

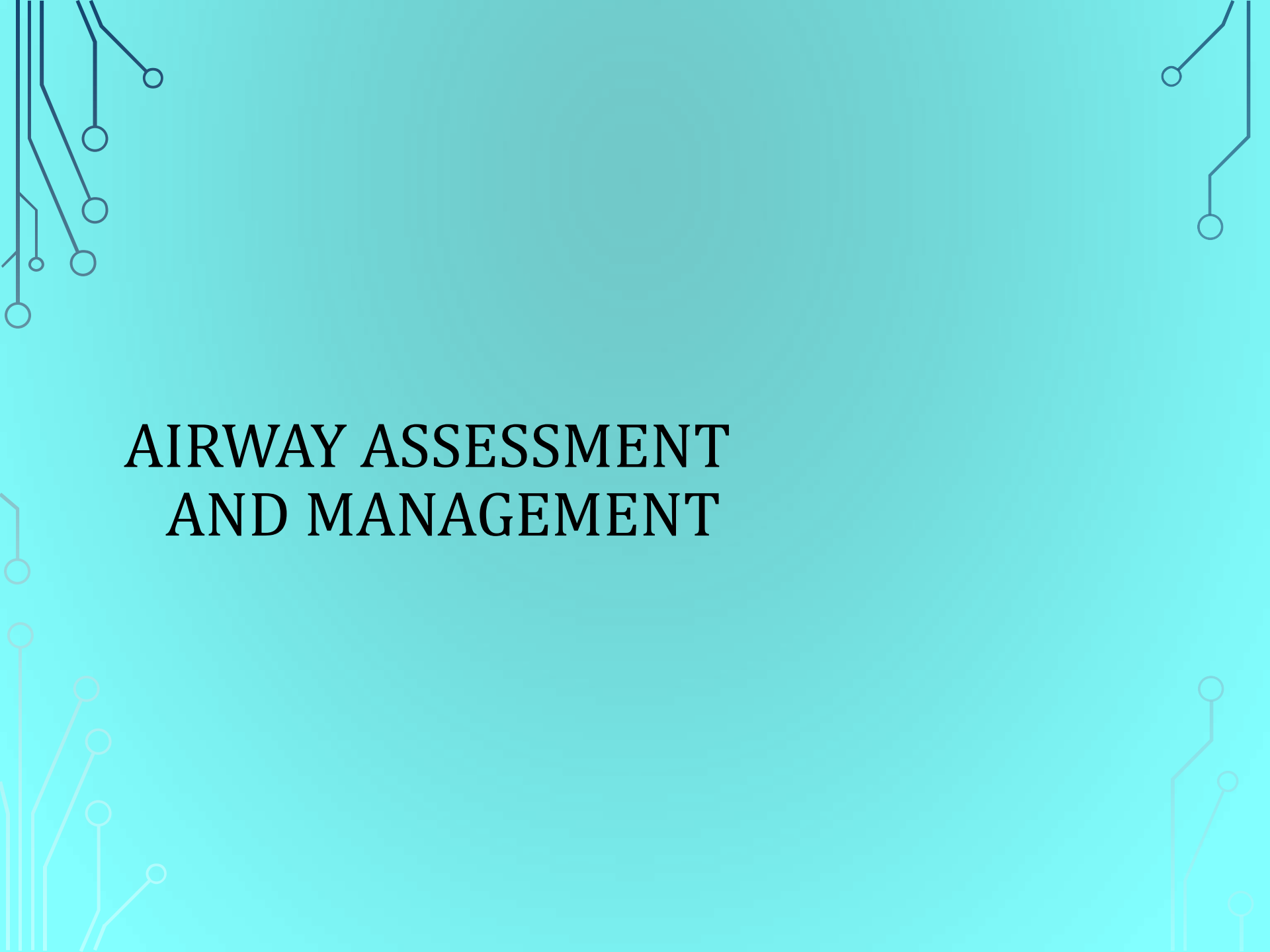


Round : Anesthesia - Lecture 1.....

Group no : B 8.....

Done By : Layan Yaseen.....

Edited by "Batool ALzubaidi"

The background is a solid light blue color. In the four corners, there are decorative line art elements resembling electronic circuit boards. These elements consist of thin, dark blue lines that branch out and terminate in small circles, mimicking the look of microchips or circuit traces. The top-left and top-right corners have these elements in a dark blue color, while the bottom-left and bottom-right corners have them in a lighter, pale blue color.

AIRWAY ASSESSMENT AND MANAGEMENT

DEFINITIONS

- Functional residual capacity » 3 L » 21% of them O₂ » 630 ml

- معامل التنفس بالدقيقة ٨٪

- 630 ml » last for 3 minutes

Airway : “The extrapulmonary air passage, consisting of the nasal and oral cavities, pharynx, larynx, trachea and large bronchi.”

This part is also known as the blind part because no exchange of gases takes place here yet.

↓
Dead space » no gas exchange

Airway management : “Is the maintenance of a patent airway.”

It's the main goal always especially during emergency situations as we can't survive without oxygen even for a short period of time.
(Remember ABC; AIRWAY, breathing, circulation))

Maintaining a patent airway is essential for adequate oxygenation and ventilation and failure to do so, even for a brief period of time, can be life threatening.

DIFFICULT AIRWAY :

“The clinical situation in which a conventionally trained anesthesiologist experiences difficulty with mask ventilation, difficulty with tracheal intubation or both.”

*3 conditions of difficult airway ! —

DIFFICULT INTUBATION:

1.

If a normally trained anesthesiologist needs more than 3 attempts or more than 10 min for a successful endotracheal intubation.

Explanation : the difference between difficult intubation vs airway is that patients with a difficult airway will experience troubles with more than one method of airway management (like having difficulty with intubation and masks/laryngoscopy.) But patients with difficult intubation are troubled with the administration of endotracheal tube ONLY.

MANAGEMENT OF THE PATIENTS AIRWAY CONSISTS OF :

الأساس

First step in ICU, CPR, surgeries

- Bag Mask ventilation. (basic)
- Laryngoscopy .
- Endotracheal intubation.
- The Laryngeal Mask Airway (LMA).

1- BAG MASK VENTILATION

Tight seal on nose and mouth

- Triangular in shape
- Connected to breathing circuits

* BMV is usually the **first step** in airway management and an essential rescue maneuver when the attempt at intubation fails.

That's why it is called basic

* Face mask applied before, during and after loss of consciousness at anesthetic induction.

* the mandible is held into the mask by the anesthetist (holding rather than pressing)

- the mandible is held forward , helping to prevent posterior movement of the tongue and obstruction of the airway.

C shaped hold (jaw thrust)

* The face mask has variants of type and size .

CONTRAINDICATIONS

Any non fasting patient, any trauma patient, cesarean woman, patient with upper GI bleeding

full stomach - because it could result in aspiration

2 conditions to be full stomach » 1. obstruction that results in delayed gastric emptying 2. reflux

long procedures - Not applicable (very exhausting and no one is up to do it that long)
However it is NOT an absolute contraindication

complete upper-airway obstruction - Air can't reach the trachea so instead passes to the stomach, increasing intragastric pressure and the risk of vomiting and aspiration.

Increased risk of aspiration after paralysis and induction

↳ Taking muscle relaxant

cardiac arrest. - We start managing a cardiac arrest with ventilation masks but contraindicated to continue with it (not applicable)

♣ What to do in case of full stomach: -

- Rapid sequence induction » preoxygenation 3-5 minutes why? Increase functional residual capacity from 21% to 100% oxygen » denitrogenation **I**

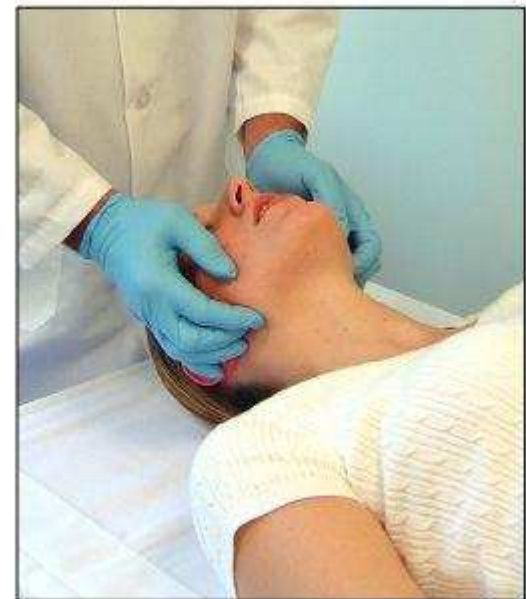
↳ With rapid acting hypnotic and muscle relaxant with one minute intubation time

The **head-tilt/chin-lift** is a procedure used to prevent the tongue obstructing the upper airways



- Main purpose » to have patent airway

Part of pre-intubation and emergency rescue breathing procedures, the head tilt–chin lift maneuver and the **jaw-thrust** maneuver are **2 noninvasive**, manual means to help restore upper airway patency when the tongue occludes the glottis, which commonly occurs in an obtunded or unconscious patient.



There are two methods of applying BMV:

1. One-hand ventilation in which the mask is held with the left hand of the provider and placed against the face by downward pressure on the mask by the left thumb and index finger (pressure should be placed on the bony mandible (not on the soft tissues)) while the right hand gives positive-pressure ventilation with the breathing bag.

“ CE ” - C represents anterior pressure on the mask.

- E represents the last three fingers lifting the jaw.

- C » thumb and index of body of the mask
- E » middle, ring and little fingers on bony edge of the mandible » should be tight fitting



2. Two-hand-ventilation technique in which the provider uses two hands to provide jaw thrust and create a mask seal similarly to the one-hand technique, while an assistant provides positive-pressure ventilation with the breathing bag.

Two people needed. One does CE but with both hands. (2 CE)
Another person squeezes the air bag to give positive pressure.



2- LARYNGOSCOPY

A medical procedure that is used to obtain a view of the vocal folds and the glottis. Laryngoscopy performed to facilitate tracheal intubation during general anesthesia.



It is carried out (usually) with the patient lying on his or her back

Supine position

This procedure is done in an operation theatre ^{مسرح} with full preparation for resuscitative measures to deal with respiratory distress.

Like keeping ventilation masks nearby, as well as other alternatives in case the intubation after preparation turned to be difficult.

There are at least ten different types of laryngoscope used for this procedure.

It is extremely uncomfortable and is not typically performed on conscious patients, or on patients with an intact gag reflex.

Mostly done with patients under anesthesia

● يتمسكه باليد الشمالو و بتعمل displacement of the tongue من اليمين لليساو و معها بترفع ال mandible لفوق و قدام المفروض تشوف ال vocal cords و تحط ال tube اذا ما شفقتهم بتعمل advancement لجوا عن طريق انه تعمل زاوية بين ال hand and forearm مقدارها ١٨٠ درجة اي زاوية غيرها يا اما راح تركي على الاسنان و تكسرهم او تعمل injury لل tip of the tongue من ورا

* دائما بنمسك بالأيدي الشمال لأنه الضوء على اليمين

Direct laryngoscopy : this procedure is performed to see the vocal cords directly.

Patients are mostly placed in sniffing position while supine unless there is a limitation to neck movement. (patients with possible cervical spine injury)

Mainly in emergency or operation rooms (not used in clinics)

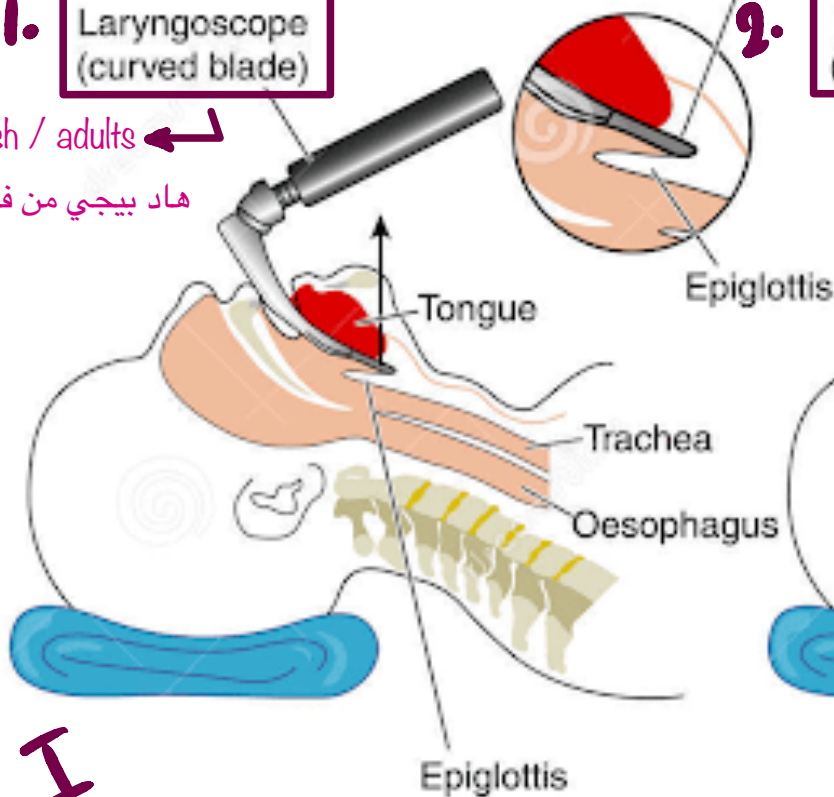
Rigid: Rigid so it provokes gag reflex, only used on unconscious patients under general anesthesia.

☆ an important note; It is NOT used for diagnostic purposes

* Type of laryngoscope depends on type of the blade :

1. Laryngoscope (curved blade)

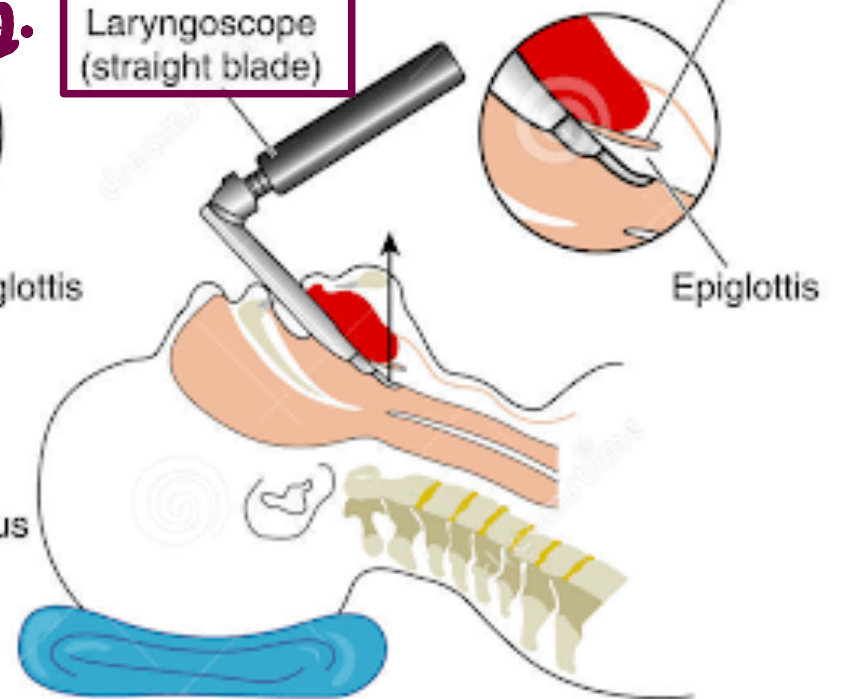
Macintosh / adults



2. Laryngoscope (straight blade)

Miller / pediatric

هاد بييجي تحت ال epiglottis و برفعه مع ال vallecule



FIBEROPTIC LARYNGOSCOPES

Oral and nasal forms

Flexible fiberoptic bronchoscope or rhinoscope can be used for office-based diagnostics or for tracheal intubation. The patient can remain conscious during the procedure, so that the vocal folds can be observed during phonation. Surgical instruments passed through the scope can be used for performing procedures such as biopsies of suspicious masses /difficult intubation

More comfortable

- It's flexible unlike the direct one. It can be used on conscious patients in clinics.
- It CAN be used for diagnostic purposes.
- In cases of difficult intubations, we can use it as an alternative, or in patients with uncontrolled gag reflex, in young children..etc

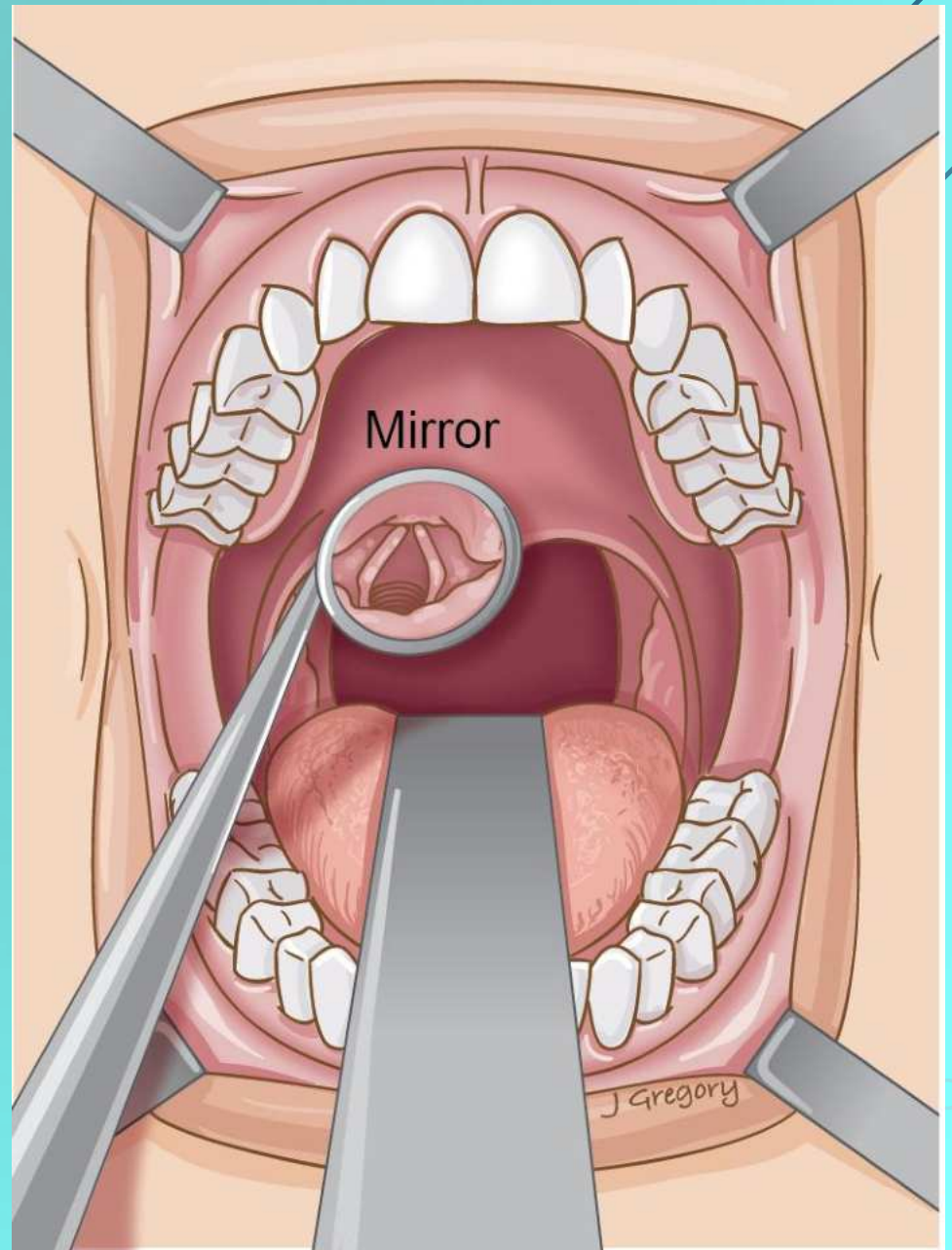
*Spray anesthetic, lubricant .. muscle relaxant not required



Flexible Fiberoptic Laryngoscope

- Indirect laryngoscopy :
- is performed when we see the vocal cords through mirrors.

Not really used right now. The mirror used is the same mirror used in dentistry



CONVENTIONAL LARYNGOSCOPES

The vast majority of tracheal intubations involve the use of the conventional laryngoscope.

The conventional laryngoscope consists of a handle containing batteries with a light source, and a set of interchangeable blades.

↳ 5 sizes » from 0-4

LARYNGOSCOPE BLADES

Two basic styles of laryngoscope blade are currently commercially available:

✱ The curved blade and the straight blade. The Macintosh blade is the most widely used of the curved laryngoscope blades, while the Miller blade is the most popular style of straight blade.
 Used in adults
 Used in children
 Miller blade can result in intense vagus nerve stimulation in adults that's why it is only used for pediatrics but not adults.

✱ Both Miller and Macintosh laryngoscope blades are available in sizes 0 (neonatal) through 4 (large adult).

There are many other styles of curved and straight blades (e.g., Phillips, Robertshaw, Sykes, Wisconsin, Wis-Hipple, etc.) with accessories such as mirrors for enlarging the field of view and even ports for the administration of oxygen. These specialty blades are primarily designed for use by anesthesiologists, most commonly in the operating room.

The straight blade is difficult to control in adult humans and can cause pressure on the vagus nerve, which can cause unexpected cardiac arrhythmias.

CONVENTIONAL LARYNGOSCOPES

- The Macintosh blade is positioned in the vallecula, anterior to the epiglottis, lifting it out of the visual pathway, while the Miller blade is positioned posterior to the epiglottis, trapping it while exposing the glottis and vocal folds.

- Incorrect usage can cause trauma to the front incisors; the correct technique is to displace the chin upwards and forward at the same time, not to use the blade as a lever with the teeth serving as the fulcrum.

Fulcrum is basically a point for balance (like the centre point in a seesaw)

Do not press the blade against the teeth using it as a hinge

- The Miller, Wisconsin, Wis-Hipple, and Robertshaw blades are commonly used for infants. It is easier to visualize the glottis using these blades than the Macintosh blade in infants, due to the larger size of the epiglottis relative to that of the glottis.



Macintosh laryngoscope



Miller laryngoscope

VIDEO LARYNGOSCOPE

A regular laryngoscope but attached to a camera.

- Video laryngoscopes are specialized fiberoptic laryngoscopes that use a digital video camera sensor to allow the operator to view the glottis and larynx on a video monitor.



LARYNGOSCOPES

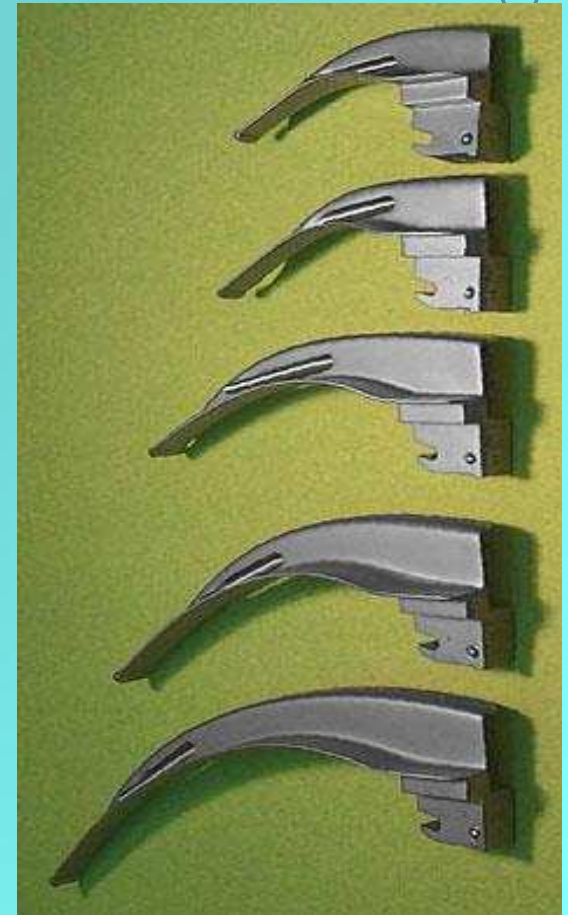
مستعمل

Difficult intubation

McCooy blade

(Tip is movable by pressing on the handle)

Macintosh blade



Miller blade

TRACHEAL INTUBATION

Tracheal intubation is the placement of a flexible plastic tube into the trachea to maintain an open airway. Could be inserted through the mouth (orotracheal) or the nose (nasotracheal)

Tracheal Intubation is useful to **deliver anaesthetic gases** directly to trachea and allow **control of ventilation** and oxygenation. The airway device is maintained in situ from the start to the end of anesthesia.

It is frequently performed in critically injured, ill or anesthetized patients to facilitate ventilation of the lungs, including mechanical ventilation, and to prevent the possibility of airway obstruction.

Before starting the intubation, you should perform patient airway assessment to predict any difficulty on direct laryngoscopy and ETT placement.

Using [LEMON](#)

2. And to predict any potential problems

INDICATIONS OF TRACHEAL INTUBATION

* **Deliver anesthetic gases** *Inhalational anesthetics.*

* **Control of ventilation** *Mainly in patients undergoing general anesthesia*

* **The patient is unable to protect their airway:**

- Loss of reflexes e.g., obtunded or GCS less than 8.
- Spasticity of muscles e.g., malignant hyperthermia.
- Risk of aspiration from the stomach, blood or secretions.

وقاية

* **Prophylactically:**

- **High risk of losing airway protection or patency e.g., local neck hematoma, epiglottitis, or airway burns.** *Thumb sign on x-ray*
CO toxicity; inhaling burns which result in edema (could also cause upper airway obstruction)
- **To control the airway** e.g., pre-transfer, clinical deterioration expected, uncooperative patient needing urgent investigations or treatment.

Could compress the trachea and result in upper airway obstruction

Indications of Tracheal Intubation

Inadequate ventilation:

-Treatment of hypercapnia e.g., severe COPD, head injury.

COPD causes destruction of the lung tissue resulting in altered airway flow (hypercapnia) + excess secretions

Could result in respiratory center damage

-Selective lung ventilation e.g., massive hemoptysis, bronchopulmonary fistula.

We have a defect which allows air to escape from the bronchi or the lung to the atmosphere

Inability to oxygenate the patient. e.g., severe ARDS or severe CO toxicity.

Inhalational burns

ARDS (acute respiratory distress syndrome) could affect children and adults but causes are different. In pediatric patients, mainly the cause is lack of lung surfactant. In adults, the main cause is infection.

Drug delivery: a rare indication e.g., surfactant in a neonate.

After birth, mostly for premature babies

CONTRA-INDICATIONS OF TRACHEAL INTUBATION

✦ Indication for intubation but there's contraindication » you can't put tube

Absolute contra-indications (will necessitate a surgical airway or nasal intubation):

We perform atypical intubation methods in these cases like nasal intubation, or tracheostomy

Contraindications to endotracheal intubation include conditions that does not permit the safe placement of an endotracheal tube.

✦ اذا كان difficult airway بديك
تبلش من الالبسط للاصعب
اول اشي تحطه bag و تنفخه اذا ما زبط بديك تحطه airway زي ال
nasopharyngeal ما زبط بتحط laryngeal mask ما زبط اعمل nasal intubation و
اذا ما زبط fiber optic اذا ما زبط surgical airway

All these are difficult intubations:

Total upper airway obstruction.

Total loss of facial/oropharyngeal landmarks. Swellings, trauma or congenital anomalies

Inability to open the mouth (eg, scleroderma or surgical wiring).

Neck injuries.

Any disease causing limitation in the movement of the neck or mouth like rheumatoid arthritis and down syndrome

Maxillofacial surgeries



ASSESSMENT OF PATIENTS AIRWAY

The goal of assessing patients airways preoperatively is to attempt to **identify potential problems** with maintaining, protecting, and providing a patent airway during anesthesia.

The assessment is performed with the aid of a physical examination and a review of the patients history and anesthetic records.

● زي اذا في familial predisposition to malignant hyperthermia or succinylcholine apnea

History : The anaesthesiologist must elicit the history of possible airway difficulty in the past.

General, physical and regional examination :

Patency of nares, Mouth opening, Teeth, Presence of hoarse voice/stridor or previous tracheostomy may suggest stenosis, Any systemic or congenital disease requiring special attention during airway management, Infections of airway and Physiologic conditions : Pregnancy and obesity.

1. While performing assesment of the patient's airway, we should take into consideration hoarsness of voice. It could be due to a mass that's partially compressing on the vocal cords, but due to the presence of tone it is only causing this hoarseness of voice. But if we administrate muscle relaxants, the vocal cords wont be held tightly anymore and will lose their tone, and the mass could shift to completely obstruct the vocal cords resulting in respiratory blockade.

2. Pregnancy and obesity both should be taken into consideration too. In both cases, the residual volume is less than normal. Their oxygen saturation can drop very quickly in compatison to others so we aim to ensure they reach 100% before we perform anesthesia. In pregnancy, it is due to physiological changes which causes the amount of oxygen presented in the alveoli to be less than non-pregnant. On the other hand their oxygen consumption is high, their metablism rate is high so we always consider it an emergancy and treat it as a full stomach.



• **LEMON** trial = Evaluating for the difficult airway

Look

Evaluate

Mallampati

Obstruction

Neck movement “chin to chest”



LOOK = inspection

1. Neck masses (Goiter). 2. Short neck.

3. Large tongue

4. Rheumatoid arthritis

Limitation in the movement of the neck, stiffness in joints

Small mouth bad mouth opening

5. Scleroderma

6. Tumors

7. Septum deviation.

In nasal intubation

8. Micrognathia (Pierre Robin syndrome)

The jaw is undersized (mandibular hypoplasia)

linguinal defect
cause facial abnormality
upper Airway obstruction

9. Teeth: protruding upper incisors 10. Obesity.

micrognathia

glossoposis
(retracted
tongue)

cleft palate

11. Surgical causes :

- Facial fractures

- Fracture mandible

- Surgery in nose

11. Scars of previous surgery, tracheostomy, burns ,radiotherapy.

Fibrosis » bad mobility for joints and neck



Goiter



Goiter



Pierre Robin Syndrome

Protruding upper incisors

Braces and teeth protruding

- can make the intubation difficult.

Plus it doesn't provide a good visual field





Burn marks
results in
limitation of
movement

Several clinical criteria have been developed to try to estimate the degree of difficulty with direct laryngoscopy and intubation.

These criteria are represented in the

1-2-3 tests According to number of fingers

1. Mobility of the temporomandibular joint (TMJ).
2. Oral opening or Inter-incisor gap
3. Thyromental distance

1-2-3 TESTS

1: mobility of the temporomandibular joint (TMJ).

Ask the patient to sit up with their head in the neutral position and open their mouth as wide as possible. Note the mobility of the mandibular condyle at the **TM joint**.

The condyle should rotate forward freely such that the space created between the tragus of the ear and the mandibular condyle is approximately **one fingerbreadth** in width. 1 cm (very important)

↳ If less » bad month opening



Fig.6.1: 1 = TMJ mobility.



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Palpation of the TMJ. **A**, Lateral aspect of the joint with the mouth closed. **B**, Lateral aspect of the joint during opening and closing. **C**, With the patient's mouth fully open, the clinician moves a finger behind the condyle to palpate the posterior aspect of the joint.

1-2-3 TESTS

2 : Oral opening or Inter-incisor gap

If the patient has < than 4 cm mouth opening or roughly less than 2 fingerbreadth distance between his teeth, there is a greater chance of difficulty on direct laryngoscopy and ETT placement.

Not necessarily causes difficult intubation but increases the risk.

ع.ب.ع. ٩٥ أ



Fig. 6.2: 2 = Mouth opening.



1-2-3 TESTS

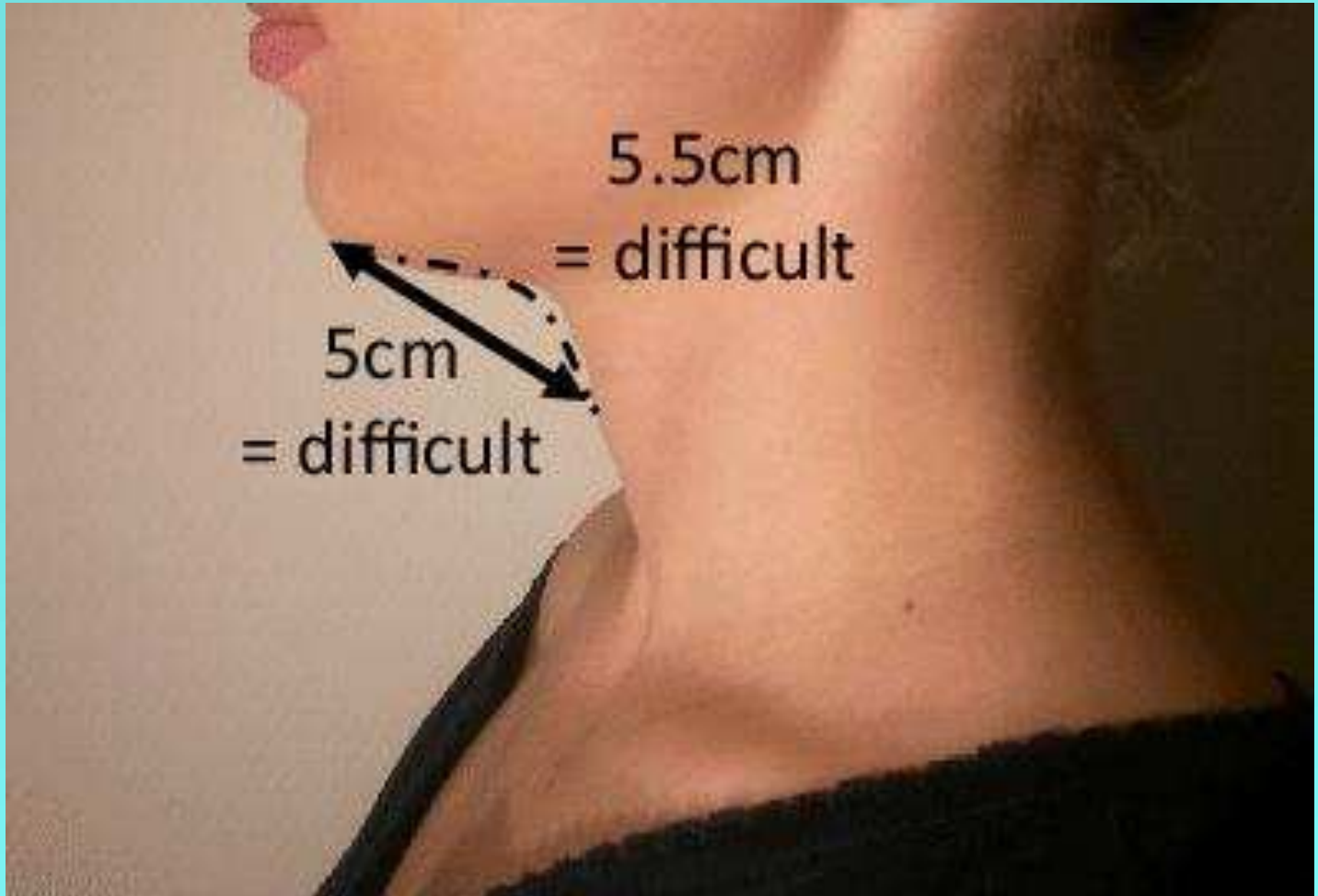
3. Thyromental distance

If the distance between the thyroid cartilage and the bony point of the chin is $<$ than 6.5 cm (3 fingerbreadth), there is an increase chance of difficulty on direct laryngoscopy and Intubation.

Same as above. Not necessarily results in it just increases the risk of difficult intubation



Fig.6.3:
3 = Thyromental distance.



MALLAMPATI SCORE:

* This tests the difficulty of the endotracheal intubation.

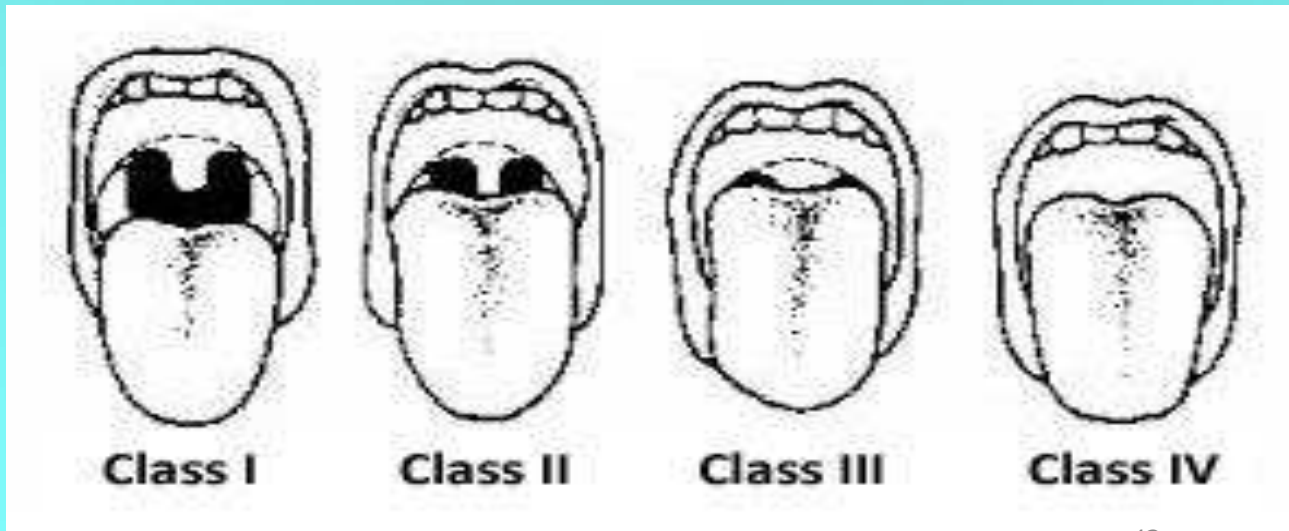
* The patient should be in a sitting position, with the head in a neutral position, and the observer located in front of the patient that should not phonate.

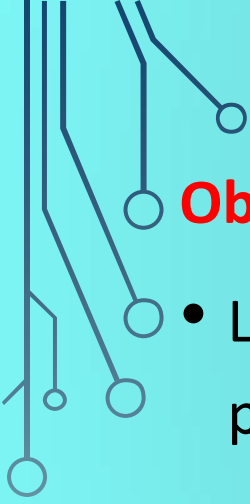
Unfortunately in emergent circumstances the ideal conditions or a cooperating patient are not the norm.

- **Class I**: Visualization of the soft palate, uvula, anterior and the posterior pillars.
- **Class II**: Visualization of the soft palate and uvula.
- **Class III**: Visualization of soft palate.
- **Class IV**: Only hard palate is visible.

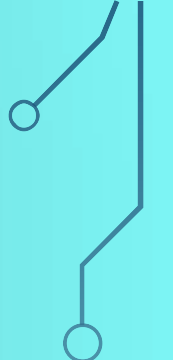
Easy
intubation

The higher the score the greater chance of difficulty and/or failure.





Obstruction :

- Laryngoscopy or intubation may be more difficult in the presence of an obstruction
 - Anatomy
 - Trauma
 - Foreign body obstruction
 - Edema (burns)
- 
- 
- 

الزوايا من حركة

• **Neck mobility :** Chin to chest examination. if they cant do it then they dont have good neck mobility and it could be difficult to place them in the sniffing position thus difficult intubation

• The **cervical** spine's **range** of motion is approximately 80° to 90° of flexion, 70° of **extension**, 20° to 45° of lateral flexion, and up to 90° of rotation to both sides.

• **Problems :**

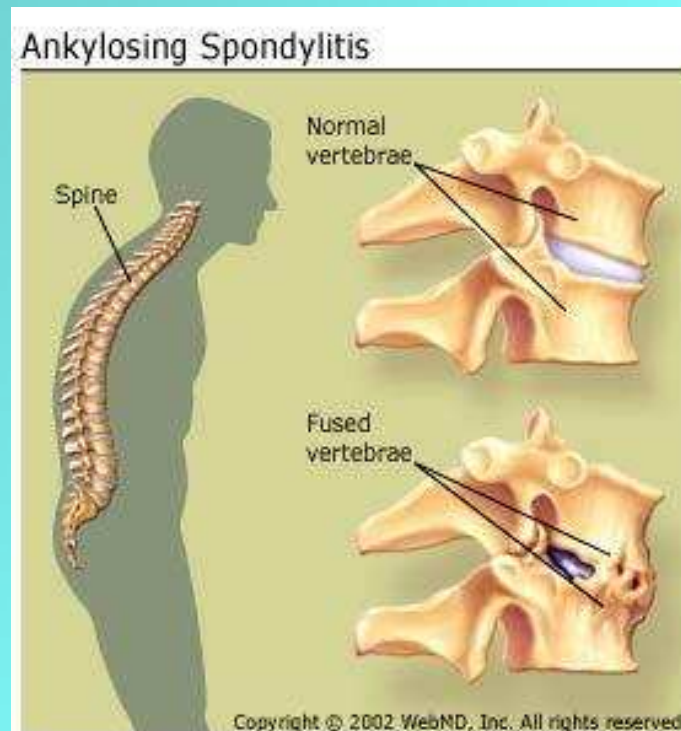
• **Cervical spine immobilization**

• **Ankylosing spondylitis** Bamboo x-ray

Ankylosing spondylitis, also known as axial spondyloarthritis, is an inflammatory disease that, over time, can cause some of the bones in the spine, called vertebrae, to fuse. This fusing makes the spine less flexible and can result in a hunched posture. If ribs are affected, it can be difficult to breathe deeply.

• **Rheumatoid arthritis** Could lead to limitation in movement

• **Halo fixation** In cases of cervical spine trauma



TIME TO INTUBATE . . .

1- proper preparation

All devices and pharmacologic agents used in intubation should be readily available before the sequence of intubation is started. This includes :

face masks,

laryngoscopes with an assortment of blades of different sizes,

oral and nasopharyngeal airway,

assortment of ETT's of different sizes,

stylets, and

rescue devices, such as LMA's.

ORAL/NASAL AIRWAYS

Very important ✨

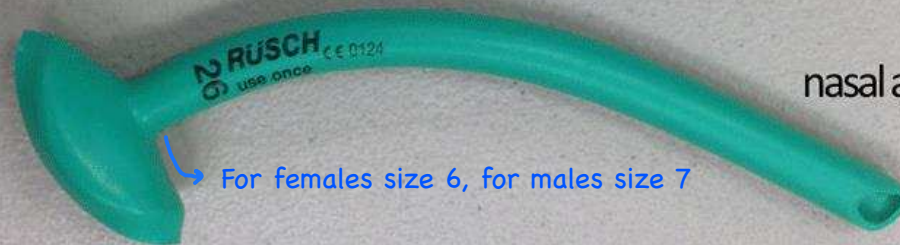
Adjuncts are often used to bypass any obstructions

Airway Adjuncts



oral airway

- The patient needs to be unconscious
- Rigid to fixate the tongue.
- Maintain the patency of the airway and also prevents tongue biting during convulsions. (Guedal airway / g airway) I



nasal airway

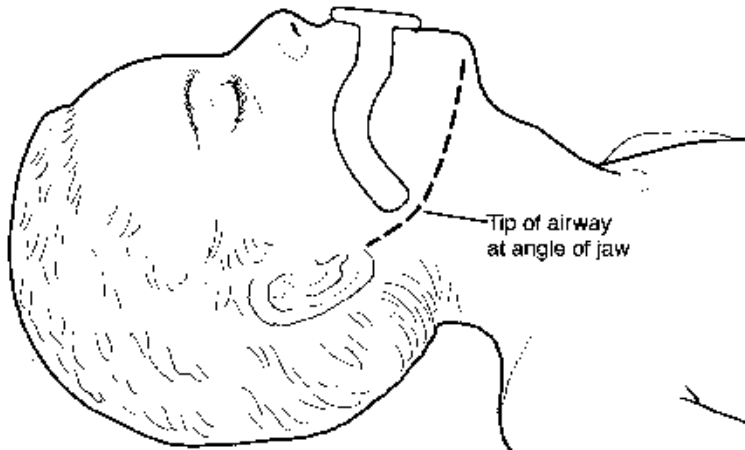
- Patient is conscious or not but contraindicated in cases of basal skull injury.
- Longer and more flexible
- Can be tolerated in patients with gag reflex.
- maintains the patency of the airway but isn't used for tongue biting

For females size 6, for males size 7

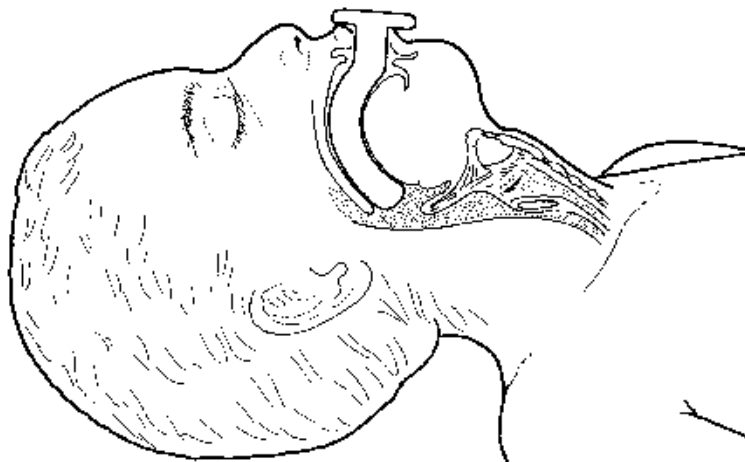
FNotebook.com

* More comfortable and tolerated

Figure 32: Oral Airway Insertion

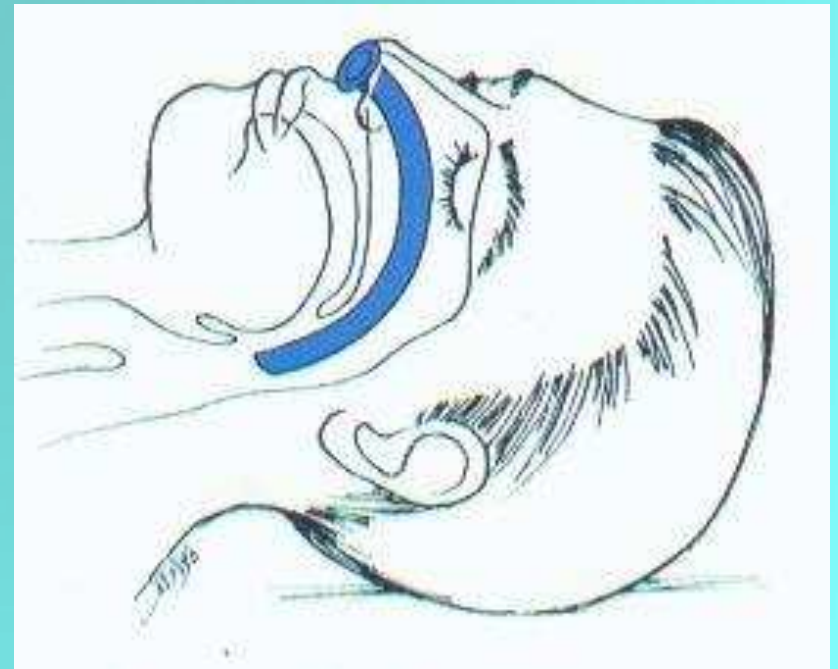


a. Proper measurement for oral airway insertion



b. Proper oral airway placement

SUSAN O. LIBERT



○ Oropharyngeal Airway

○ Nasopharyngeal airway

ENDOTRACHEAL TUBES (ETT)

*Main purpose » patency of airway

Tracheal tube is a catheter that is inserted into the trachea for the primary purpose of establishing and maintaining a patent airway and to ensure the adequate exchange of oxygen and carbon dioxide.

☆ It has a bevel tip with higher surface area, so :

1. it's less likely to be obstructed.
2. Better vision.
3. Less traumatic and damaging.
4. Easier insertion.

v.I

Note :

ID

Tubes are mainly classified depending on their internal diameter

ID: internal diameter without the wall. OD: outer diameter + thickness of the wall

- Tube size cuffed: $\text{Age}/4 + 3.5$
- Tube size uncuffed: $\text{Age}/4 + 4$
- Tube depth: $\text{Age}/2 + 12$ for greater than 1 year old; Depth in adults 20–22cm
- $\text{Weight}/2 + 8$ for under 1 year OR 3x ETT size

تاسن

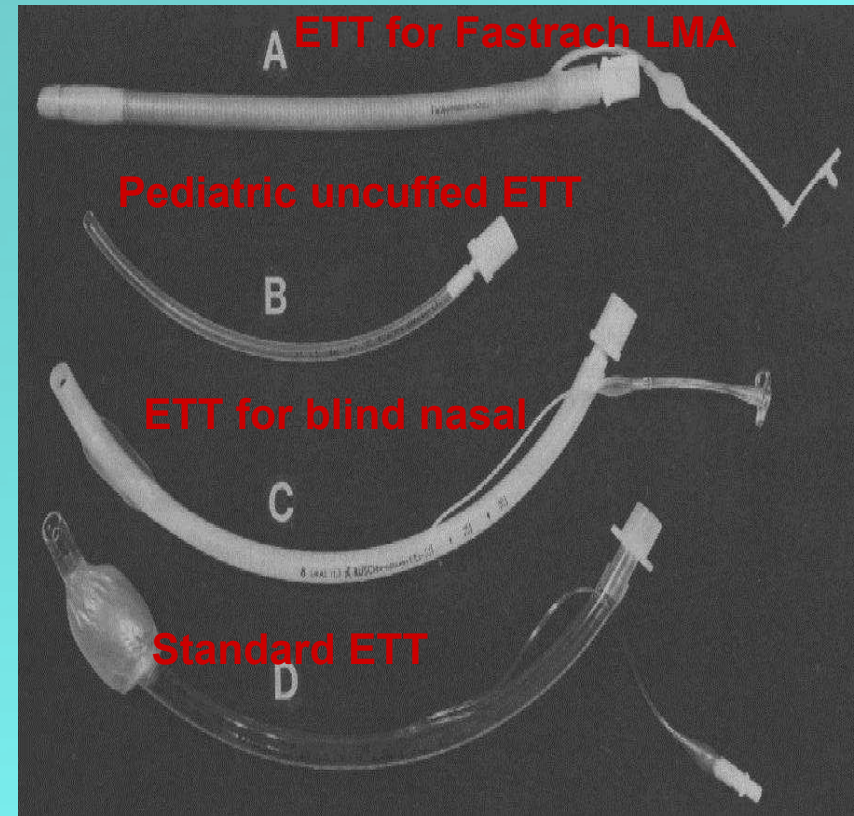
Adult sizes: females 7–^{7.5} males 8–8.5

Neonates; premature: 2.5–3 Mature: 3–3.5

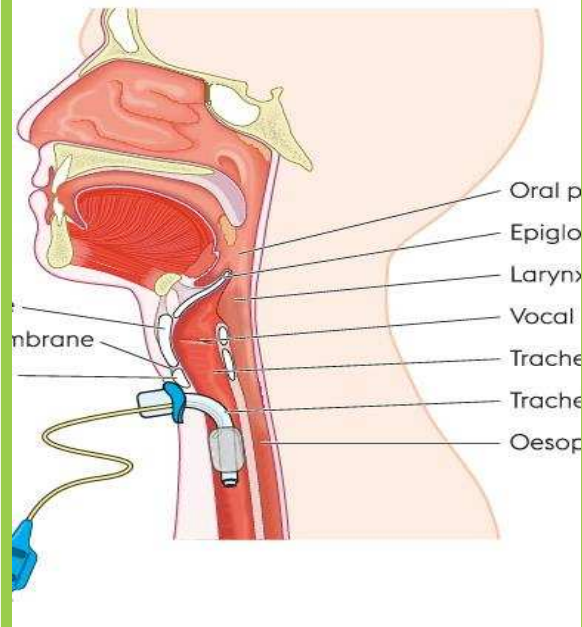
• The difference between the cuffed and uncuffed that the cuffed has a small pulgling piece that help to prevent the aspiration and to place the tube and prevent its movement

In pediatrics we cant use cuffed ETT because the narrowest point in their airway is the cricothyroid so it could easily get obstructed there while administrating the tube.

In adults, the narrowest part is the glottis, then the more you decend the wider the airway so we have no risk of obstructing the airway with the cuff

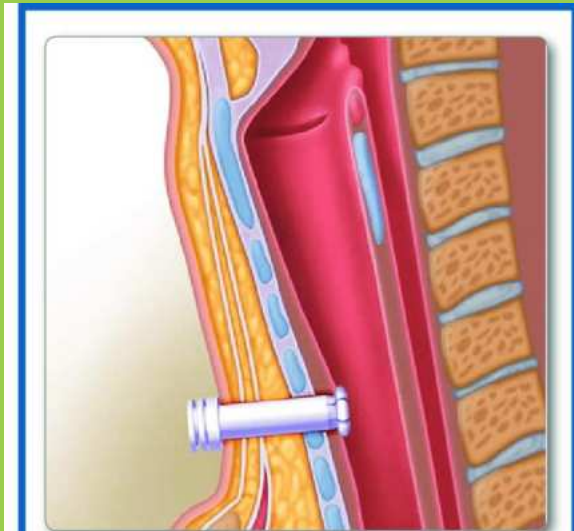


Optimal placement of a percutaneous tracheostomy



TRACHEAL TUBES

- Many different types of tracheal tubes are available, suited for different specific applications:
- An endotracheal tube is a specific type of tracheal tube that is nearly always inserted through the mouth (orotracheal) or nose (nasotracheal).
- A tracheostomy tube is another type of tracheal tube; this 2–3-inch-long (51–76 mm) curved metal or plastic tube may be inserted into a tracheostomy stoma to maintain a patent lumen.
- A tracheal button is a rigid plastic cannula about 1 inch in length that can be placed into the tracheostomy after removal of a tracheostomy tube to maintain patency of the lumen.



Narrowest point in adult » epiglottis .. in pediatrics » cricoid cartilage

1- An endotracheal tube :

- ✓ provides a passage for gases to flow between a patients lungs and an anesthesia breathing system .
- ✓ protects the lung from contamination from gastric contents and nasopharyngeal matter such as blood.

Most endotracheal tubes that you will encounter will be made out of plastic (Polyvinyl Chloride, PVC).

These may be visually clear or opaque.

Plastic is not radio opaque and therefore plastic tubes have a line of radio opaque material that makes them more visible on a chest X Ray.

- **Endotracheal tubes** have an inner diameter and an outer diameter.
- The “size” of an endotracheal tube refers to its internal diameter. Therefore if you ask for a “size 6 ” endotracheal tube, you are asking for one with an internal diameter of 6 mm.
- Narrower tubes increase the resistance to gas flow . This can be especially relevant in the spontaneously breathing patient who will have to work harder to overcome the increased resistance. Thus one should choose the largest diameter endotracheal tube that is suitable for a given patient.
- Pediatric endotracheal tubes have a much smaller internal diameter.
- The length of an endotracheal tube is measured from the end that goes into the trachea and is marked in centimeters.
- An endotracheal tube that is too long for a given patient may be more prone to kinking and become obstructed. It can be cut to a more appropriate length if necessary.

ID = internal diameter,
OD = outer diameter

* في دائرة فيها ٢ و مشطوب عليها يعني يستخدم مرة وحدة

* يعطي انطباع عن وضع ال cuff تاعته ال tube

ENDOTRACHEAL TUBE

1. Better vision,
2. easier insertion,
3. less traumatic,
4. less incidence to be obstructed

* بتوصل بين ال lumen of the tube and breathing bag or circuits

* في خطين بكونوا على ال tube ما

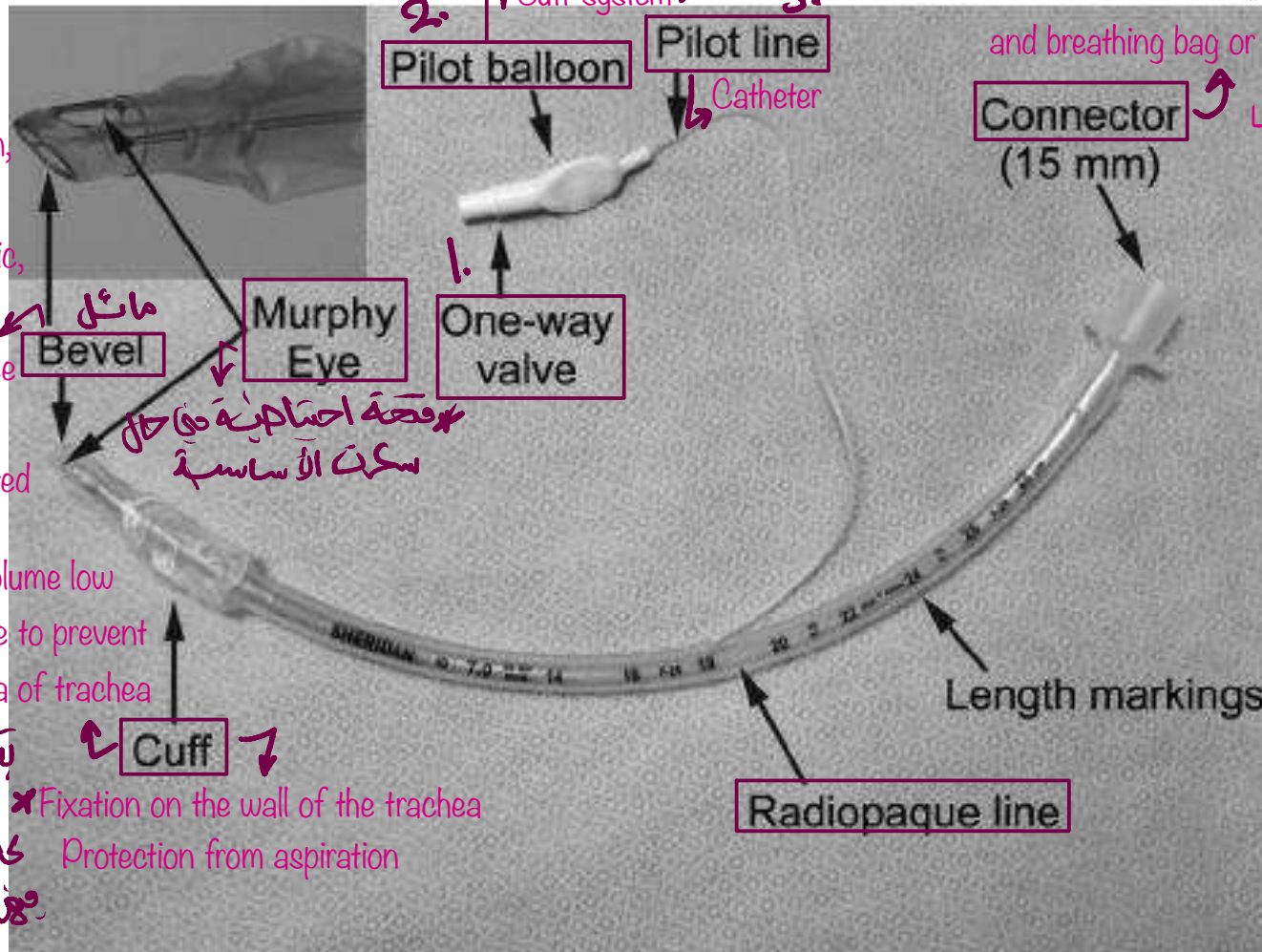
عليهم ارقام ولا اشي هدول

بيعطوا indication تقريبا وين

لازم توقف intubation يعني

مكانهم هو الحد تاع ال tube

الي تفوت فيه بال vocal cords



* Fixation on the wall of the trachea
Protection from aspiration

SPECIAL ENDOTRACHEAL TUBES

❖ **PREFORMED endotracheal tubes** *Oral and nasal*

are molded into special shapes that permit good surgical access in the oronasal area. The endotracheal has a special name. It is a "RAE" tube.

↗ *Connected facing downward*

Oral one is called south facing tube (used in ENT surgeries)

Nasal one is called north facing tube (used in mouth and teeth surgeries. Maxillofacial surgeries. Any surgery that requires the mouth to remain free)



❖ **PEDIATRIC endotracheal tubes**

✶ *The narrowest point in the anatomy of the airway of the pediatrics is cricoid cartilage*

Endotracheal tubes for pediatric patients are smaller than those meant for adults. Because the pediatric trachea is susceptible to damage by pressure, most pediatric endotracheal tubes are uncuffed. However, cuffed versions similar to adult endotracheal tubes exist and when used, must be inflated with care. A wide range of sizes are available.

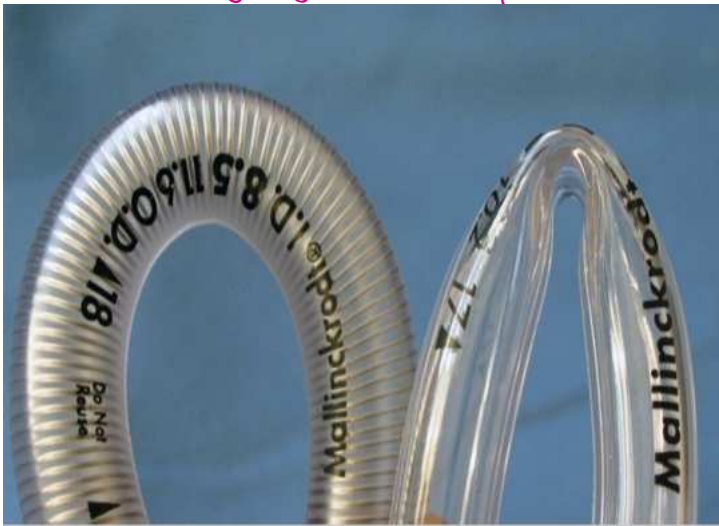
SPECIAL ENDOTRACHEAL TUBES

☆ mainly used in two situations:

1. When the tube is covered. (Cranial surgeries, neck surgeries, eye surgeries, neck surgery)

2. In cases of unusual positions (prone and lateral)

Anything other than supine



Unkinkible

- **Reinforced / armoured endotracheal tubes**

- specially designed to be resistant to kinking, they achieve this property by having a spiral of wire embedded into the wall of the endotracheal tube to give it strength and flexibility at the same time. These are particularly **useful for head and neck surgery** where the endotracheal tube may be sharply bent and also compressed by the surgeons. Armoured endotracheal tubes can be easily bent away from the area of surgery and thus improve surgical access.

SPECIAL ENDOTRACHEAL TUBES

✳️ لما تدخل ال tip بتكون للامام بس تتعدى ال cuff ال vocal cords و تختفي بدك

تروح على الشمال مثلا بتلفه ٩٠ درجة لليساو و بتقوت ال left bronchus

بهاي الحالة الفتحة الزرقا راح تعطي الهوا لل left lung و الفتحة الشفافة تاعت ال

✳️ Right tube when surgery on the left and vise verse

trachea راح تعطي ال right lung فلما الجراح يبيلش العملية بتعمل clamping لل

tube تاته ال trachea و هيك ما بوصل هوا لليمين و بعرف يشتغل براحتة

❖ DOUBLE LUMEN endobroncheal tubes

○ In **thoracic surgery**, there are times that you may need to isolate and selectively not ventilate one lung. For an example, during an oesophagectomy, one may choose to not ventilate one lung to provide better surgical access to the oesophagus. There are special endotracheal tubes called “double lumen tubes” to achieve this.

○ A double lumen tube can be thought of as two endotracheal tubes joined together (see graphic above). One tube is shorter and ends in the trachea and there is cuff at this level called the tracheal cuff (colored red in the image). The other tube extends further and enters a main bronchus and has its own cuff (bronchial cuff, coloured blue).

The blue one is broncheal (inserted into the bronchi of the lung that is not involved in surgery)

The colorless one is tracheal (inserted into the trachea)

Size for females 35-37, for males 39-41



TRACHEAL TUBES (CONT.)

- **2- Tracheostomy tube**

Surgical airway. Last alternative for difficult intubation

- Several types of tracheostomy tubes are available, depending on the requirements of the patient, including Shiley, Bivona (a silicon tube with metal rings that are good for airways with damage to the tracheal rings or otherwise not straight), and fenestrated.

- **3- Tracheal button**

- A tracheal button is generally used in people with severe obstructive sleep apnea, who often wear this device during waking hours and remove it while sleeping to ensure a patent airway and reduce the risk of asphyxiation. Since the tube does not extend far into the trachea, it is easy to breathe and speak with the device in place.





Most TTs have cuff inflating system consisting of valve, balloon, inflating tube and cuff.

Uncuffed tubes used in children to minimise pressure injury

❖ Purpose of cuff is:

- ❖ Airtight seal between tube and trachea**
- ❖ Protect from aspiration of blood, mucus or vomitus.**

TT CUFF

MAGILL FORCEPS

Designed for guiding tip of ETT through larynx nasal intubation.

★ Magill forceps uses:

1. The administration of throat pack (gauze) in ENT surgeries
2. Removal of the throat pack
3. Removal of foreign bodies; mainly in the esophagus.
4. Guidance of nasal intubation (manipulate the tube)



Malleable Stylet

Administered inside kinkable tubes, very important in emergency situations

- ◆ Thin piece of metal or plastic
- ◆ Threaded through lumen of ETT
- ◆ In the emergency setting, where speed of insertion and the possibility of gastric aspiration are always of concern, it is preferable to always use a malleable stylet inside the ETT to control the shape and direction of the tip of the tube. It is important to ensure that the tip of the stylet does not protrude beyond the tip of the ETT.

It could perforate the esophagus



إذا فتت بال laryngealscope و كنت شاييف طرف ال vocal cords بس بتفرت بال bougie عشان ما تعمل trauma لو فتت بال tube لل cords و بس تحس ال rings تعون ال trachea بتتاكد انك in و بتستخدمه ك guide عشان تقوت ال tube

BOUGIE

Similar to the stylet but mainly used to guide during difficult intubation.

Or in the ICU, when changing the tubes for a patient who has been in the ICU for some time and secretions built up on and around the previous tube



2- Patient position

The patient should be aligned without lateral deviation of the head or neck.

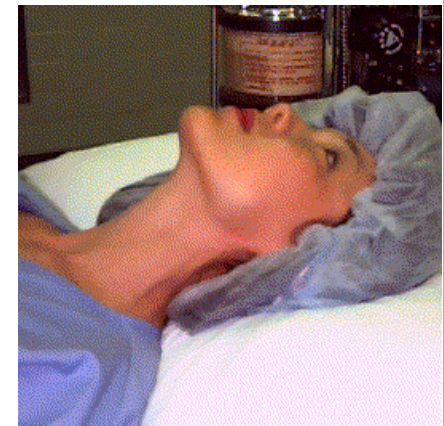
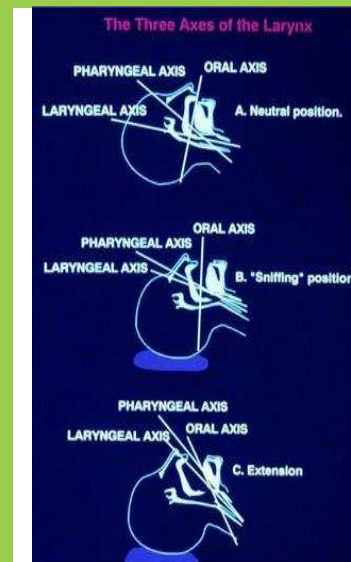
The head should be extended on the neck with a pillow under the occiput. If cervical spine trauma is suspected, have an assistant provide in-line immobilisation.

The neck should be flexed to approximately 15 degrees on the chest.

 Try to keep the external auditory meatus and sternal notch in same horizontal plane (except infants or when cervical spine injury is present or suspected).

= In infants aged under 2, the occiput naturally extends the head and the chin alone needs lifting into the neutral position.

= In older children a "sniffing" position should be used.



SNIFFING POSITION

- The sniffing position
- only in the absence of cervical spine injury
- Position the patient supine on the stretcher.
- Proper sniffing position aligns the external auditory canal with the sternal notch.
- The “sniffing position” has traditionally been considered the optimal position for direct laryngoscopy as it aligns the oral, pharyngeal, and laryngeal axes. This position is achieved by elevating the patient's head, extending the head at the neck, and aligning the ears horizontally with the sternal notch.

3- BLADE INSERTION

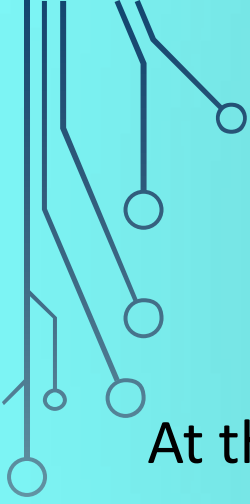
The blade of the laryngoscope is introduced into the right side of the mouth.

Hold the laryngoscope with the left hand, smooth and gentle insertion.
Do not move your wrist so you dont result in trauma to the teeth

it is advanced toward the base of the tongue, keeping it to the left side of the blade.

Once the oropharynx is passed and the tongue is being held in place, the operator should lift the laryngoscope blade forward to show the glottic opening.

((One of the common mistakes made during laryngoscopy is not having control of the tongue. The tongue occupies a great deal of the surface area of the mouth and if not displaced properly (laterally and to the left) it will “herniate” to the right side of the blade and obstruct your field of vision and not allow the ETT to be introduced into the larynx))



At this point, where the tip of the blade ends up depends on the type of blade you are using:

- i. Straight blades: The tip should extend underneath the epiglottis and lift it.
 - ii. Curved blades: The tip should extend into the vallecula.
- 
- 

Tracheal ring

Epiglottis (posterior)

True vocal cord

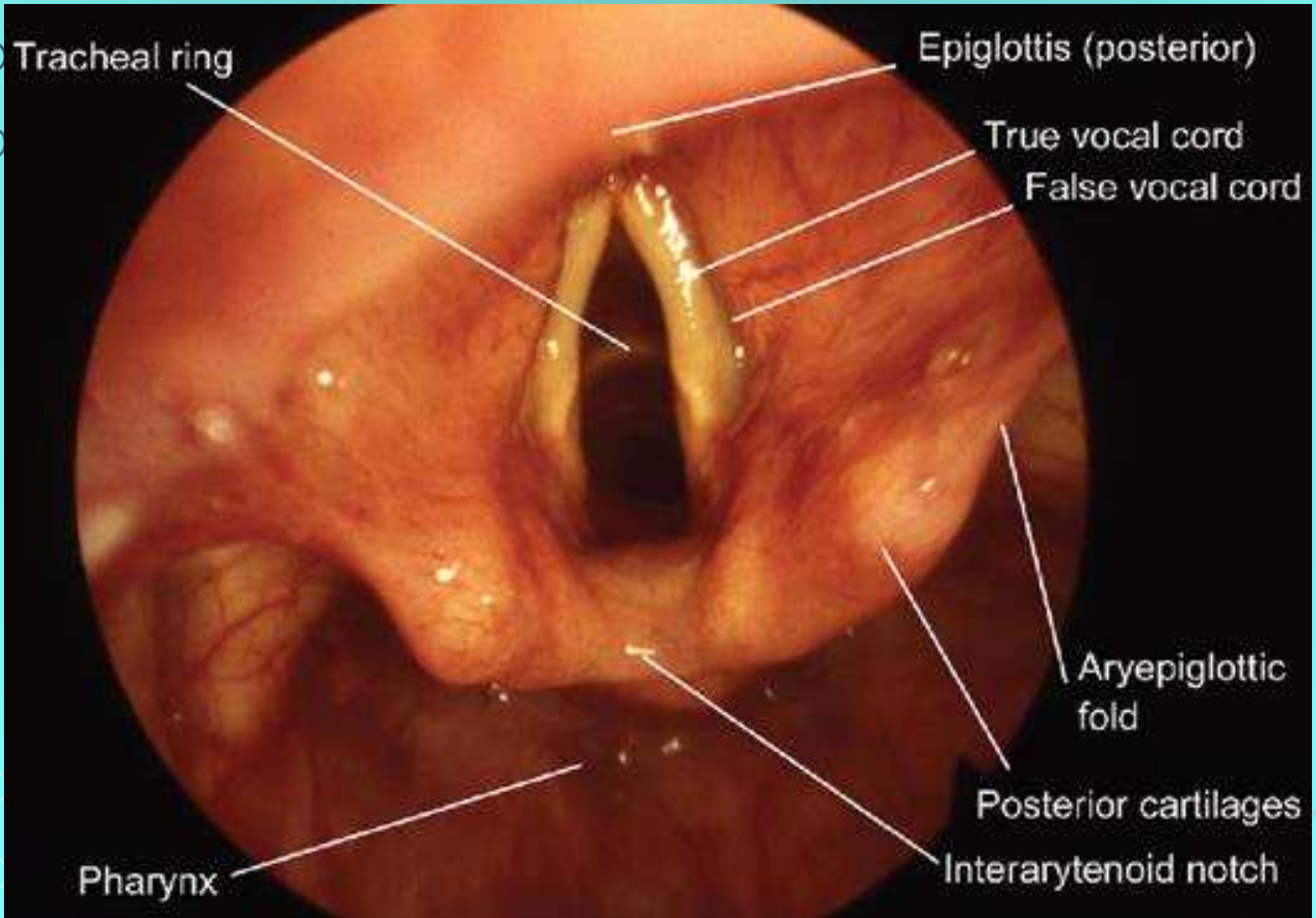
False vocal cord

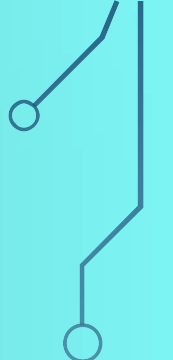
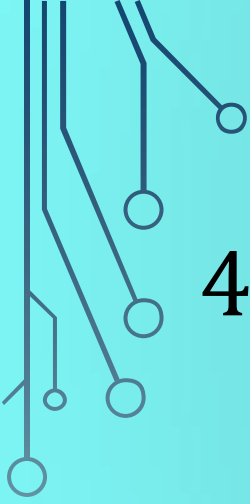
Aryepiglottic fold

Posterior cartilages

Interarytenoid notch

Pharynx





4- ETT PLACEMENT:

Once the cords are exposed, the ETT is handed by an assistant and introduced with the right hand.

Once the ETT is placed, the laryngoscope is taken out, the ETT cuff is inflated, the operator or assistant holds the tube in place, and correct placement is confirmed.



5- CONFIRMATION OF ETT PLACEMENT:

1. Directly observing the endotracheal tube pass through the vocal cords. Under vision
2. Capnography Multiple waves if it was in the trachea (often rhythmic)
little or no co2 if it was in the esophagus
3. ETT fogging or condensation
4. Symmetrical chest movement.
5. Presence of bilateral breath sounds. both lungs and the stomach to check for transmitted sound
6. Absent gastric sounds and distention.
7. Radiographic confirmation.

6- ETT FIXATION

Once the correct ETT position has been confirmed, the next step is to secure the tube in place to prevent tube migration and even extubation.

Methods of fixation:-

- 1- adhesive tape. pediatrics and females. in males it can be affected by facial hair preventing it from being fixated in place so we use circumferential instead.
- 2- circumferential tape around the neck has been recommended -
Keep in mind that if not done properly it can restrict venous return from cranial Structures.

NASOTRACHEAL INTUBATION

Indications

1. Oral Surgery
2. Faciomaxillary surgery
3. If mouth need to be closed after surgery *Fracture in mandible*
4. Closed mouth
5. Difficult oral intubation
6. Prolonged mechanical ventilation in ICU *Unlikely to be extubated*

Contraindications

1. Coagulopathy *The most common adverse effect of nasal intubation is epistaxis. In patients with coagulopathy, it could put them to danger due to excess bleeding or clotting and hematoma development that could obstruct their nasal airway.*
2. Severe intranasal pathology
3. Fracture of skull base *To avoid introducing the infectious agent to the lungs and causing pneumonia*
4. CSF leak *It's an indication of basal skull fracture (rhinorrhea + raccoon eyes)*

NASOTRACHEAL INTUBATION

Technique

In comparison to oral tube.

example: if the patient's oral tube size is 7, then nasal tube should be size 6-6.5

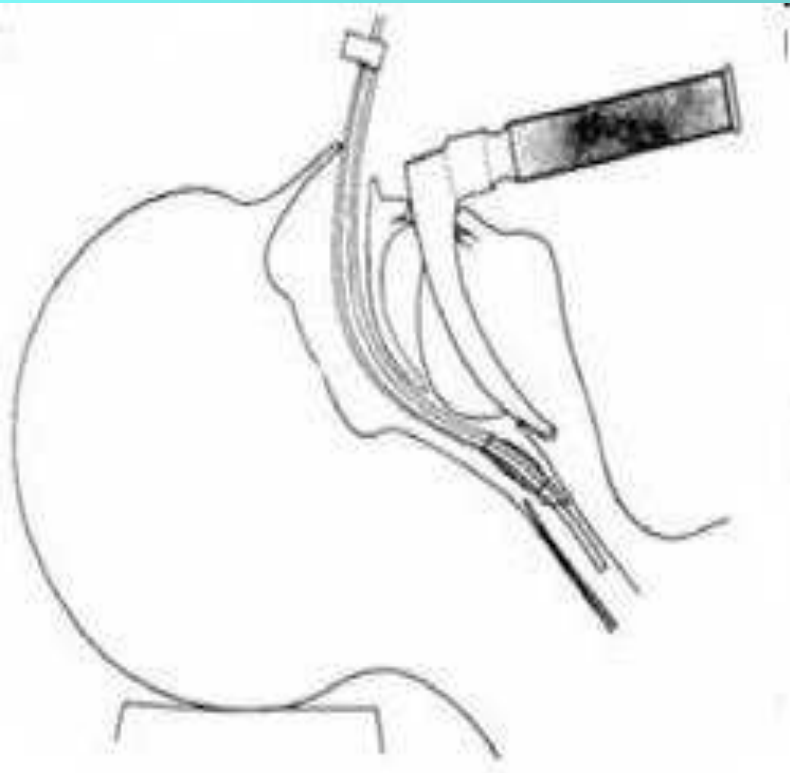
If the oral tube is inserted 15 cm, in case of nasal, we insert it 17 cm.

- ◆ Apply vasoconstrictor nasal drops

- ◆ Lubricate tube wall. Length should be 2 cm longer and ($\frac{1}{2}$ -1) mm smaller diameter

- ◆ Guide the tube slowly but firmly into the nasal passage, going up from the nostril (to avoid the large inferior turbinate) and then backward and down into the nasopharynx

- ◆ Proceed with the procedure as an orotracheal intubation, guiding the tube through the vocal cords with a Magill's forceps



EXTUBATION

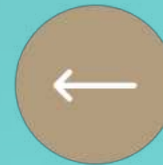


**MUSCLE RELAXANT
FULLY REVERSED**

Give neostigmine and
atropine combination



**PATIENT AWAKE &
RESPONSIVE,
SUITABLE VITAL SIGNS**



**100% OXYGEN AT HIGH
FLOW 2-3 MIN**



**REMOVE SECRETION
IN TRACHEA OR
PHARYNX**

Suction to prevent pneumonia
and spasms



**TURN PATIENT TO
LATERAL POSITION**



**DEFLATE CUFF AND
REMOVE ETT DURING
INSPIRATION**

- Because the vocal cords
are open the widest during
inspiration so you avoid
causing trauma



**CONTINUE 100%
OXYGEN BY
FACEMASK**

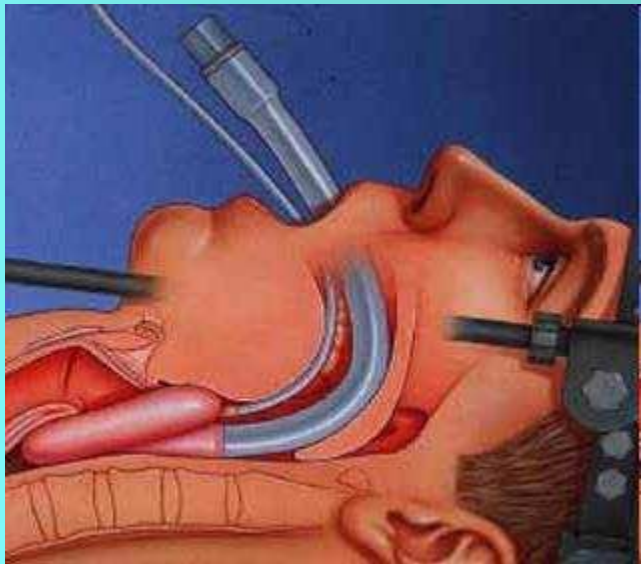


**EXTUBATION IN
SEMICONSCIOUS
PATIENT CAN
PROVOKE
LARYNGOSPASM**

THE LARYNGEAL MASK AIRWAY (LMA)

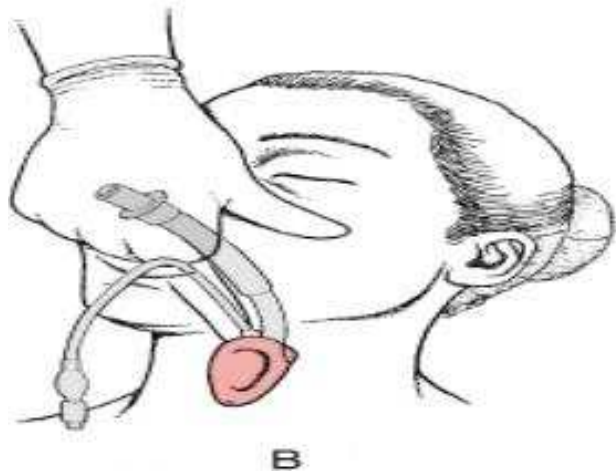
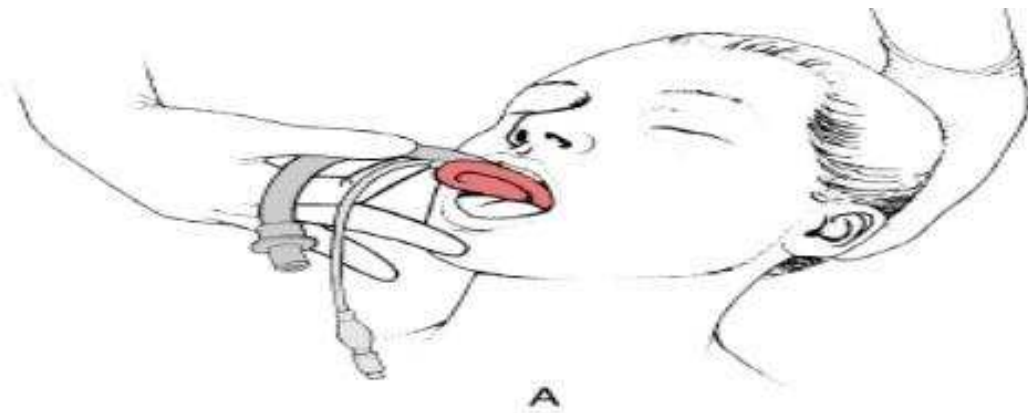
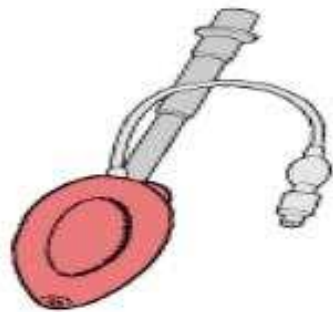


THE LARYNGEAL MASK AIRWAY (LMA)



- New device to maintain airway during anesthesia when TI is not desired.
- It was developed as an alternative to either ETT or face mask ventilation.
Supraglottic so more invasive
- It's easier in insertion and has high rate of success *Can be administered by non-trained individual*
- It's made in 8 sizes to suite neonates, children and adults.
- Better inserted with propofol (that depresses laryngeal reflex) or deep inhalation anesthesia. *Doesnt need muscle relaxant for insertion*
- After adequate anesthesia, LMA is inserted to mouth blindly without laryngoscope and pushed downward till resistance is felt. The cuff is then inflated.

- It can be used 40 times before it is thrown away. Unlike other tubes that are for a single use.
- Selection depends on weight not age.



LARYNGEAL MASK AIRWAY

- **indications**

- A. In the simple procedures that are not axial (head, neck, thoracic, and abdominal surgery).
- B. Avoid the use of tracheal intubation during spontaneous ventilation . Short surgeries mainly
- C. in a case of difficult intubation , to facilitate subsequent insertion of a tracheal tube

- **Contraindications**

Not used for ICU patients

- A. Full stomach or any condition lead to delayed gastric emptying. LMA does NOT protect against aspiration
- B. Possible regurgitation .
- C. Surgical access is Impeded By the cuff of the LMA(face and neck surgery).
- D.an unusual position (Prone). Used only in supine
- E. A Caesarean section.
- F. pregnancies.

LARYNGEAL MASK AIRWAY



Use of LMA avoids occurrence of most TI complication.

The major disadvantage is lack of mechanical protection from regurgitation and aspiration.

Other problems are laryngospasm, coughing and sore throat.

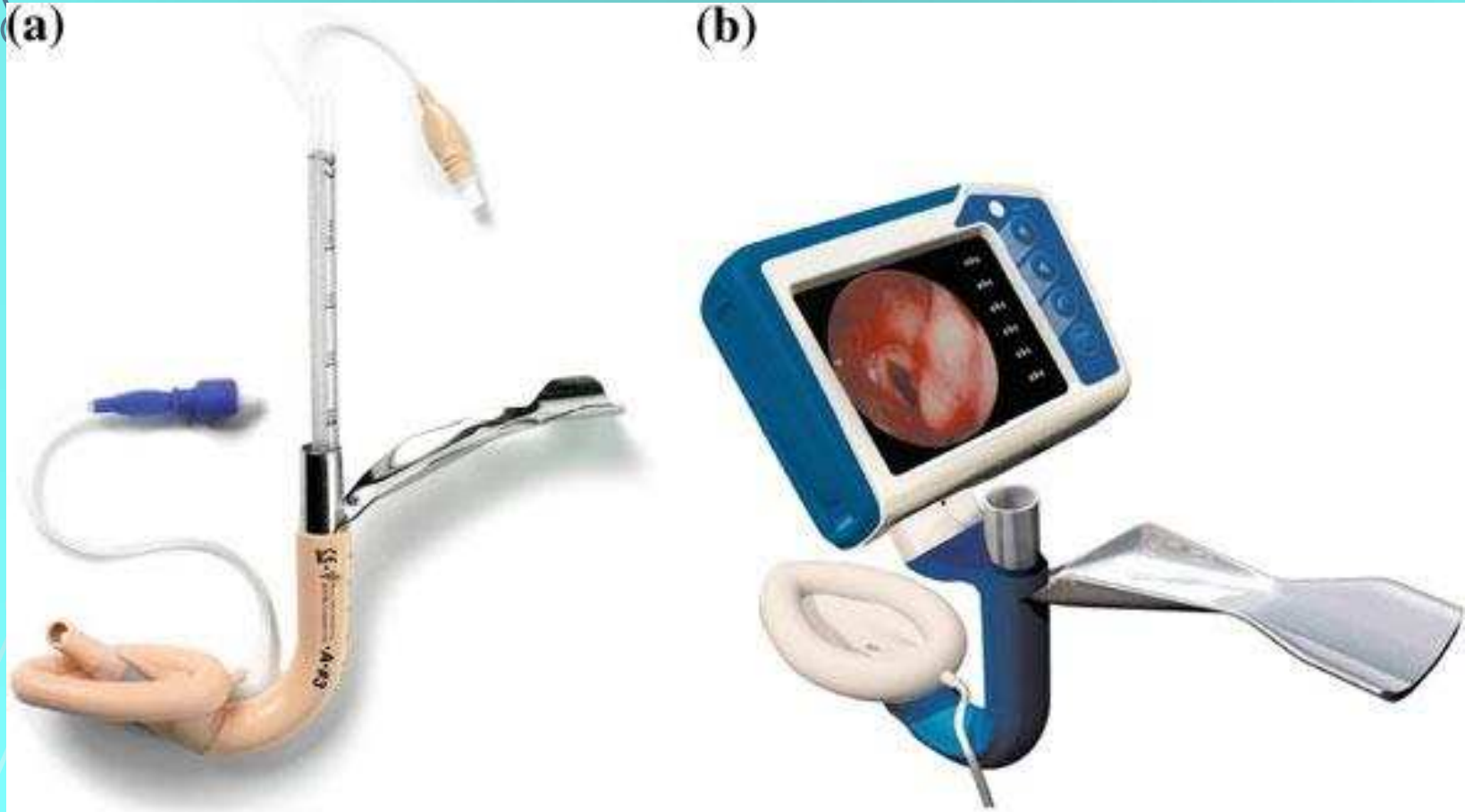




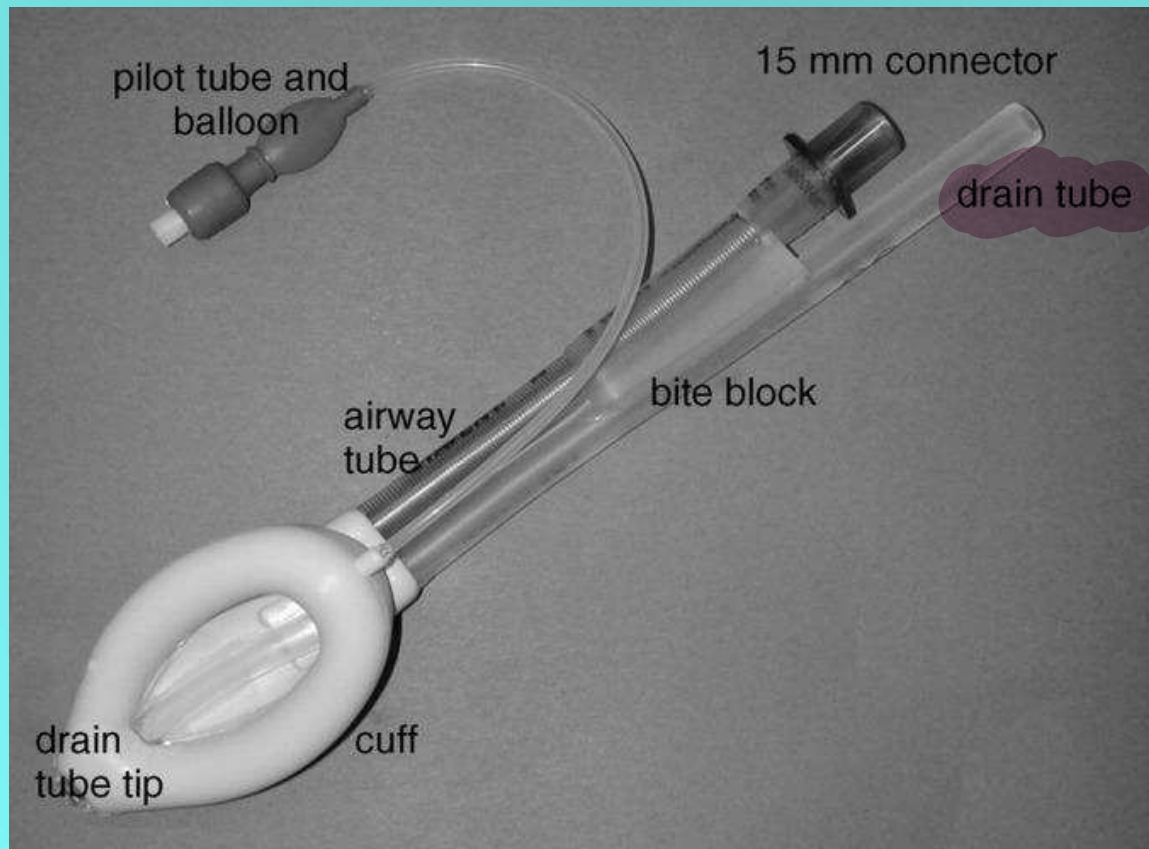
A. INTUBATING LMA FASTRACH

B. INTUBATING LMA C-TRACH

For difficult intubation



ProSeal LMA



I-GEL LMA:

It is made from a medical grade thermoplastic elastomer and has been designed to create a noninflatable, anatomical seal of the pharyngeal, laryngeal, and perilaryngeal structures.

The gelatinous material allows it to fit according to the anatomical shape of the throat. so it provides tight sealing of the airway and yet it is easier to administrate and doesnt cause compression trauma.

