

The Difficult Paediatric Airway



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Acute Care Education - Sydney – November 2015

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Introductions

No conflict of interest

Wrong room



Hostage



Shopper



Enthusiast



Elaine Bromiley



Most cardiac arrests
Secondary to hypoxia
(Excluding CHD)

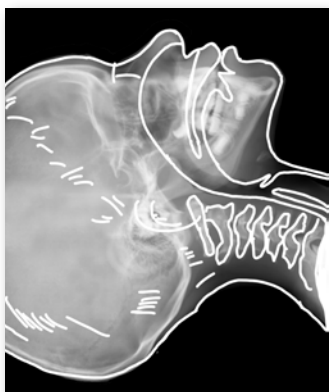
By the time the heart stops
the brain is damaged

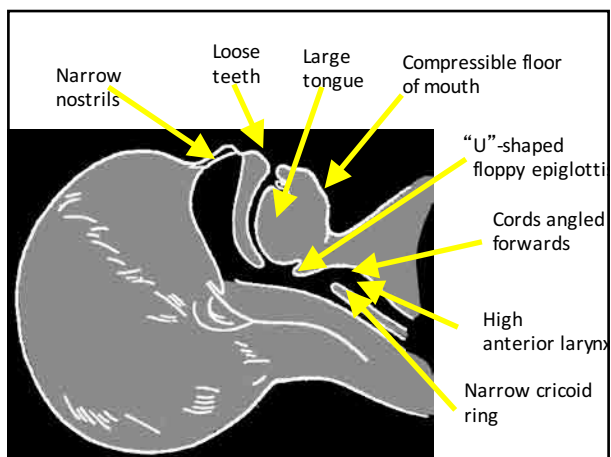
Skills

- assess ventilation
- bag and mask
- advanced techniques
- toys

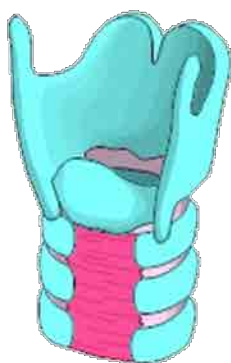
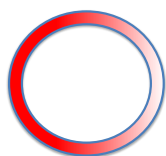


Paediatric Airways



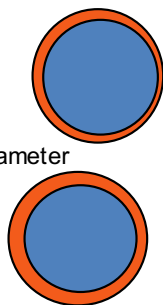


Cricoid Ring



Cricoid Ring in Adult

- Normal diameter 8mm
 - Oedema of 1mm leaves 6mm diameter
 - 44% cross sectional area lost
 - Resistance multiplied by 3X
- Hagen-Poiseuille Resistance = $1/\text{radius}^4$



Cricoid Ring in Infant

- Normal diameter 4mm
- Oedema of 1mm leaves 2mm diameter
- 75% cross sectional area lost
- Resistance increases by 16X !!!



Message

- Always have a leak around an un-cuffed tube
- Monitor the pressure in cuff of cuffed tubes



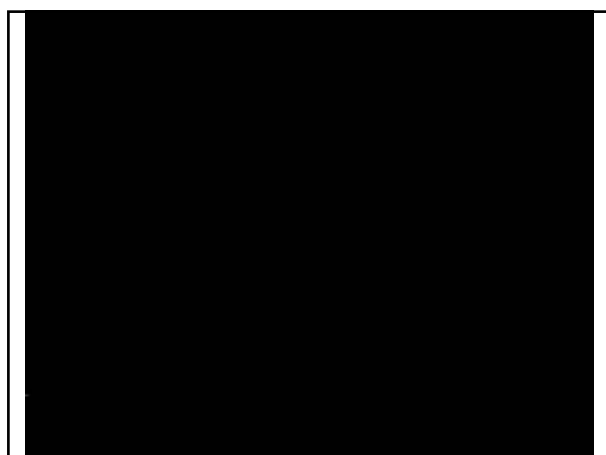
Compliant airways: Dynamic airway closure

- Inspiratory stridor
extrathoracic obstruction
eg. Epiglottitis, croup,
laryngo-, tracheo-, malacea
- Expiratory stridor
intrathoracic obstruction
eg Asthma
- During severe or combined obstruction,
stridor may be present through out the respiratory cycle.
eg severe croup



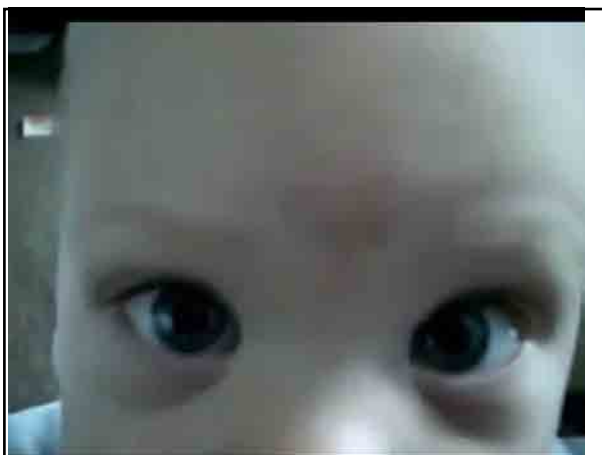
Croup
Inspiratory
Extrathoracic obstruction

<https://www.youtube.com/watch?v=1Enq2BvX9aw>



Wheeze
Expiratory stridor
Intrathoracic obstruction

<https://www.youtube.com/watch?v=ZS-PJ9jlpFw>



Diaphragmatic breathers





- Compliant chest wall
 - Ribs: soft, horizontal
 - Major excursion is diaphragm
- BUT**
- Large liver & spleen
 - Gastric distension

“Auto-PEEP”

- Neonates create their own PEEP during normal breathing
- You need to add CPAP while assisting their ventilation
- In particular, if they are intubated

Respiratory Physiology: Desaturate quickly

- Oxygen consumption doubled
– neonate 4-6 ml/kg...adult 2-3 ml/kg
- CO₂ production doubled
- Ventilation doubled
- Tidal volume per kilo constant 7 ml/kilo
- Therefore rate doubled

	O_2	
	CO_2	
	Ventilation	
	Rate	

Summary: Physiology & Anatomy

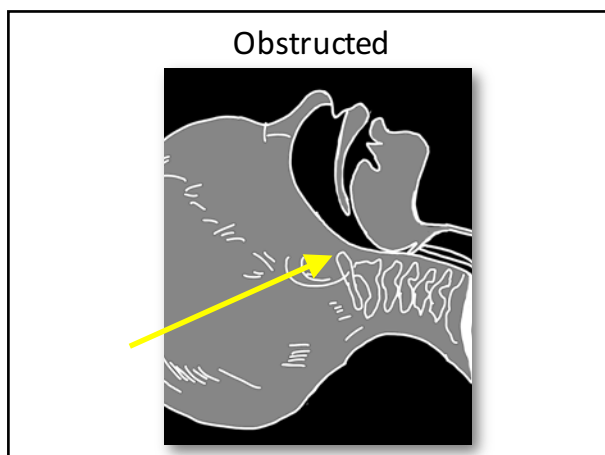
Children go BLUE quicker

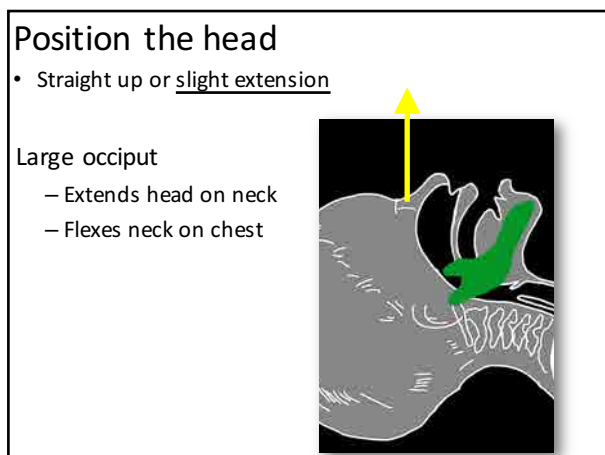
Recognition of airway obstruction

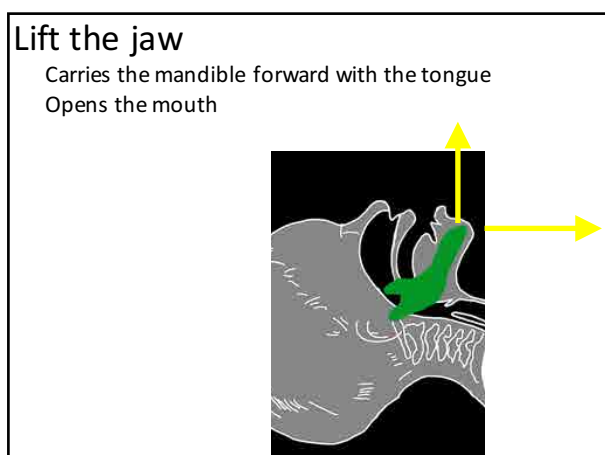


Intervene

- Finding the airway
- Bag and mask ventilation
- Endotracheal intubation
- Clever stuff







1. Airway 1st
2. Then O2 Mask
3. Then CPAP









Bag & Mask

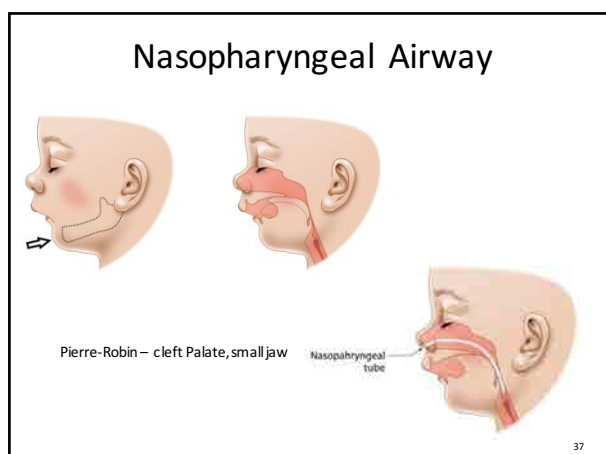
- Good seal with mask
- Insert Guedel airway if obstructed
- Be gentle - being heavy handed will squash nose and push tongue back
- Don't press on soft tissues of neck
- NG tube if stomach distended
- Squeeze bag sufficiently to inflate chest

Oral Airway Insertion

Size: - incisor to angle of mandible



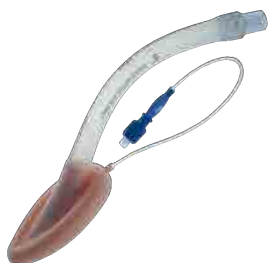
Wrong size easily causes obstruction
Insert forward (Not backwards and rotate)







Laryngeal Mask Airway














Intubation

- BAG WITH OXYGEN FIRST
- Neonate
 - Head in neutral position
 - Straight blade down centre of tongue
 - Lift the epiglottis
- Child
 - May need folded towel under head
 - Curved blade down right side of tongue
 - Lift the base of tongue
(Blade in vallecula fossa)

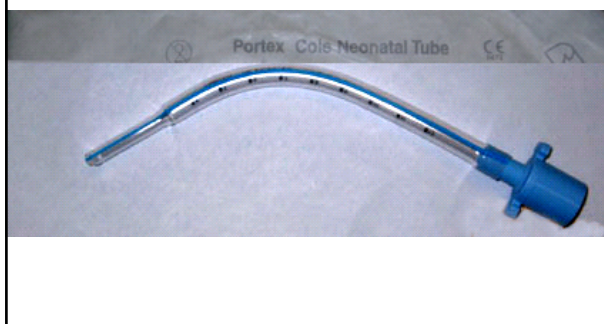




Paediatric Endotracheal Tubes

- Do not usually have cuffs
- Always have a leak
- If it won't go, don't force it
- Lubrication not required (unless cuffed)
- Size = $4 + \frac{\text{age}}{4}$ (Internal Diameter)
- Length = $\frac{\text{Age}}{2} + 12$ cm



Coles Tube



Confirming ET intubation

1. See it go through the cords
2. Chest movement – clavicals
3. Listen, armpits and stomach
4. Fogging – unfogging
5. Oximetry
6. End tidal CO2

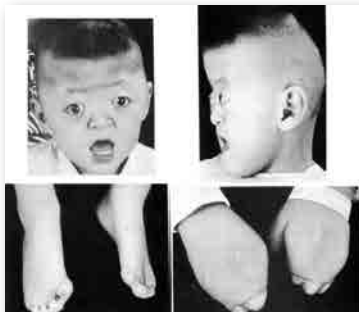


The difficult paediatric airway

Why do we need a different approach to the airway and intubation in children?

- Not cooperative & frighten easily
- NEED TO BE ASLEEP before we intubate then
 - Difficult to ventilate, easy to intubate
 - Easy to ventilate, difficult to intubate
 - Difficult to ventilate, difficult to intubate

Difficult to ventilate, easy to intubate



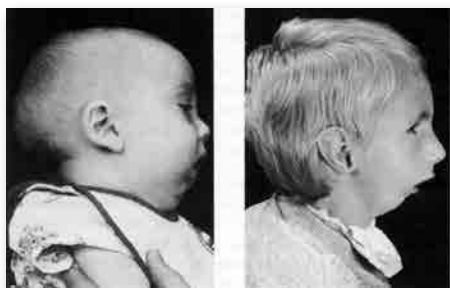
Apert's
Syndrome

Easy to ventilate, difficult to intubate

- Hemifacial Microsomia
- Goldenhar syndrome



Difficult to ventilate, difficult to intubate



Pierre Robin

Difficult to ventilate, difficult to intubate

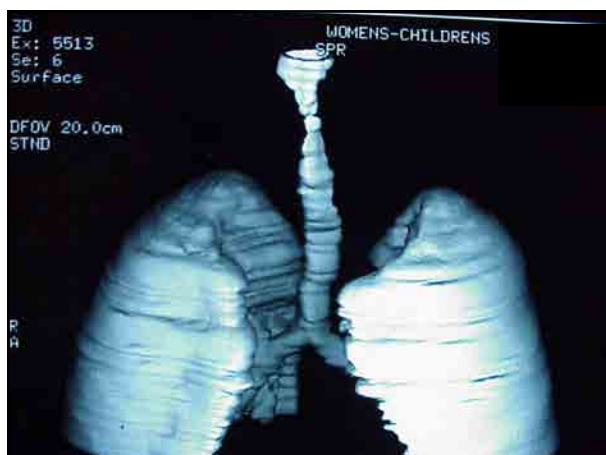


Treacher Collins



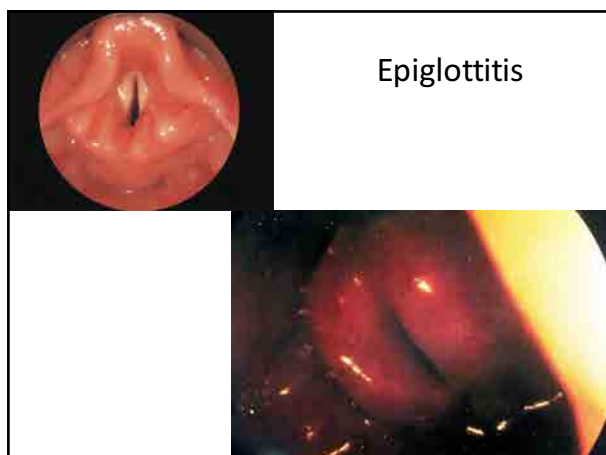


Mucopolysaccharidosis









Epiglottitis

Managing the difficult intubation

Equipment
Skills, techniques
Protocols

Situation awareness
Leadership
Communication
Teamwork
Decision Making



The **STEP** of situation awareness

- **S**tatus of Patient
- **T**eam: skills
- **E**nvironment: necessary equipment
- **P**lan A, Plan B
 - know the plan, share the plan, review the risk

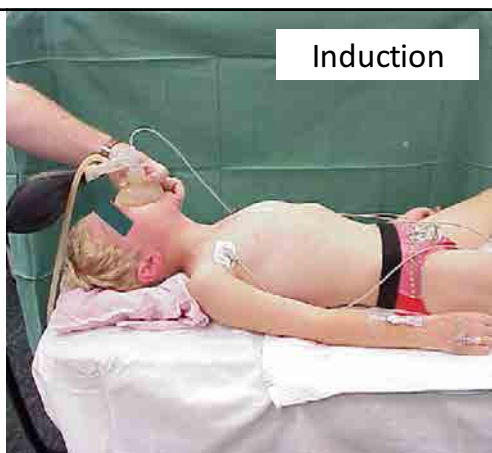
Fibre-Optic



Fibre-optic intubation through LMA



Induction



Securing the airway: 1



Local anaesthesia

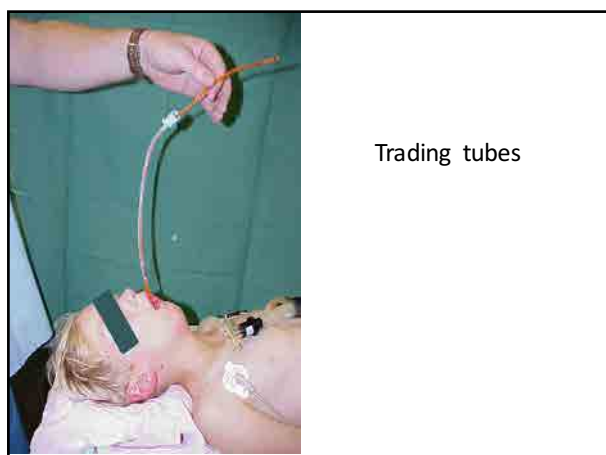


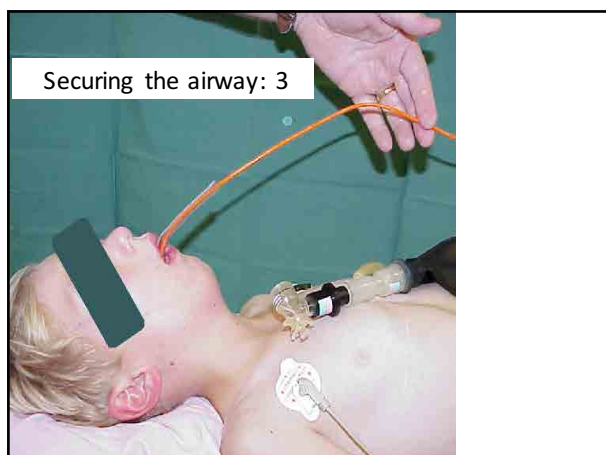
The scope





















Don't Panic

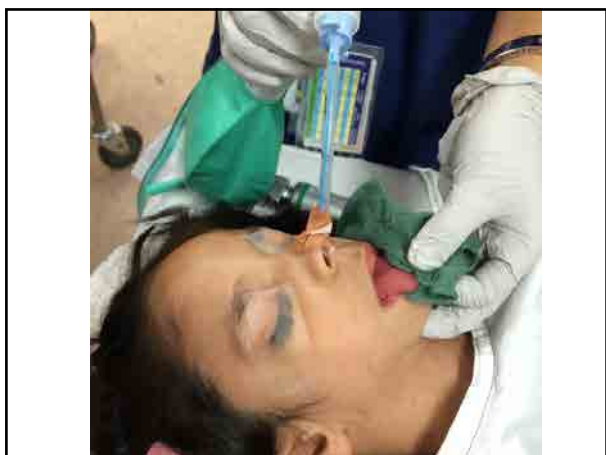
Options...



Stabilised... what next?

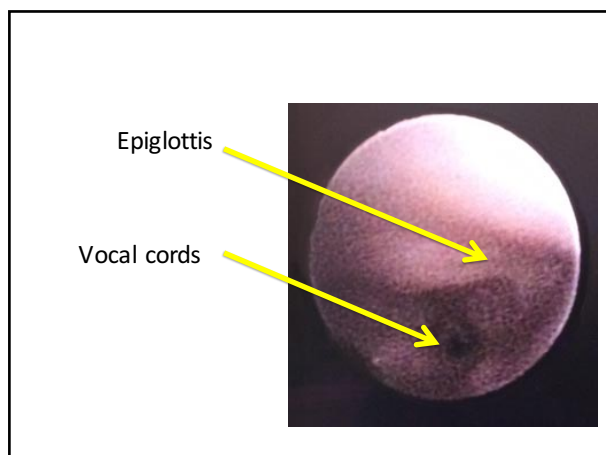
Local Anaesthetic to larynx

Co-phenylcaine to nose

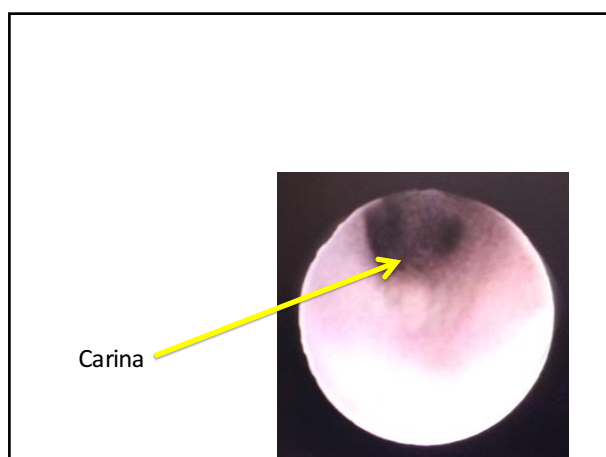






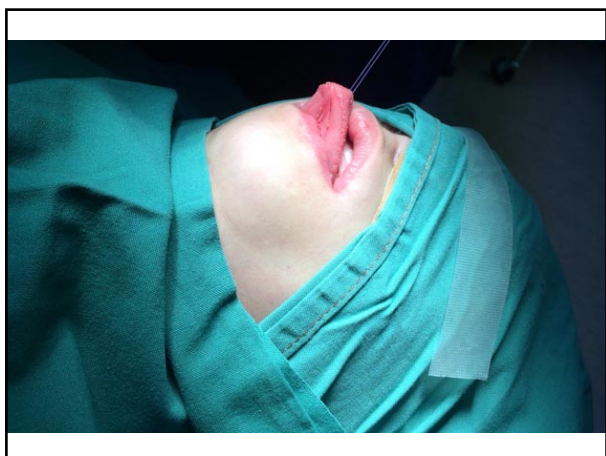


















Bonfils









