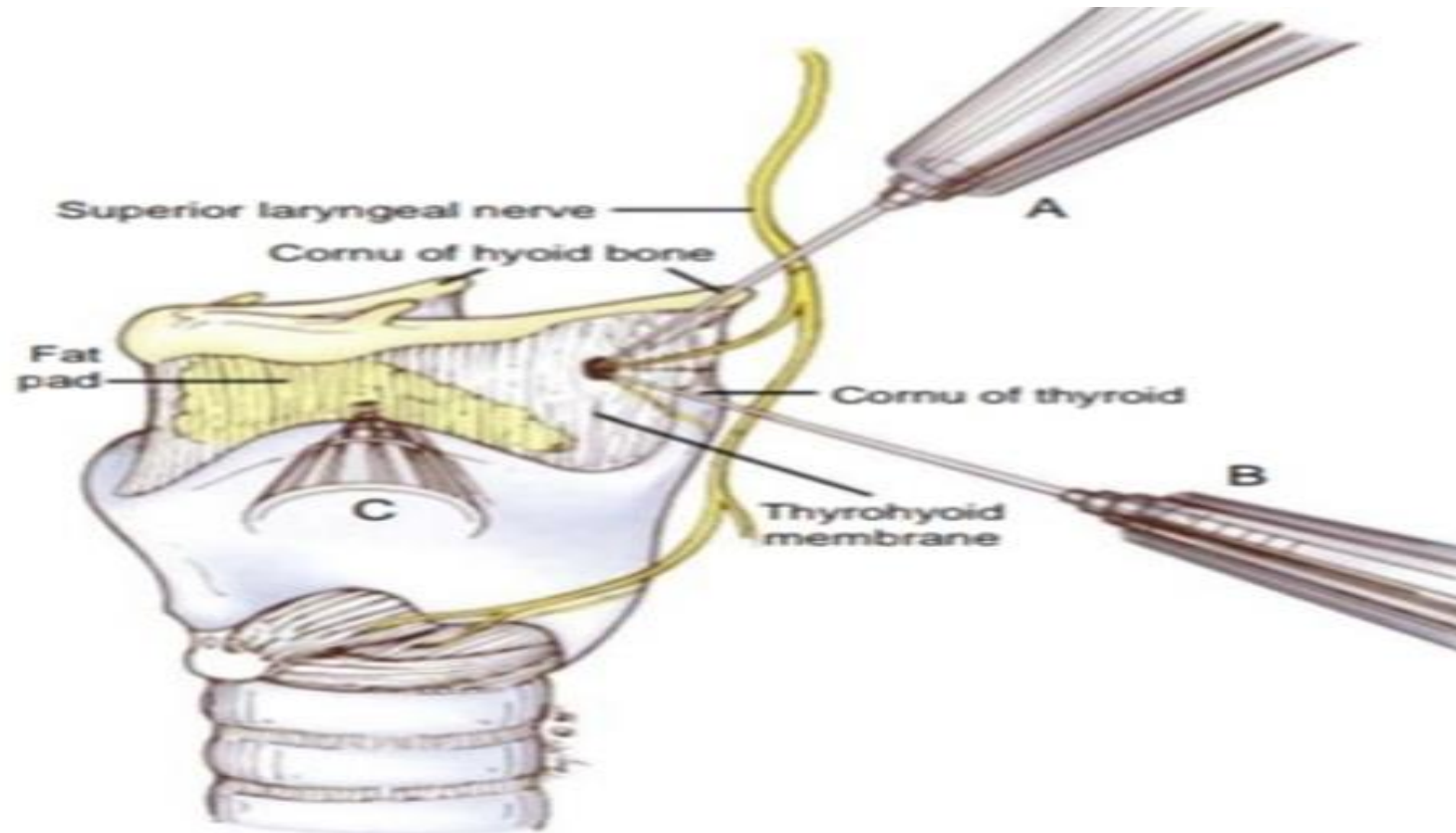


Fig. 44.10 Superior laryngeal nerve block, external approach using as landmark the greater cornu of the hyoid bone (A), the superior cornu of the thyroid cartilage (B), or the thyroid notch (C). (Reprinted from Artim)

Trans Laryngeal Anesthesia (Angiocatheter Technique)

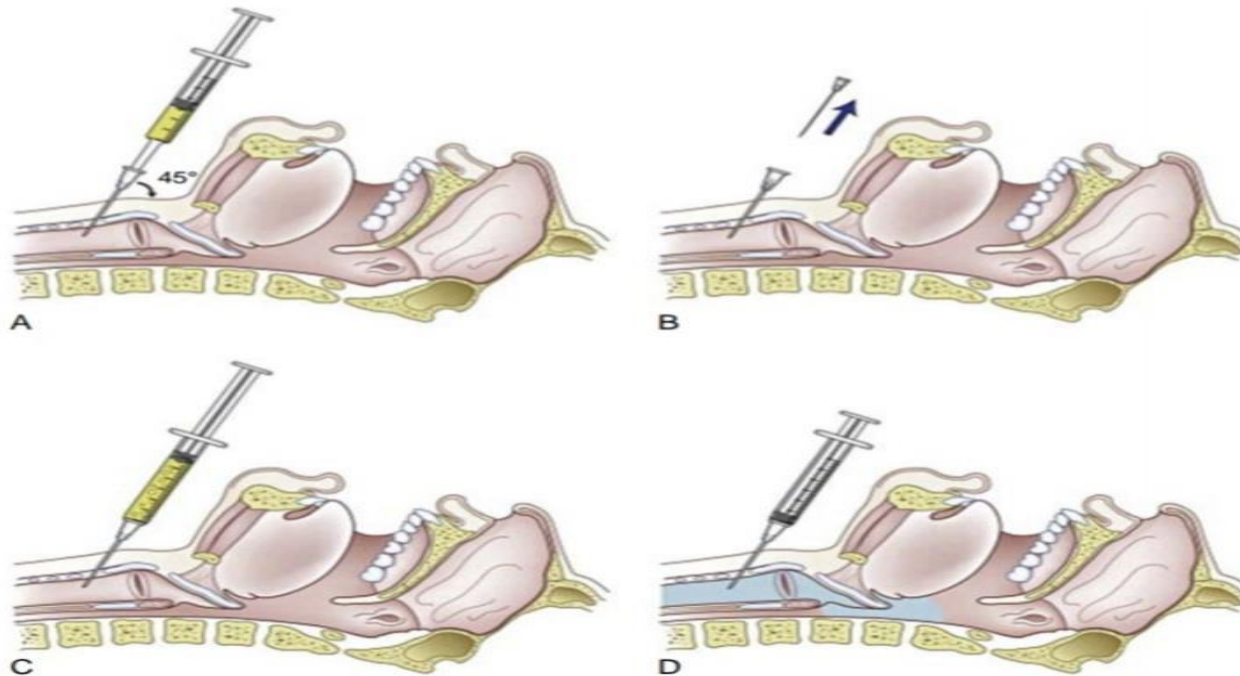


Fig. 44.11 Translaryngeal anesthesia, angiocatheter technique (midsagittal view of the head and neck). (A) The angiocatheter is inserted at the cricothyroid membrane, aimed caudally. An aspiration test is performed to verify the position of the tip of the needle in the tracheal lumen. (B) The needle is removed from the angiocatheter. (C) The syringe containing local anesthetic is attached, and the aspiration test is repeated. (D) Local anesthetic is injected, resulting in coughing and nebulization of the local anesthetic (*shaded blue area*). (Reprinted from Arttime CA, Sanchez A. Preparation of the patient for awake intubation. In: Hagberg CA, Arttime CA, Aziz M, eds. *Hagberg and Benumof's Airway Management*. 4th ed. Philadelphia: Elsevier; 2018. From Difficult airway teaching aids, Irvine, University of California, Department of Anesthesia.)

Sedative Drugs for Awake Airway Management

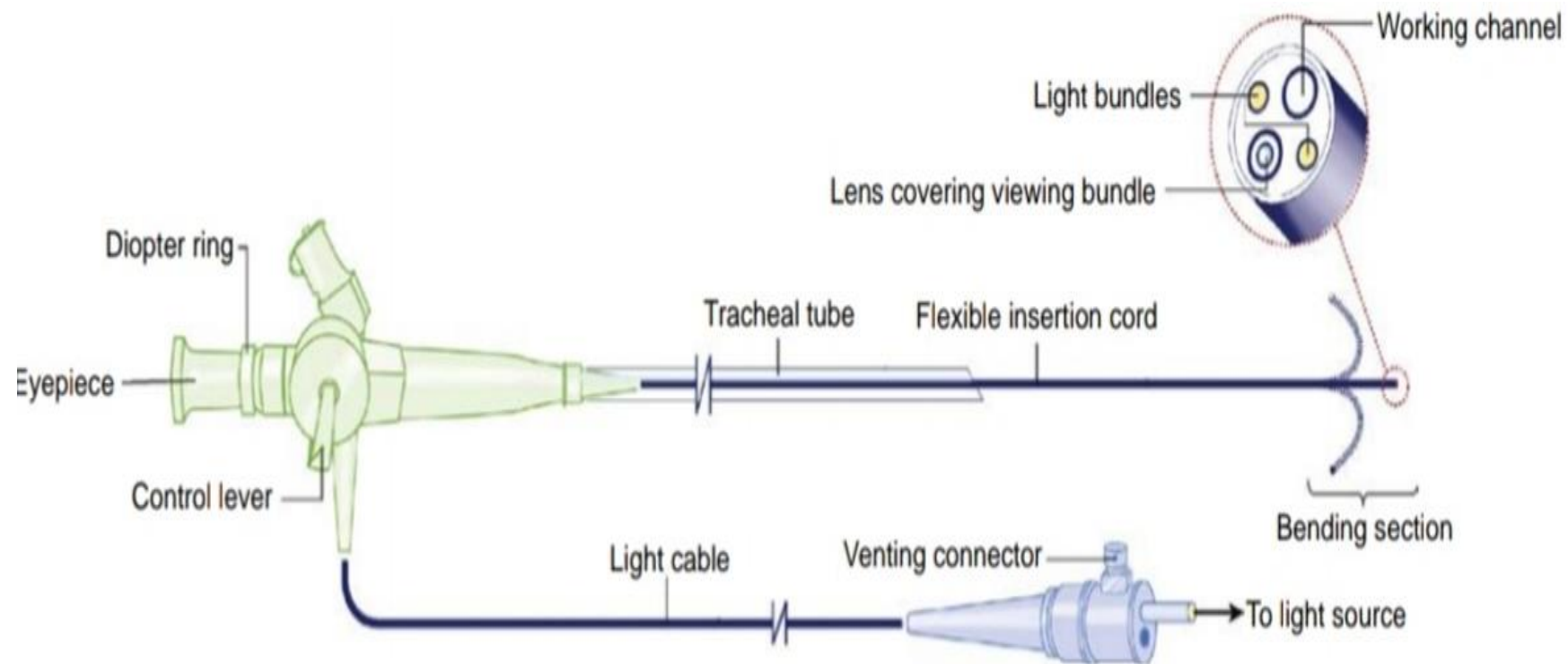
TABLE 44.1 Sedative Drugs for Awake Airway Management

Drug	Class	Sedative Dose	Notes
Midazolam	Benzodiazepine	1-2 mg IV, repeated prn (0.025-0.1 mg/kg)	Frequently used in combination with fentanyl.
Fentanyl	Opioid	25-200 µg IV (0.5-2 µg/kg)	Usually used in combination with other agents (e.g., midazolam, propofol).
Alfentanil	Opioid	500-1500 µg IV (10-30 µg/kg)	Has a faster onset, shorter duration than fentanyl.
Remifentanil	Opioid	Bolus 0.5 µg/kg IV, followed by an infusion of 0.1 µg/kg/min	Infusion can be subsequently titrated by 0.025-0.05 µg/kg/min in 5-minute intervals to achieve adequate sedation.
Propofol	Hypnotic	0.25 mg/kg IV in intermittent boluses or Continuous IV infusion of 25-75 µg/kg/min, titrated to effect	Can also be used in combination with remifentanil (decrease dose of both drugs).
Ketamine	Hypnotic	0.2-0.8 mg/kg IV	Pretreat with an antisialagogue. Consider administration of midazolam to attenuate undesirable psychologic effects.
Dexmedetomidine	α ₂ Agonist	Bolus 1 µg/kg IV over 10 minutes, followed by an infusion of 0.3-0.7 µg/kg/hr	Reduce dose in older adults and in patients with depressed cardiac function.

Flexible Fiber optic Endotracheal Intubation

- ▶ Through the Nose or Mouth of Patients
- ▶ In Awake , Sedated or Anesthetized Patients in relation to risk of Difficult Intubation and Cooperation of a patient
- ▶ Advantage :
 - ▶ Unstable Cervical Spine (Does not require movement of Neck and GA , allowing Neurologic Function after Intubation and Positioning)
 - ▶ Injury to the Upper Airway (Blunt or Penetrating) and risk of ETT creating False passage and Subcutaneous Emphysema , by performing FFETI Injury can be assessed and ETT can be placed Beyond the injury

Flexible Fiberoptic Bronchoscope





Fiberoptic Device



Indication for Fiberoptic Intubation

I. Difficult intubation

- A. Known or anticipated
- B. Unanticipated failed intubation

II. Compromised airway

- A. Upper airway
- B. Lower airway (tracheal compression)

III. Intubation of the conscious patient preferred

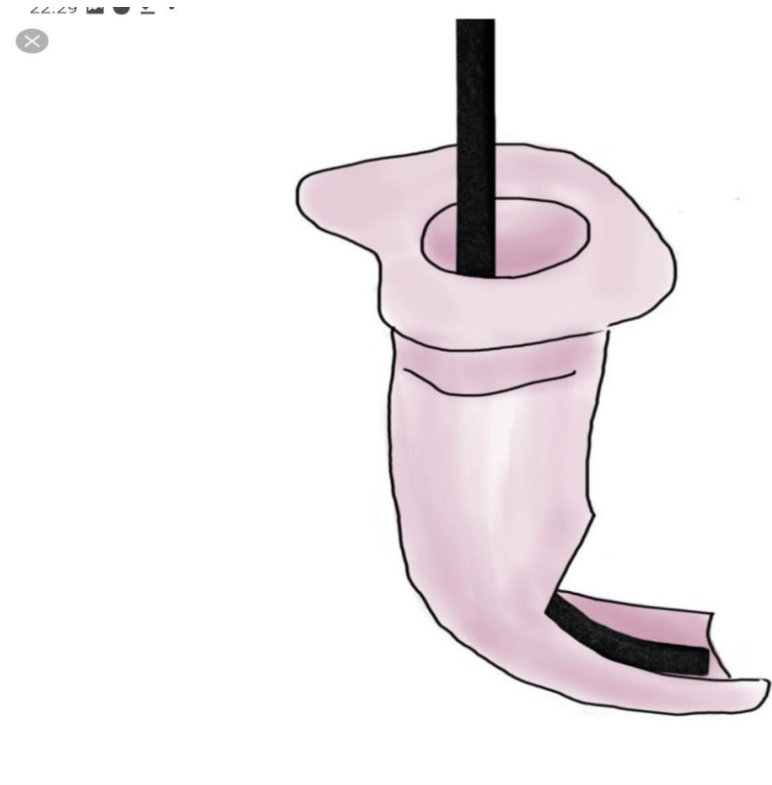
- A. High risk of aspiration
- B. Movement of neck not desirable
- C. Known difficult mask ventilation
- D. Morbid obesity
- E. Self-positioning

IV. High risk of dental damage

Flexible Fiber optic Endotracheal Intubation

- ▶ Disadvantage:
 - ▶ Time to set up and prepare the patients Airway
 - ▶ Needs space to Pass(Difficult in infection ,Hematoma, Infiltrating Mass or Edema (Tongue or Pharynx))
- ▶ Obscure the optics : Blood and Secretion , needs to suctioning and injection of Anti sialagogue before FFETI
- ▶ Relative Contra Indication :Pharyngeal abscess(disruption and aspiration of content)

Fiberoptic Awake Oral Intubation



 Resus Review

Fiberoptic Awake Oral Intubation – Resus Review

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Airway Intubator Williams



 Tri-anim Health Services

Airway Intubator, Williams, 9 cm, Adult Female, Pink, disposable

Successful Awake Fiberoptic Intubation

I. Expert endoscopist

II. Functioning fiberoptic bronchoscope and supplies

III. Preparation of the patient

- A. Psychologic preparation: informative, reassuring preoperative visit
- B. Pharmacologic preparation
 - 1. Premedication
 - a. Light or no sedation for calm patients
 - b. Heavier sedation for anxious patients
 - c. Antisialagogues unless contraindicated
 - 2. Intravenous sedation
 - a. No sedation for patients with severely compromised airways
 - b. Conscious sedation for most patients
 - c. Heavy sedation for uncooperative patients
 - 3. Topical anesthesia
 - a. Oral intubation: oropharynx, laryngotracheal
 - b. Nasal intubation: nasal mucosa, laryngotracheal
 - c. Monitoring and oxygen

Fiberoptic Intubation Failure

I. Team factors

- A. Lack of expertise
- B. Poor topical anesthesia

II. Patient factors

- A. Suboptimal patient preparation
- B. Presence of copious secretions or blood
- C. Distorted airway anatomy

III. Equipment factors

- A. Fogging of the objective and focusing lenses
- B. Passage of the fiberoptic bronchoscope through the Murphy eye
- C. Inadequate lubrication of a tightly fitting fiberoptic bronchoscope

Contraindication to Fiberoptic Bronchoscopy

Hypoxia

Heavy airway secretions not relieved with suction or antisialagogues

Bleeding from the upper or lower airway not relieved with suction

Local anesthetic allergy (for awake attempts)

Inability to cooperate (for awake attempts)

Failure During Fiberoptic Intubation

Lack of experience: Not practicing on routine intubations
Failure to adequately dry the airway: Underdose or rushed technique
Failure to adequately anesthetize the airway of the awake patient: Secretions not dried; rushed technique
Nasal cavity bleeding: Inadequate vasoconstriction; rushed technique; forcible ETT insertion
Obstructing base of tongue or epiglottis: Poor choice of intubating airway; require chin lift/jaw thrust
Inadequate sedation of the awake patient
Hang-up: ETT too large
Fogging of the FOB: Suction or oxygen not attached to working channel; cold bronchoscope

Awake FFETI

- ▶ History : Difficult Airway or Mask Ventilation , Unstable Cervical Spine ,
- ▶ Airway Injury ,High Aspiration Risk
- ▶ Benefits : Preservation of muscle tone and Airway reflexes ,Assessment of neurologic function after intubation but needs Patient Cooperation
- ▶ Method : Through the nose or Mouth of Patients
- ▶ Preference : Nasal route (curvature of ETT approximates of upper Airway)
- ▶ Relative Contra indication of Nasal route : High Risk Of Bleeding (Platelet abnormality or Coagulation disorder)
- ▶ Patient Preparation : fully Explain of Procedure to patient , Anti Sialagogue agent(Glycopyrolate 0,2-0.4 mg IV) ,carefully sedation , Monitoring (Less sedation in more difficult the airway)
- ▶ Airway anesthesia : preferred LA agent: lidocaine (choice) has broad therapeutic window(Topical: 4% ,infiltration and nerve block :1- 2%)

Awake FFETI(cont ,...)

- ▶ Nose and Nasopharynx : Vasoconstriction with spray of Oxymetazoline HCL and application of LA to Nares on soaked cotton -tipped Swabs or nasal airway covered in lidocaine ointment
- ▶ Tongue and Oropharynx : Direct Topical Spray of LA or bilateral blocks of IX nerves at the base of tonsillar pillar (2 ml of lidocaine 2% in each side)
- ▶ Larynx and Trachea : Superior Laryngeal nerve block or trans Tracheal Block
- ▶ Superior Laryngeal Nerve Block : 2-3 ml of LA solution injection in each side near the cephaled edge of thyroid cartilage or caudal edge of hyoid bone , blocks internal branch of SLN and anesthesia of thyrohyoid membrane and submucosa of piriform sinus
- ▶ Trans Tracheal Block : through cricothyroid membrane for Blocking of sensory distribution of Recurrent Laryngeal Nerve and prevent coughing with placement of ETT in Trachea

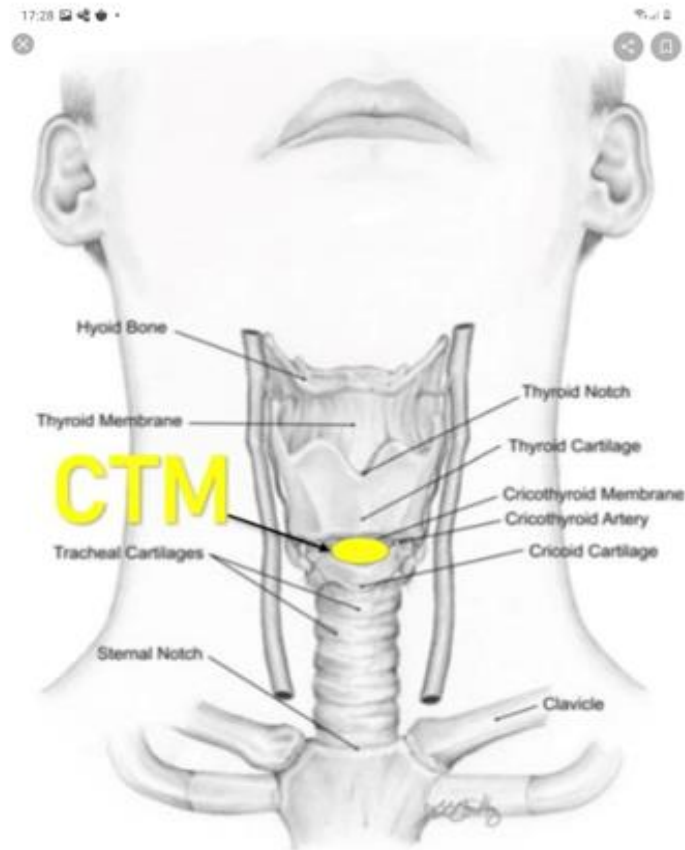
FFETI after induction of GA Through Nose or Mouth

- ▶ When Mask Ventilation Anticipated Not Be Difficult
- ▶ History of Difficult Airway or Unstable Cervical Spine
- ▶ Patients not Cooperative with Awake Fiberoptic Intubation
- ▶ Patients Breathing Spontaneously or under Controlled Ventilation
- ▶ Nasal Approach: Apply a Vasoconstrictor to Nasal Mucosa
- ▶ Nasal Airway placed and connected to Anesthesia Breathing Circuit for supplemental O₂
- ▶ In GA Soft Tissue of Pharynx tend to Relax and limit space for Visualization with FOB and for overcome this Problem using Jaw Thrust , Inflating ETT Cuff in the Pharynx or Traction the Tongue may be useful

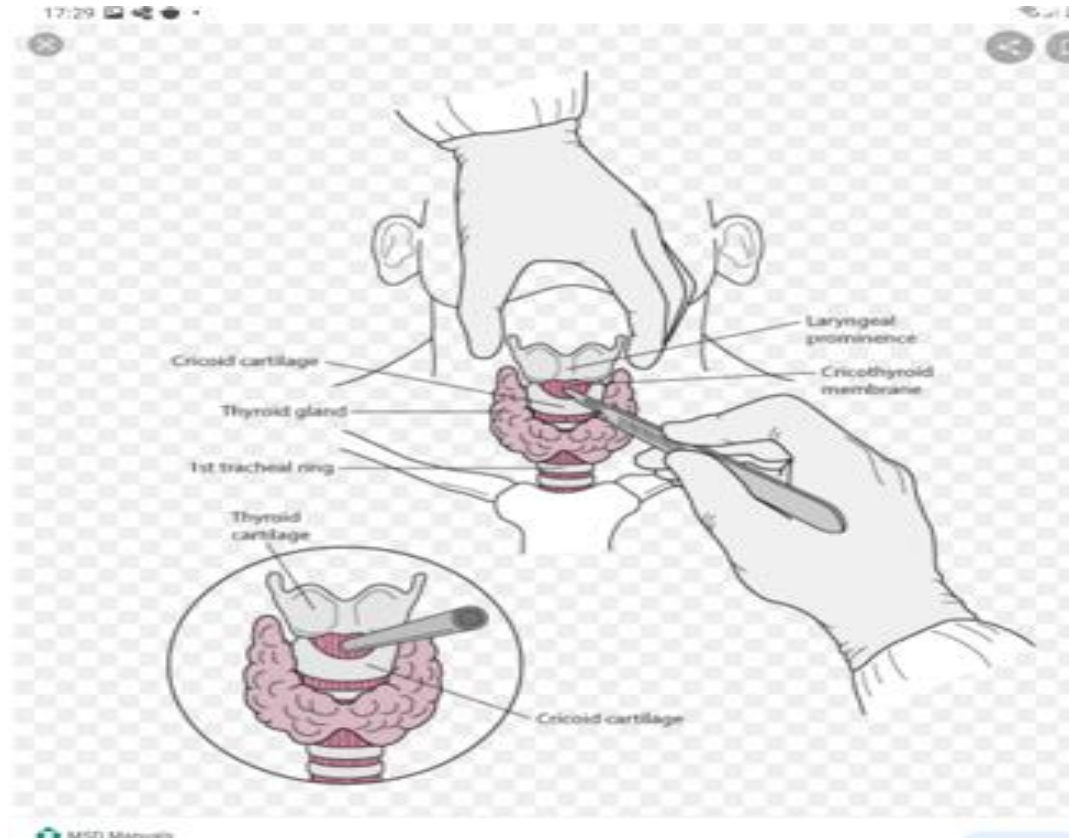
Invasive Emergency Access of Airway Through Cricothyroid Membrane or Trachea

- ▶ Indication : Ventilation , Oxygenation and Intubation are Unsuccessful despite use of SGA (CICO)
- ▶ Predictor of difficult access through Cricothyroid Membrane : Increased Neck Circumference ,Overlying Neck Malformation ,Fixed Cervical Spine Flexion Deformity
- ▶ Methods :
 - ▶ Percutaneous (Cricothyrotomy) or Surgical (tracheostomy)
 - ▶ Trans tracheal Jet Ventilation
 - ▶ Retrograde Intubation

Cricothyroid Membrane



Cricothyrotomy



can be performed in less than 30 Seconds, the final Device left in the Airway Should be of Adequate Caliber(greater than 4mm) Preferably Cuffed tube for prevention of Aspiration advantageous Over TTJV : Definitive Airway (72 Hours) and after this period, the incidence of Vocal Cord Dysfunction and Subglottic Stenosis increases

Midsagittal anatomy of the Larynx and Trachea

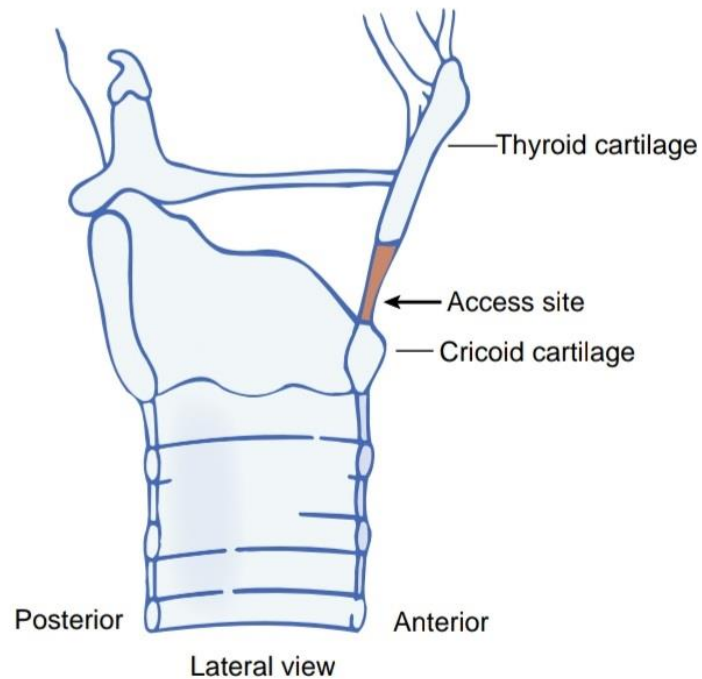
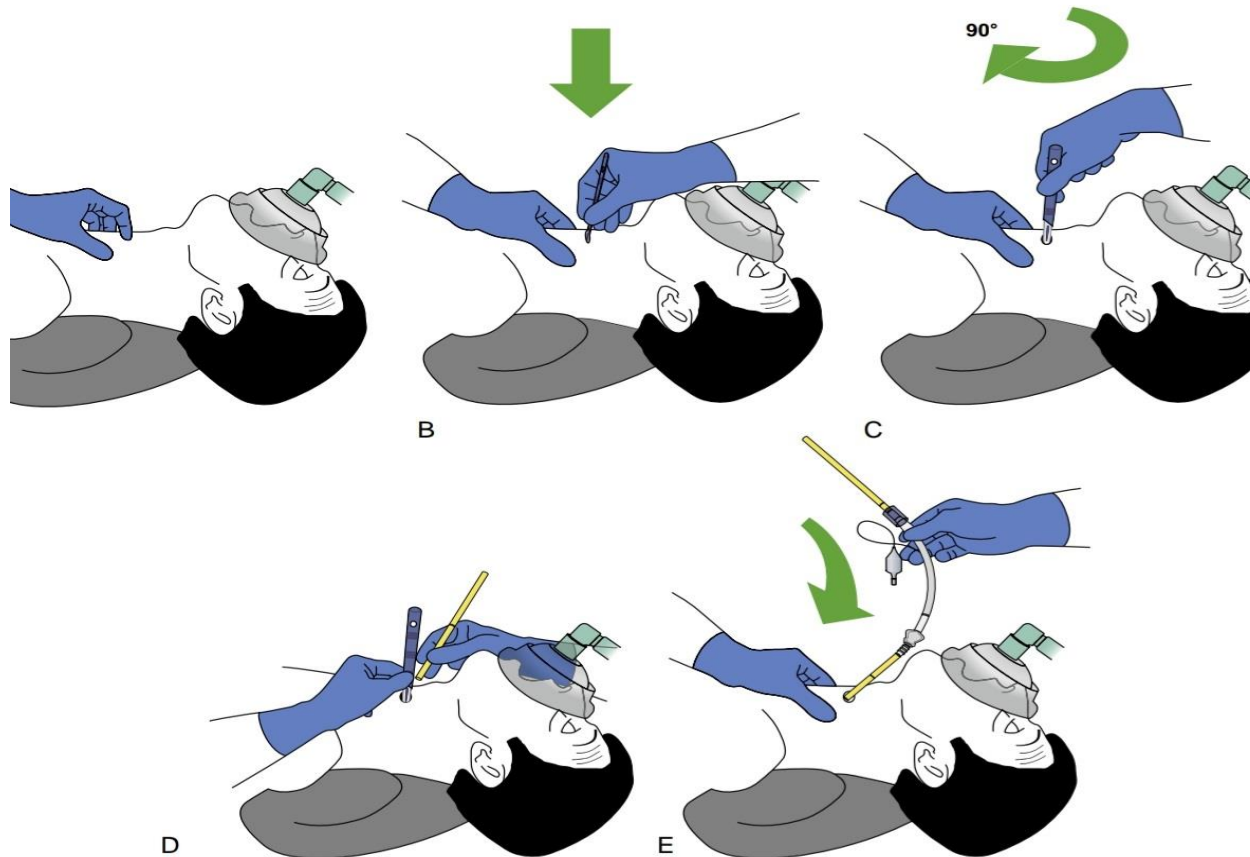


Fig. 44.33 Midsagittal anatomy of the larynx and trachea. The access point for percutaneous cricothyrotomy is in the lower third of the cricothyroid membrane. (Courtesy Cook Critical Care; Bloomington, IN.)

Cricothyrotomy (Scalpel bougie Technique)

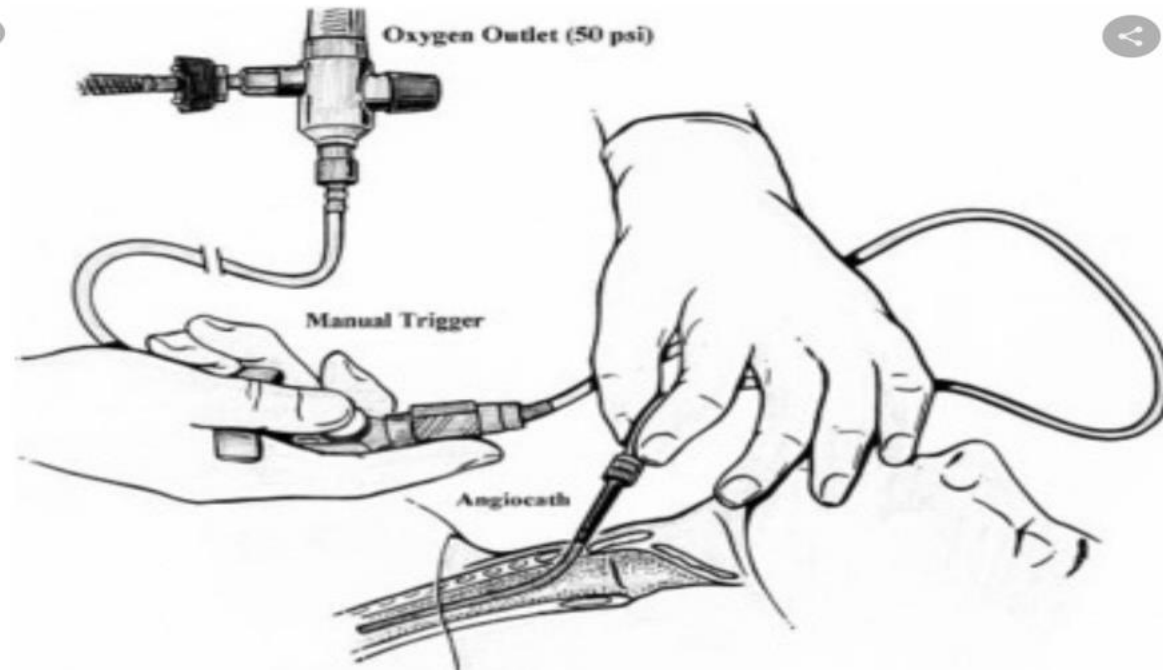


.32 Scalpel-bougie technique—"stab, twist, bougie, tube." (A) Identify the cricothyroid membrane (CTM). (B) Make a transverse stab incision through the CTM. (C) Rotate the scalpel so that the sharp edge points caudally. (D) Pulling the scalpel toward you to open up the incision, slide the endotracheal tube (ETT) down the scalpel blade into the trachea. (E) Advance the endotracheal tube into trachea. (From Frerk C, Mitchell VS, McNarry AF, et al)

Trans Tracheal Jet Ventilation(TTJV)

- ▶ Commercial Available Products obviate need for self assembled products that rely on friction connections
- ▶ Risk of TTGV is similar to Cricothyrotomy and includes : Pneumothorax , pneumoperitoneum , Bleeding , Infection and Subcutaneous Emphysema , Laryngospasm (Lung Become rapidly Overinflation leads to Pulmonary Barotrauma
- ▶ These Complications of TTJV can become Life Threatening very Quickly (high oxygen pressure
- ▶ Absolute Contraindications : Upper Airway Obstruction , Disruption of Airway

Percutaneous Transtracheal Jet Ventilation



TTJV

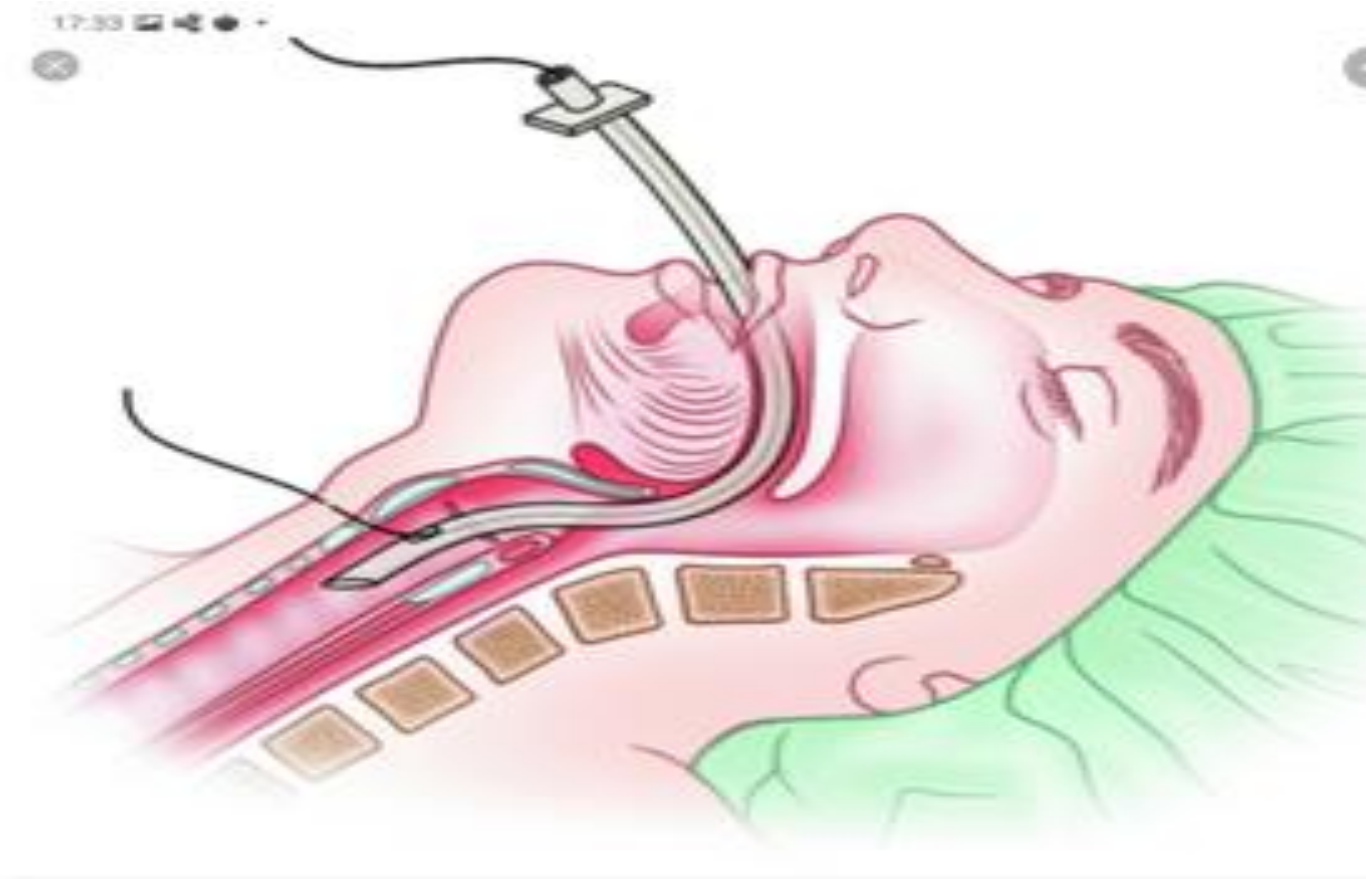


Sanders Injector Apparatus uses High Flow Oxygen Insufflations

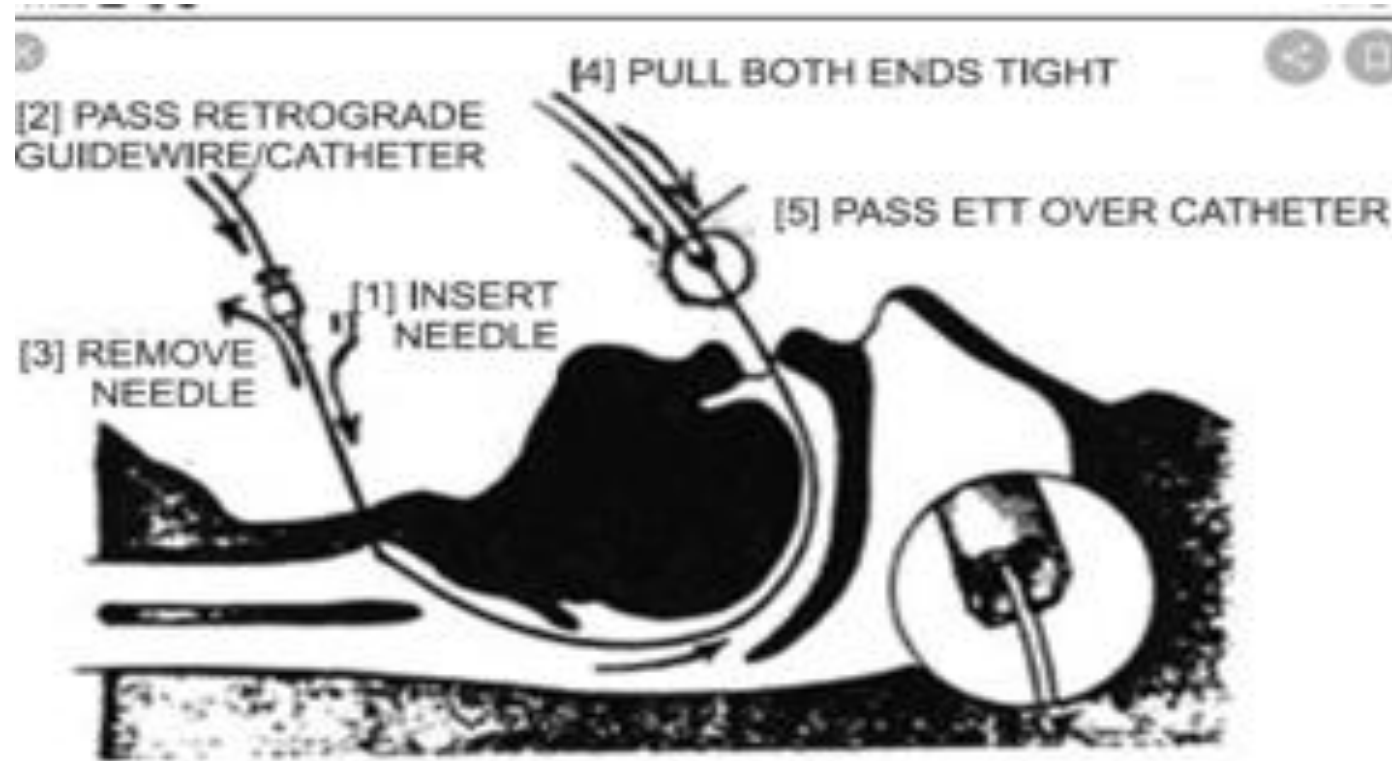


Fig. 31.4 Sanders injector apparatus uses high-flow oxygen insufflations through a small-gauge catheter placed in the trachea.

Retrograde Intubation



Techniques of Retrograde Intubation



Indication for Tracheotomy

BOX 7.1 Indications for Tracheotomy

Prolonged mechanical ventilation

- Respiratory disease
- Neuromuscular disease
- Depressed mental status (inability to protect airway)

Pulmonary toilet

Surgical access

- Head and neck cancer reconstruction
- Extensive maxillofacial fractures

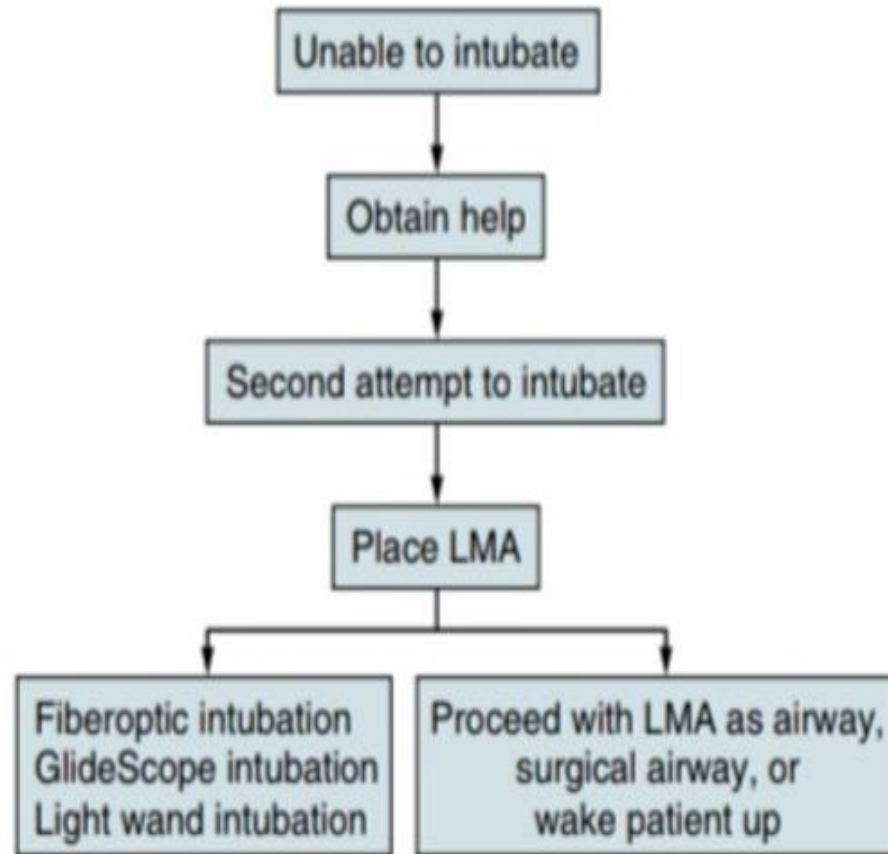
Airway obstruction

- Epiglottitis/supraglottitis
- Craniofacial abnormalities
- Tumor
- Bilateral vocal cord paralysis
- Angioedema
- Foreign body
- Blunt/penetrating neck trauma

The Infant Airway Versus the Adult Airway

- Larynx positioned higher in the neck
- Tongue larger relative to mouth size
- Epiglottis larger, stiffer, and angled more posteriorly
- Head and occiput larger relative to body size
- Short neck
- Narrow nares
- Cricoid ring is the narrowest region

Difficult Airway Algorithm For Infants and Children



References

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