HANDWRITTEN NOTES

DAMS

ANAESTHESIA

CRISP, CONCISE, CONCEPTUAL

Integrated Edition

Student first @DAMS

DAMS Publications

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HOW TO MAKE BEST USE OF NOTES?

A Message by Mentor Duo Specially for you,

- *Read the notes thoroughly, they are absolutely concise, crisp & conceptual and hence it is best advised not to add a lot of extra information to them as that will dilute the quality.*
- *Images have been provided alongside to aid in better understanding and also help you solve image-based questions, these images have been specially picked by the faculty so have a high probability of being asked in exams.*
- *Notes are handwritten in a way to help make them easier to retain, a lot of tables, graphs and algorithms have been used to simplify the learning.*
- *While reading notes try and use the CFAQ technique —*
  - A. *Use the C to denote concept part in the notes and ensure you are clear with this part in the first go if not then it's advisable to listen to this part of the video from your course.*
  - B. *Use the F To denotes facts in your notes, it is okay if you can't remember them in first go but will need repeat reading. But these facts are important for exams as they could be integrated to clinical questions.*
  - C. *Use A to denote applied parts, this is how concepts and facts are asked indirectly in exams. This will also help you develop MCQ solving skill.*
  - D. *Use Q to denote areas where faculty has said it's a direct question or a PYQ or a potential question.*
- *This technique will help you summarize your notes In way that your second reading will become easy and faster.*
- *Active space has been provided with these notes to make your own annotations alongside and this will help you maintain one single notebook for one subject.*
- *Try and solve MCQs with every topic from DQB. Your goal should be to start with at least 30 MCQs every day and then increase to at least 50 MCQs every day. Also, when you do a topic wrong write it alongside the notes that this topic needs to be read again but mark only the specific area that you have done wrong not the whole topic.*
- *After the topic is covered then in the active space try and summarize the topic in the form of mind map. This will help in active recall and make your revision easier.*

Best Wishes & Happy Learning!!!!!

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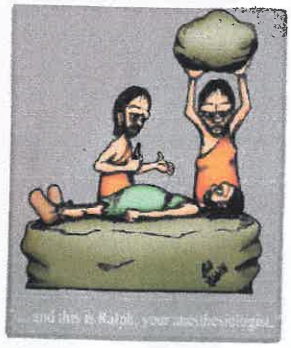
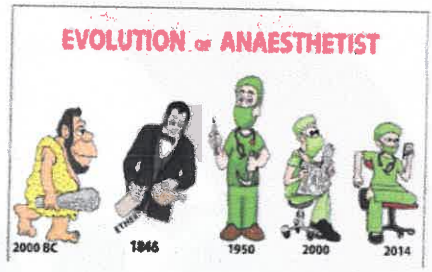
ANAESTHESIA

1. PRE-OPERATIVE ASSESSMENT





GENERAL ANESTHESIA | ANESTHESIA MACHINE & BREATHING CIRCUITS | CRITICAL CARE & CPR | LOCAL ANESTHETICS & REGIONAL ANESTHESIA

GENERAL ANESTHESIA-STEPS

PRE-OPERATIVE ASSESSMENT & PREPARATION → MONITORING → INDUCTION (iv agents) → BAG & MASK VENTILATION → INTUBATION (muscle relaxants) → MAINTAINENCE (inhaled agents) → REVERSAL & NM MONITORING → EXTUBATION & POST OPERATIVE CARE

Preoperative Assessment & Preparation

ASSESSMENT	PREPARATION
• Airway Assessment To prevent hypoxia induced cardiac arrest	• Control Of Perioperative Medications
• Risk Assessment	• Premedication • Preoxygenation

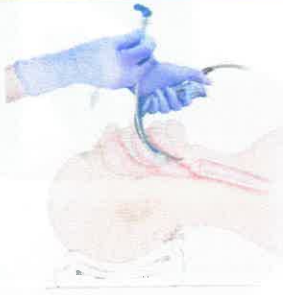
AIRWAY ASSESSMENT

Predictors of difficult bag & mask ventilation	Predictors of difficult laryngoscopy & intubation
OBESE	**LEMON**
O: Obese individual (BMI > 30kg\m2)	L: Look externally (facial trauma, large incisors, beard or moustache, large tongue, high arched palate)
B: Bearded individual	E: Evaluate 3-3-2 rule
E: Edentulous individual (no teeth)	M: Mallampati (Mallampati score ≥ 3)
S: H\O of Snoring (Obstructive Sleep Apnea)	O: Obstruction (epiglottitis, peritonsillar abscess, trauma)
E: Elderly (age > 55 years)	N: Neck mobility (limited neck mobility)






Bag & mask ventilation



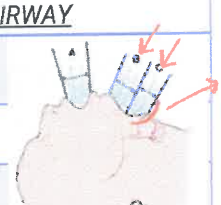
Laryngoscopy & intubation

EVALUATE 3-3-2

Tells Size of Sub-Mandibular Space

Position of Larynx in neck

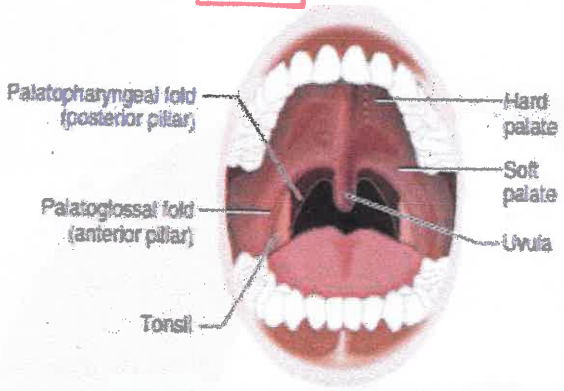
DISTANCE	CRITERIA FOR DIFFICULT AIRWAY
1:Mouth opening\ Interincisor gap Required for laryngoscopy	> 3 finger breadths <2 FB - (Inadequate)
2:Hyomental distance	> 3 finger breadths
3: Thyrohyoid distance	>2 finger breadths
4) TMD(Thyromental distance) (Patil's test)	Normal > 6.5 cms Abnormal < 6cms
5) SMD(Sternomental distance) (Savva's test)	Distance between manubrium sterni & chin Normal> 12.5 cms
BEST PREDICTOR OF DIFFICULT AIRWAY	



MALLAMPATTI CLASSIFICATION

Most Commonly used Airway Assessment Tool

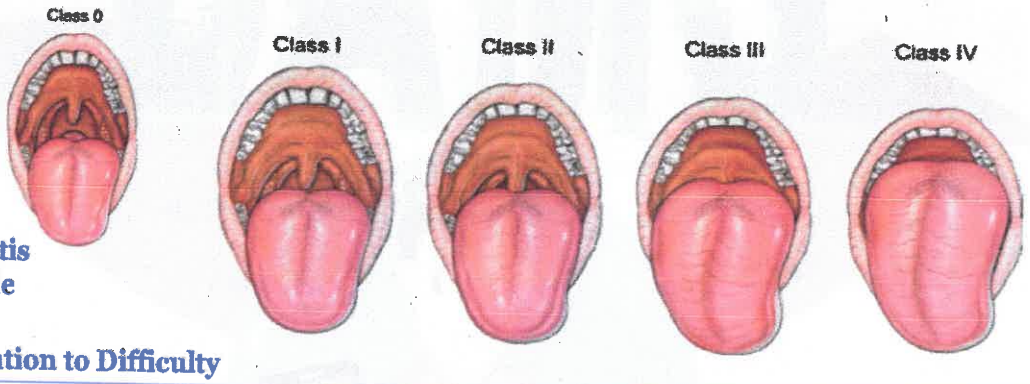
PUSH



Instructions to the patient
- Open the mouth wide
- Protrude tongue
- No phonation

ANATOMY ON MOUTH OPENING

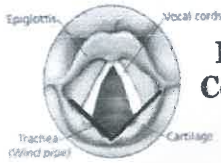
Measures: Relative size of Tongue with respect to Oropharynx



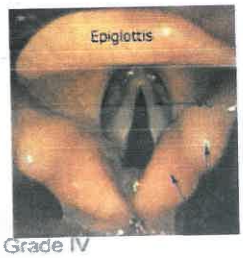
- Epiglottis is visible
- Rare
- No Relation to Difficulty

MALLAMPATI CLASS	I	II	III	IV
PILLARS	✓	Partial View	X	X
UVULA	✓	Tip is Missing	Only Base Visible	X
SOFT PALATE	✓	✓	✓	X
HARD PALATE	✓	✓	✓	✓
INTERPRETATION	EASY		DIFFICULT	

Cormack And Lehane Classification (Direct Laryngoscopy)

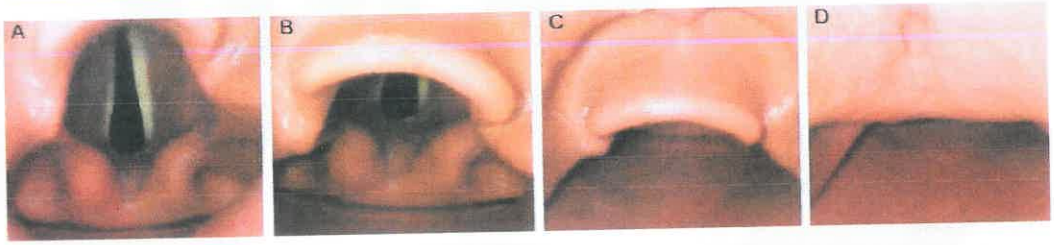


Posterior Commisure (PC)



Grade I | Grade II | Grade III | Grade IV

Epi/VC/PC	Predominant view of PC	Hanging Epi	No Glottic stucture Visible
EASY		DIFFICULT	

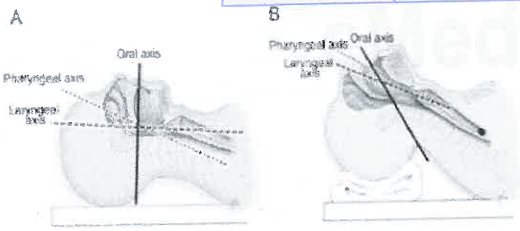


RANGE OF MOTION

Ring Pillow/ Doughnut.

IDEAL POSITION FOR INTUBATION

NAMES	Sniffing / Barking Dog	
Positions	Extension	Flexion
Joints involved	Atlanto-Occipital Joint	Lower Cervical Joint
Assessment	>35°	Chin can touch Sternum

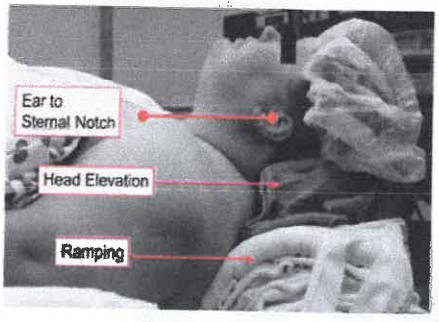


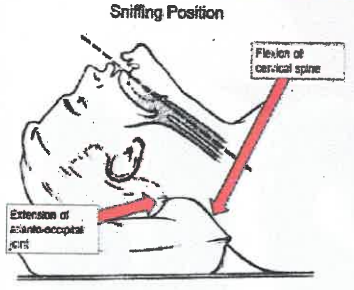
Aligns the axes to make laryngoscopic view better.

Modified Position

HELP (Head Elevated Laryngoscopy Position) \ RAMP Position (Neetq)

INDICATIONS	CRITERIA
- Obese	- Pillows under Neck and Shoulder.
- Patient with Large Breasts	- Ear in Line with Suprasternal Notch.





POST BURN CONTRACTURE (PBC) NECK

IMPORTANT POINTS

- Thyromental and sternomental distance are important predictor of difficult airway.
- Mallampati classification is most used but is a subjective scale.
- Class III & IV in both Mallampati and Cormack and lehane classification are suggestive of difficult airway3
- MPG 0 : epiglottis visible on mouth opening & cant comment about the difficulty of airway
- Ideal position of intubation (sniffing position) causes the 3 axes (oropharyngeal , laryngopharyngeal and visual axis)to come in same line thus making intubation easier.
- HELP (Head Elevated Laryngoscopy Position) \ RAMP position
- In obese patients, considerable shoulders and head elevation may be necessary so that an imaginary horizontal line connects the patient's sternal notch with the external auditory meatus.

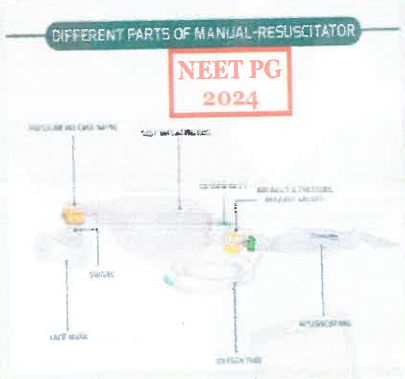
1.2 AIRWAY MANAGEMENT

Temporary			Permanent
Face mask	Airways	Endotracheal tube	Tracheostomy tube

- Face mask → **Bag & Mask ventilation**
- Airways → **OPA**, **NPA**, **SAD**
- Endotracheal tube, Tracheostomy tube → **Cuffed** → **Secure Airway/ Definitive Airway** ⇒ **Prevents Risk of Aspiration**


Bag & Mask Ventilation (BMV)

Bag = Artificial \ Manual Resuscitator \ AMBU Bag



Maximum FiO2 delivered: 100% O2

Volume of bag :
Adult : 1.5 L
Child: 500 mL
Neonate : 250 mL

Pressure at which pop off valve opens:
30 -40 cm of water

Face Mask

- Simplest and most non-invasive
- Administration of gas to the patient from the breathing system without introducing any apparatus into the patient's mouth.

- **Physiologically** : increase in dead space
- Decreasing order of dead space associated with different airway devices:

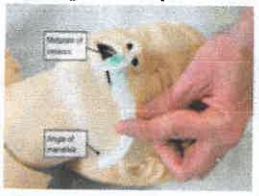
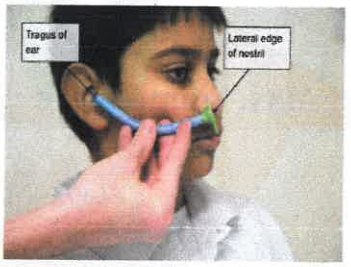
FACE MASK > SAD > ETT [Decreases Dead Space]

EXCEPT : Use of long ETT in a Preterm Neonate.

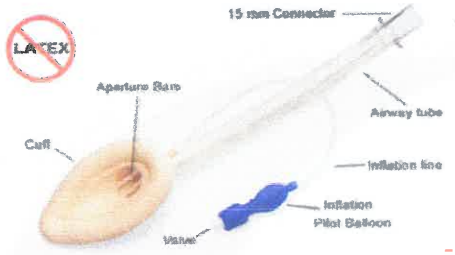
Drawback: Increased risk of aspiration
↓
Gastric Insuflation Of Air

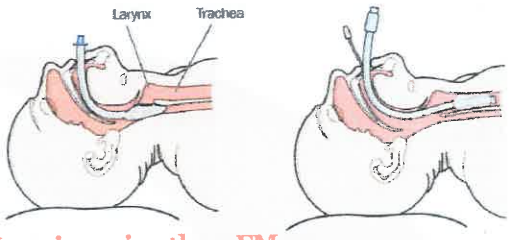
Oropharyngeal & Nasopharyngeal Airways

	  1. Opaque 2. No Marking 3. Doesn't have Connector	
Purpose:	Prevents Tongue Fall  	
A\k\a	Guedel's Airway	Nasal Trumpet
Material	Hard Plastic	Soft Silicon
USE	• Prevents tongue fall & biting • Prevents biting and occluding of an oral tracheal tube	• To apply continuous positive airway pressure (CPAP) • To dilate the nasal passages in preparation for nasotracheal intubation

Appropriate Size(neetq)	• Vertical Distance Between Angle Of Mandible & Central Incisor OR • Distance Between External Auditory Meatus To Angle Of Lip 	Tragus To Nose 
Advantages	• Easier to insert • Less traumatic	• Better tolerated in semi awake patients. • Preferable in loose tooth • Useful in restricted mouth
Disadvantages & limitations	• Pharyngeal and laryngeal reflexes should be depressed	• Risk of bleeding in patients on anticoagulation • A basilar skull fracture

SUPRA GLOTTIC AIRWAY DEVICE (SAD)\ LARYNGEAL MASK AIRWAY (LMA)\ EXTRAGLOTTIC AIRWAY DEVICE (EAD)





- More invasive than FM
- Less invasive than ETT

TECHNIQUE OF LMA INSERTION

Suppresion Of Airway Reflexes.

Max. Suppression : AOC= PROPOFOL

Ideal position of SAD: Q
Tip of the sad is in front of

ESOPHAGUS

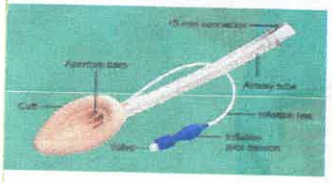
	ADVANTAGES OF LMA OVER	DISADVANTAGES OF LMA OVER
FACEMASK	. Better ventilation . Hands free operation . Less OT pollution . Can be used for longer time . No jaw pain	. More incidence of sore throat
ENDOTRACHEAL TUBE	. Less anesthetic requirement . No need of muscle relaxation . No damage to vocal cords . Useful even in difficult airways . Less post-operative sore throat . Easier to learn and insert	. Doesn't prevent the risk of aspiration . Not useful in distorted anatomy of upper airway

USES	CONTRAINDICATIONS
• As An Alternate To ETT	• Distorted Upper Airway Anatomy
• In Professional Singers	• Emergency Surgery\ Full Stomach Patients
• Difficult Airways (PLAN B)	
• Cpr	
• Short Surgical Procedures	
• Endotracheal intubation (without laryngoscopy)	

SAD – CLASSIFICATION

1ST GENERATION	2ND GENERATION
• Only ventilating tube in LMA design	• Ventilating tube + gastric drain tube
• Older device	• Newer device • Better protection against aspiration (not secure)
• Eg: LMA classic • LMA unique ↳ Disposable	• Eg: LMA proseal No particular shape • LMA supreme Anatomical • I Gel No Cuff

LMA – CLASSIC



Sizes Available: 8 (1,1.5,2,2.5,3,4,5,6)

Max Intracuff Pressure: 60cm of water

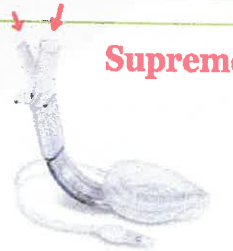
Most Common Size Used:
Adult male: 5
Adult female : 4
Child (30-50 kgs) : 3

- Special SAD \ Intubating LMA\ LMA Fastrach

Intubate Trachea

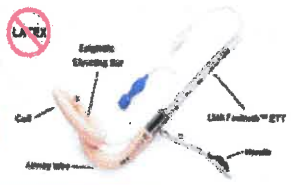
INDICATION- unstable cervical spine injury

LMN
Proseal



Supreme

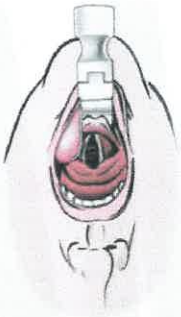
I-Gel

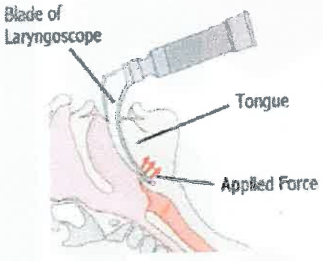


Laryngoscopes

Macintosh blade	Miller's blade
- Cuffed Blade - Adult - Most commonly Used	- Straight Blade - Pediatric Intubation

TECHNIQUE



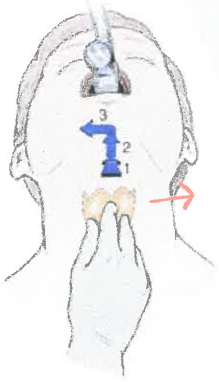


Holding Laryngoscope	Insertion	Applied force
Left Hand	Right angle of Mouth	Forward & Upwards

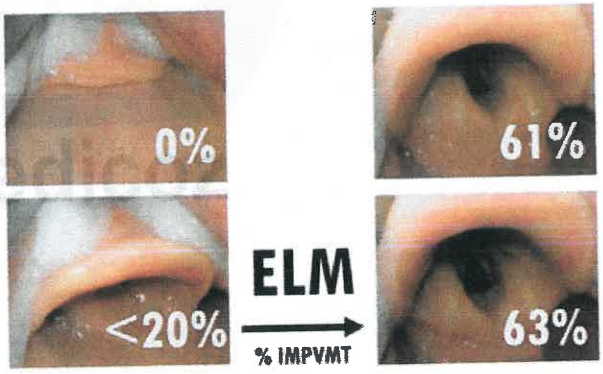
- Most Common Complication: **Trauma to Upper Central Incisors**

Backward, Upward, And Rightward Pressure (BURP) Maneuver\ Optimal External Laryngeal Manipulation (OELM)

- Maneuver to improve visualization of vocal cords during insertion



Thyroid Cartilage

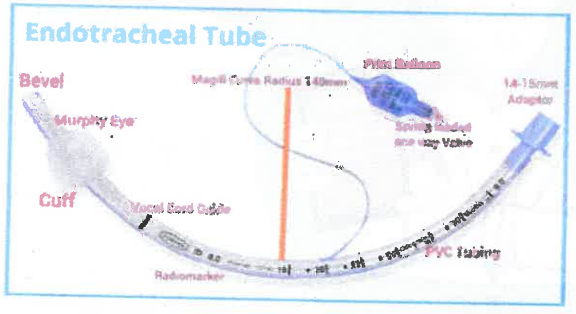


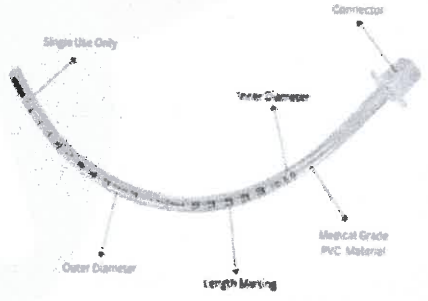
Difficult Airway Society (DAS) : Difficult intubation guidelines

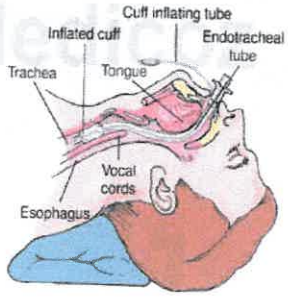
Anticipated difficult airway	Unanticipated difficult airway
Gold Standard : Awake Fibroptic Bronchoscopy guided Intubation	- Seen after Induction

PLAN	CONCEPT	ACTION
A	Facemask Ventilation & Intubation	Laryngoscopy & intubation
↓	(Difficult Airway)	
B	Oxygenation Using Sad	SAD insertion
C	Face Mask Ventilation	Final attempt at face mask ventilation & waking up the patient
↓	CICO - Can't Intubate Can't Oxygenate	
D	Front Of Neck Access	Emergency cricothyroidotomy

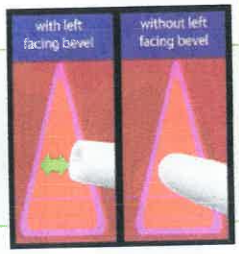
ENDO TRACHEAL TUBE





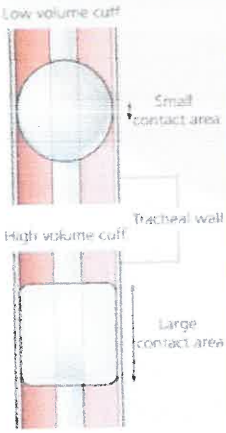


Parts of ETT

1: Murphy's Eye	2: Bevel (always faces left)	3: Cuff
(2nd opening in the wall of ett)	Oblique cut end of the tube	**USE** **1) Prevents Aspiration** **2) Prevents leak of Gases**
Murphy's Tube - Adult 		
Allows secondary ventilation route in case main lumen is blocked by carina\ secretions	Improves visualization of vocal cords during intubation (surest sign of intubation)  	
 **Pediatric Tube**		

CUFF TYPES

Sphere



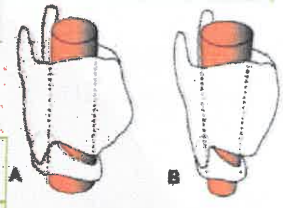
Cylinder

	LOW PRESSURE HIGH VOLUME CUFF	HIGH PRESSURE LOW VOLUME CUFF
Advantages	**Less R/O Tracheal Stenosis**	**No R/O Aspiration**
Disadvantages	**R/O Micro Aspiration**	**High R/O Tracheal Stenosis**
• Material • Max intracuff pressure • Volume of air for inflation	**PVC** **<25mmHg** **4-8 mL**	**Red Rubber** **Obsolete**

APPROPRIATE SIZE

Size description: internal diameter (mm) range : 2.5 to 10.5 mm ID , cuffed & uncuffed

Adult	Pediatric
Male : 7.5 to 9 Female: 7 or 7.5	Concept: pediatric larynx is conical in shape (Narrowest part: cricoid cartilage) **(Sub Glottic)**
Depth of insertion: **21-23 cm**	Uncuffed tube till 8 years of age **Prevent post Extubation Stridor**

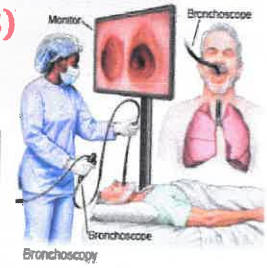


AGE	TUBE SIZE	DEPTH OF INSERTION
Preterm neonate	2.5\3 mm id	Size* 3 cms
Term neonate	3\3.5 mm id	Same
Upto 1 year	4\4.5 mm id	Same
After 1 year	(Age\4) + 4 mm id	(Age \2) + 12

Confirmation of placement: trachea\esophagus???

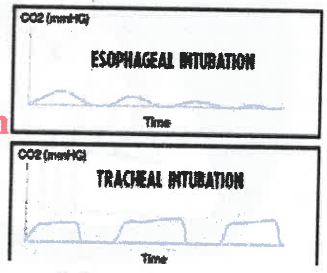
- SUREST SIGN: **Visualization of VC during Insertion.**

- GOLD STANDARD METHOD: **Fibroptic Bronchoscopy(FOB)**



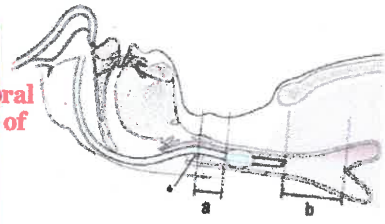
Bronchoscopy

- MOST COMMONLY USED: **Persistant Capnograph**



NASAL INTUBATION

INDICATIONS	CONTRAINDICATIONS	
• Restricted mouth opening	• Base of skull fracture	IntraCerebral Migration of tube.
• Oral surgeries	• Csf rhinorrhea	
• Cervical spine injury	• Bleeding tendency	R/O Bleeding
	• Nasal polyps	



COMPLICATIONS

At intubation	When the tube is insitu	After extubation
1. Trauma (Larynx>Pharynx> Esophagus)	Endotracheal Intubation	Sore Throat
2. Sympathetic Stimulation	- Rt> Lt - Diagnosis 1. Auscultation: U/L Breath sounds	
-↑HR & BP - Arrythmia -↑ICP & IOP - Cardiac Arrest	2.Gold Standard - FOB No Role : Capno	

IMPORTANT POINTS

- Facemask is simplest and most non invasive airway device
- Nasopharyngeal airway is useful in semi awake patients
- Appropriate size of oropharyngeal airway is by distance between angle of mandible & central incisor
- LMA is an airway device between facemask and endotracheal tube
- LMA classic is available in 8 sizes
- LMA size 4 is most common used for adult females and 5 for adult males
- Macintosh blade (curved) is the most common used blade of laryngoscope
- Most common injured structure during laryngoscopy is upper central incisor
- Most PVC endotracheal tubes have low-pressure high-volume cuff
- Age is a better criterion for tube size selection in paediatric patients
- Gold standard technique of confirmation of placement of ETT is fibreoptic bronchoscopy