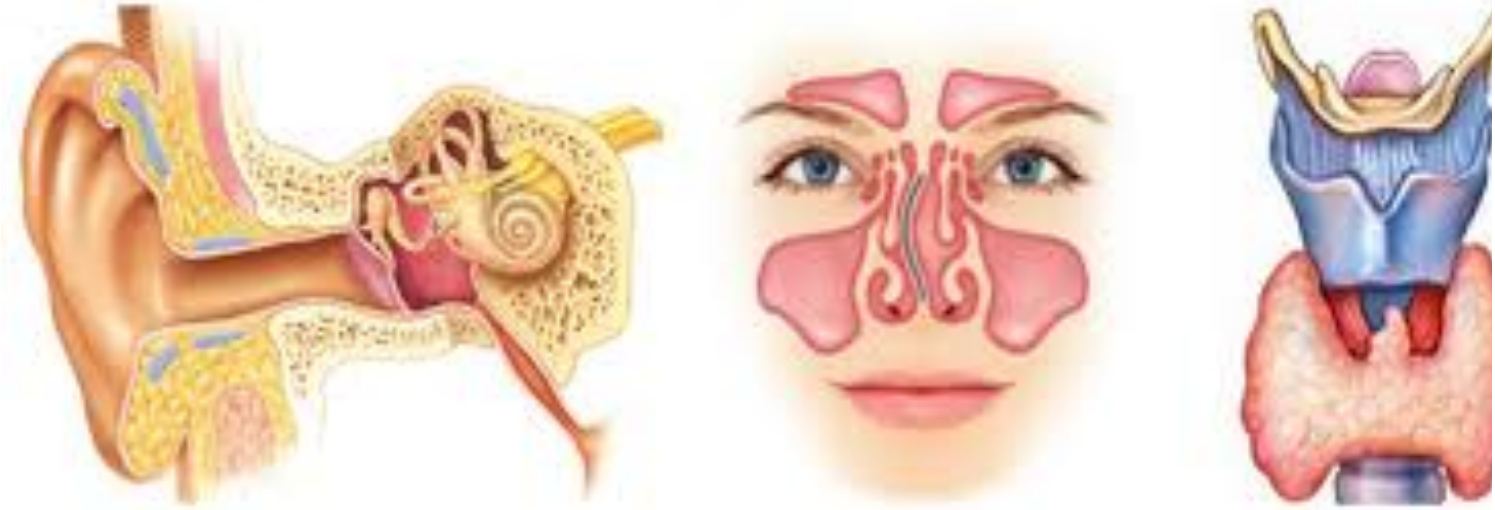
430 Teams

Diseases of the Ear, Nose and Throat



Hadeel AlMadany

1st Lecture:

Airway Obstruction

Done by: Seham Alarfaj

The slides were provided by doctor (Manal Bukari)
Important Notes in red
Copied slides in black
Your notes in green/ blue
Titles and subtitles in this color
Highlight possible MCQs mentioned or pointed by the doctor

2 Airway Obstruction

Objectives:

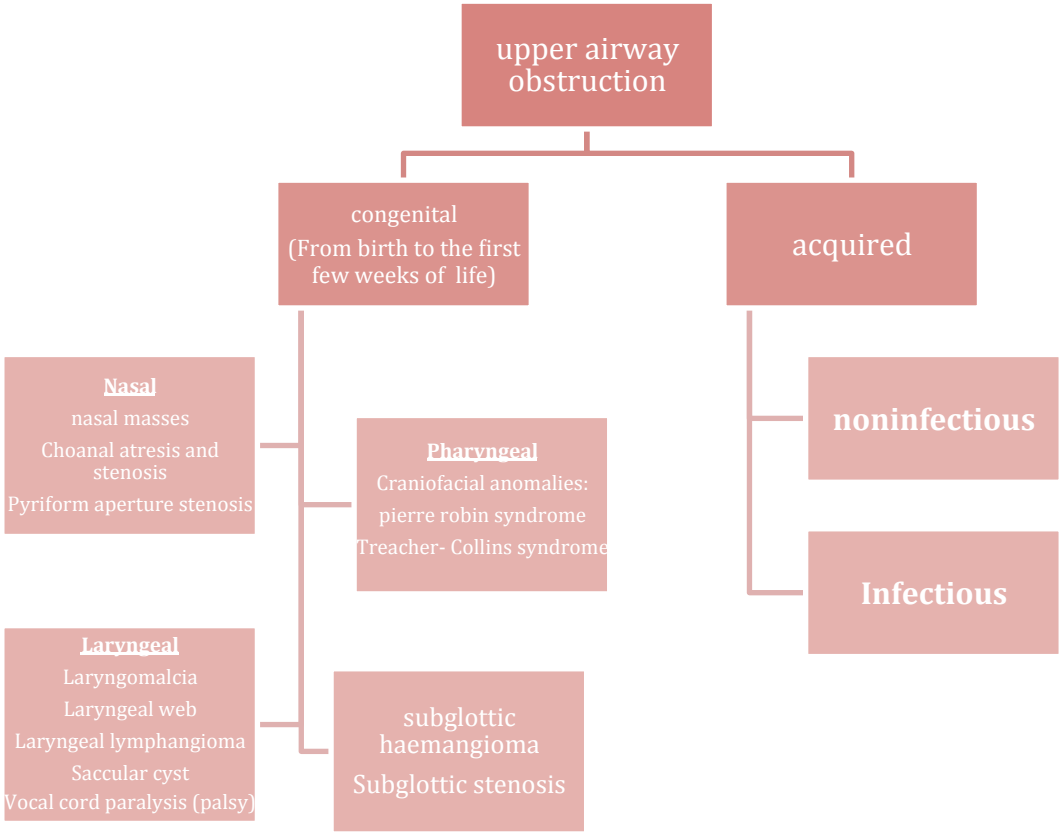
Airway Obstruction I:

- Causes of airway obstruction (congenital and acquired)
- Signs and symptoms

Airway Obstruction II:

- Investigation of airway obstruction
- Radiology illustration
- Medical and surgical treatment
- Operations (indication, procedure and complication) tracheostomy, cricothyroidectormy, intubation, choanal atresia repair etc..

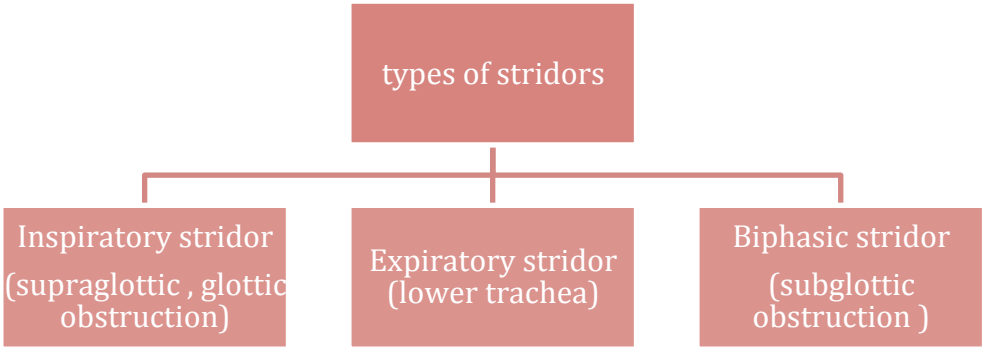
The Upper airway extended from the nares and lip to the subglottic area



Q: 3 years old child who has stridor for 3 weeks, what is stridor? And what's the difference between it and snoring?

Stridor is a high-pitched wheezing sound resulting from turbulent airflow in the upper airway. Stridor is a physical sign, which is produced by narrowed or obstructed airway path

Type of stridor:



e.g: inspiratory stridor in started after birth think about laryngomylacia
Biphasic stridor in started after birth: subglottic stenosis, subglottic hemangioma

Snoring: is low pitch sound caused by tissue vibration of the nasopharynx pharynx and soft plate due to obstruction above the larynx.

Nasal obstruction:

Neonates are obligatory nasal breather
In neonate Cyanosis improved with crying but worsens on feeding (cyclical cyanosis)

1. Nasal masses:

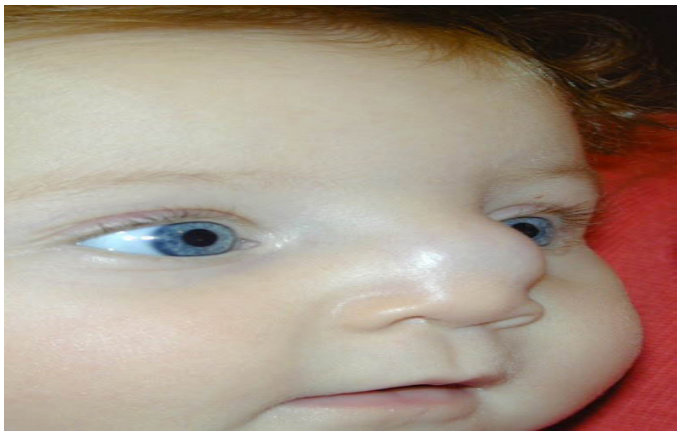
Types:

- Cystic (meningoencephalocoele,)
- Solid (glioma, hamartoma ,teratoma ,and lymphangioma)

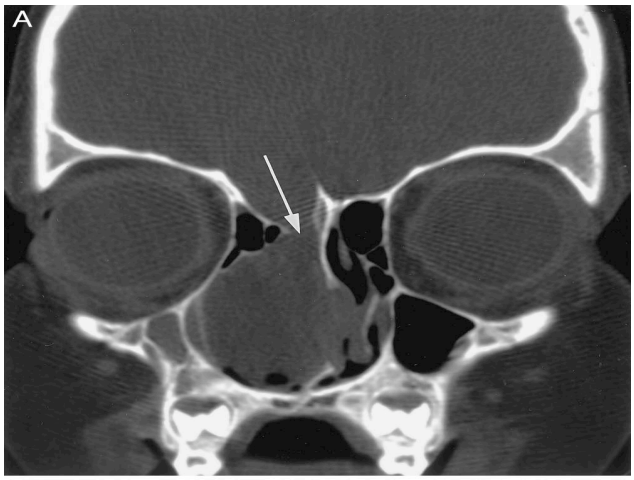
Diagnosis: CT scan and MRI (better in visualizing soft tissue)
Don't take biopsy before imaging studies

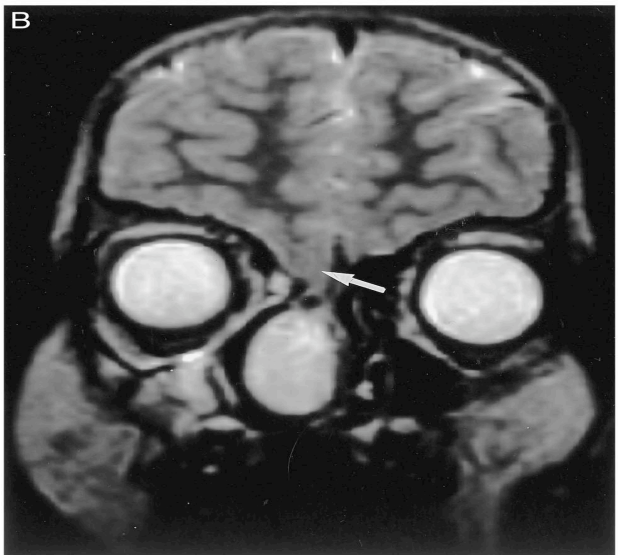
Cystic	Solid
Meningoencephalocele	Haemangioma
Meningocele	Neurofibroma
Dermoid cyst	Glioma
Epidermoid cyst	Lymphangioma
	Neuroblastoma
	Craniopharyngioma
	Rhabdomyosarcoma
	Chordoma

4 Airway Obstruction



Differential diagnosis: dermoid, meningoenchephalocele





A: coronal CT scan showing homogenous mass in the right nostrils (arrow)
B: MRI shows communication
(Homogenous = all the same color)
Every exam contain CT scan sinus (homogenous opacification of sinus = fluid, polyp)
(Heterogeneous with spiking = fungal or malignancy)

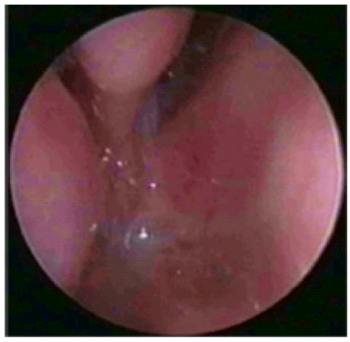
2. Choanal atresia:

- Lack of patency of posterior nasal aperture
- Bilateral atrasia presents soon after birth with sever respiratory distress
- Unilateral atrasia may undiagnosed until later in childhood (rhinorrheoa)

Q: What is the commonest cause of unilateral nasal obstruction and nasal discharge in pediatric?
A: Foreign body (purulent, foul smelling discharge)

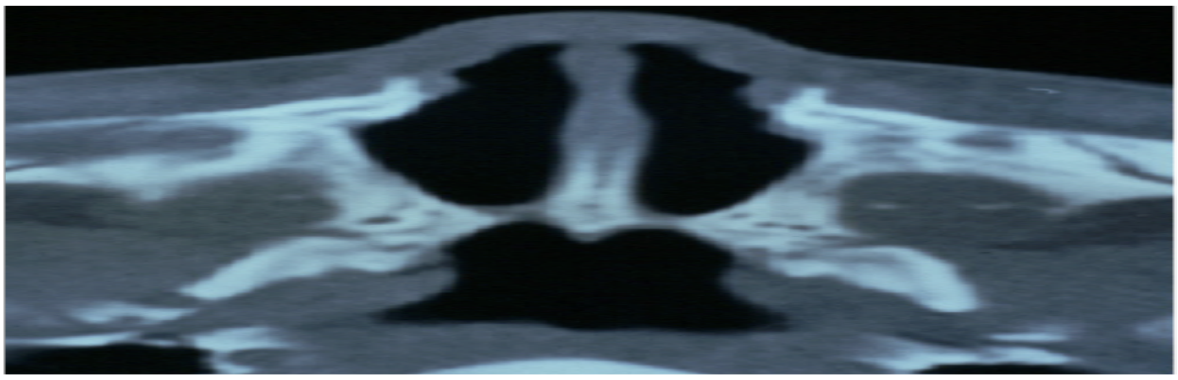
Types:

1. Membranous 10%
2. Bony
3. Mixed

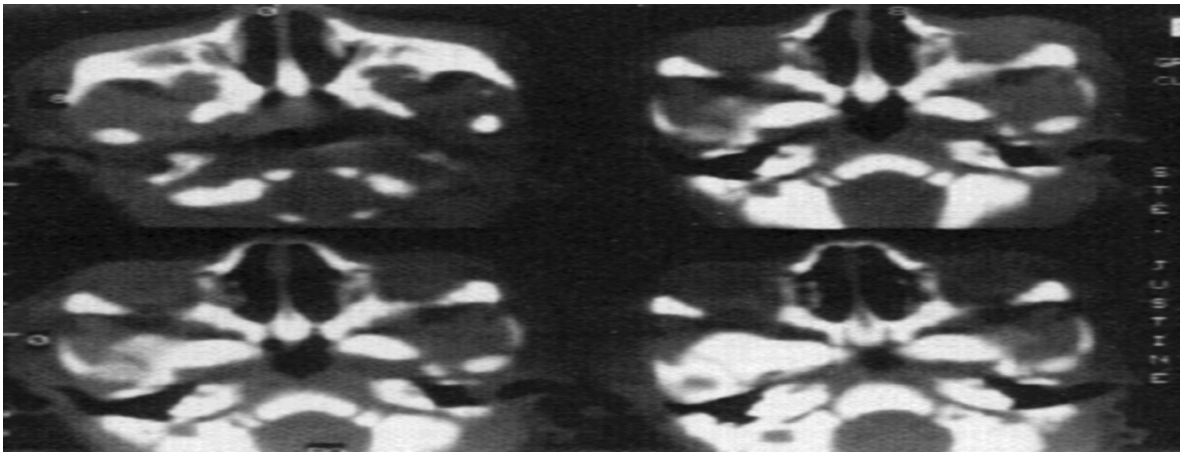


Diagnosis:

- Cyanosis improved with crying
- Inability to pass size 6 French catheter
- Do CT scan to differentiate between the subtypes



A 3 wks old baby presented with cyanosis and difficulty breathing since birth
An axial CT scan showing bilateral membranous choanal atresia (membranous=grey, white=bone)



An axial CT scan showing bilateral mixed choanal atresia (not important to pick the subtype from Ct scan as long as you can identify the choanal atrsia)

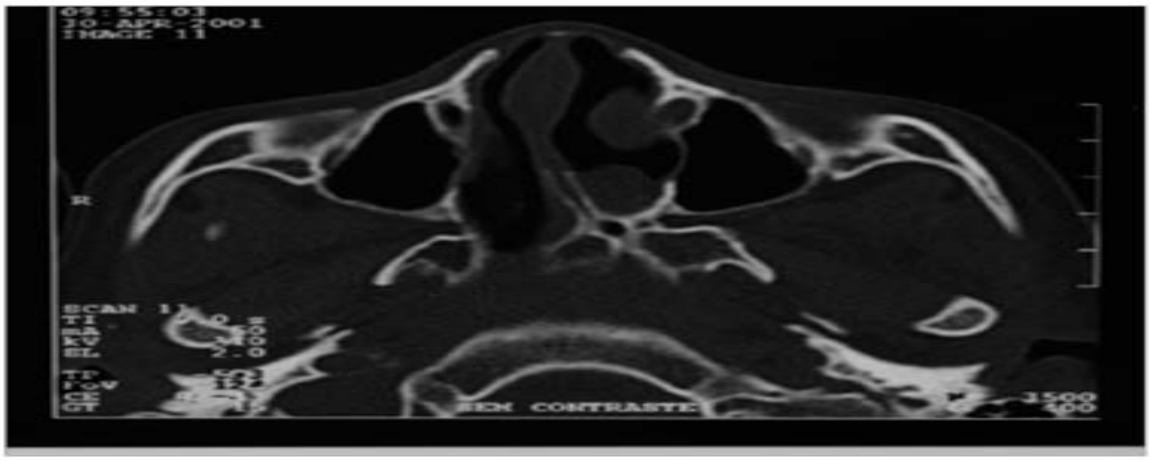
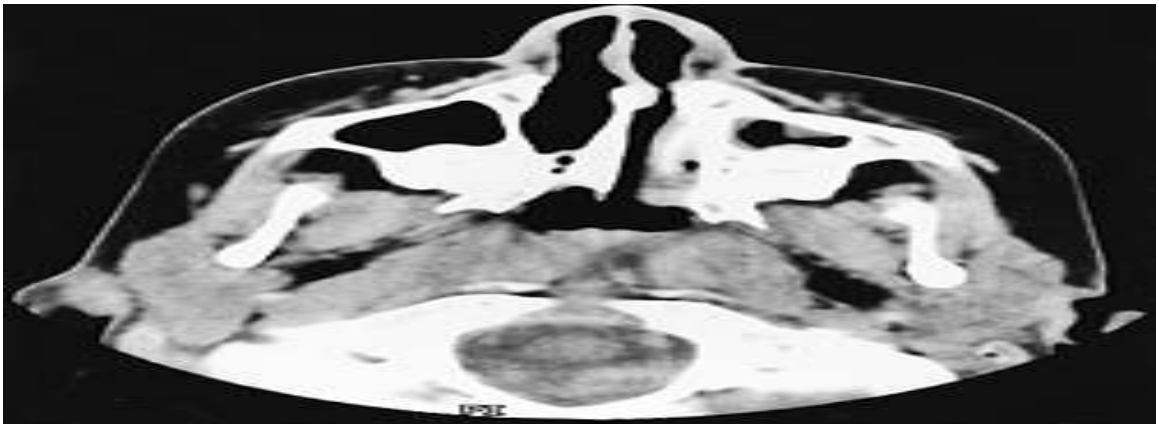


Figure 1. A case of left side choanal atresia and symmetrical maxillary sinuses and no sinus disease.



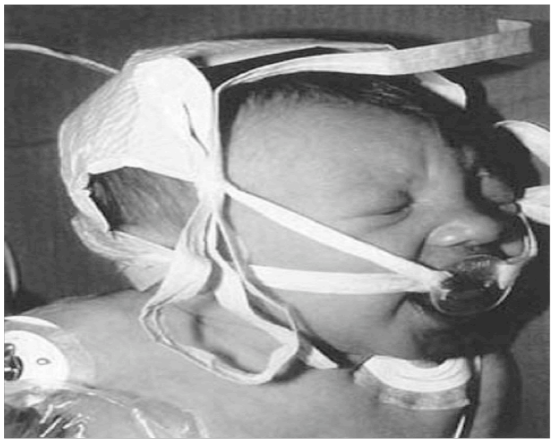
An axial CT scan showing unilateral bony choanal atresia

70% of choanal atrasia associated with CHARGE:

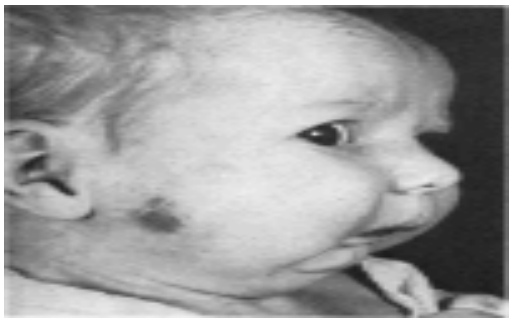
- C: coloboma (is a hole in one of the structures of the eye, such as the iris, retina, choroid or optic disc)
- H: heart disease
- A: atrasia
- R: retarded growth
- G: genital hypoplasia
- E: ear deformity

Treatment:

- Emergency treatment is by insertion of oral tube
- Surgical treatment is by either transnasal or transpalatal choanal atrasia repair (different techniques but now a days it is done endoscopicaly)



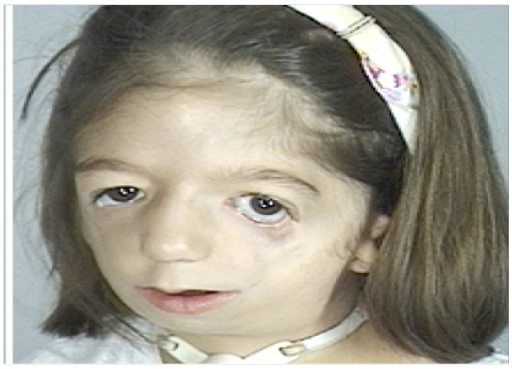
Pharyngeal obstruction:



Craniofacial anomalies:

1. Pierre –Robin syndrome:

Glossoptosis (airway obstruction caused by backwards displacement of the tongue base), micrognatheia (small lower mandible) (causes narrowing of the airway), cleft palate



2. Treacher- Collins syndromes:

(Mandibulofacial Dysostosis is a disorder of the development of bone, in particular affecting ossification.)
Narrow nose high arched palate

If the baby was born with a syndrome sometimes he needs intubation or even tracheostomy

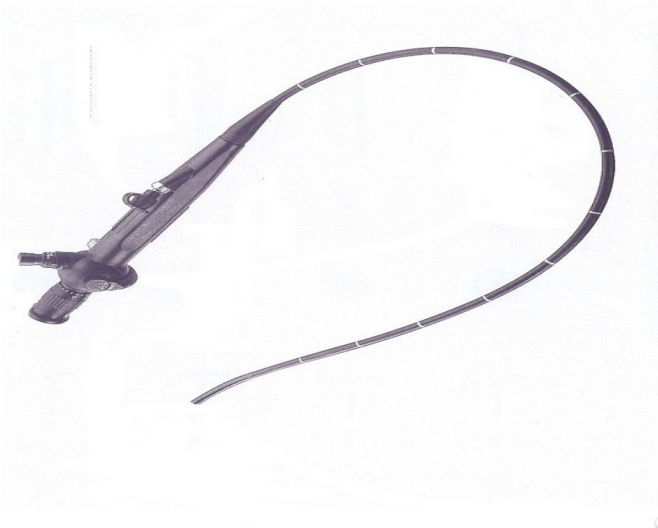
Laryngeal:

1. Laryngomalcia:

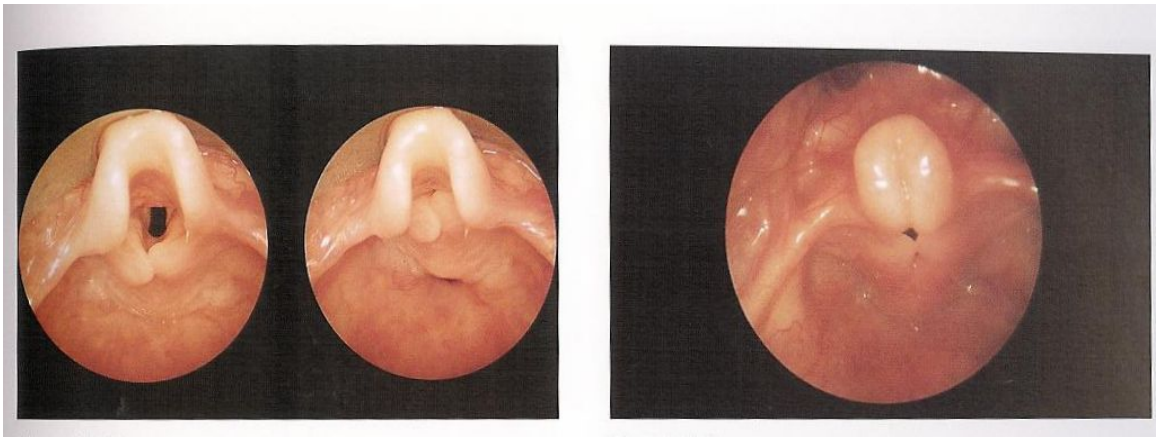
The most common cause of congenital airway obstruction
The most common cause of stridor in infancy
Cause: immaturity of the cartilage, associated with inward and forward arytenoid when child breaths with short aryepiglottic folds.
Symptoms:

- Stridor in the first weeks of life in the inspiratory phase
- Worse with crying, feeding, and respiratory tract infection (leading to failure to thrive)
- Improved in prone position

Diagnosis: flexible fibrotic endoscopy while the child is awake to see the pattern of breathing



Name this instrument and its indications?
Flexible fibroptic
Examination of nose, nasopharynx, oropharynx, hypopharynx, biopsy



Endoscopic finding:

- ❑ Tall ,omega shape epiglottis
- ❑ Inward forward movement of arytenoid mucosa (sucked)
- ❑ Short aryepiglottis fold

Treatment:

Mild cases: (no cyanosis and not effecting the child growth):

Observation spontaneously subside by 12 to 18 months in 90% of cases

Sever cases:

1. supraglottoplasty ,
2. Tracheostomy

2. Vocal cord paralysis:

Nerves that supply the vocal cords are superior and recurrent laryngeal nerves

Can be unilateral or bilateral ,congenital or acquired

Congenital form may associated with abnormality of the central nervous system (Arnold Chiari syndrome) or cardiovascular anomalies

Symptoms:

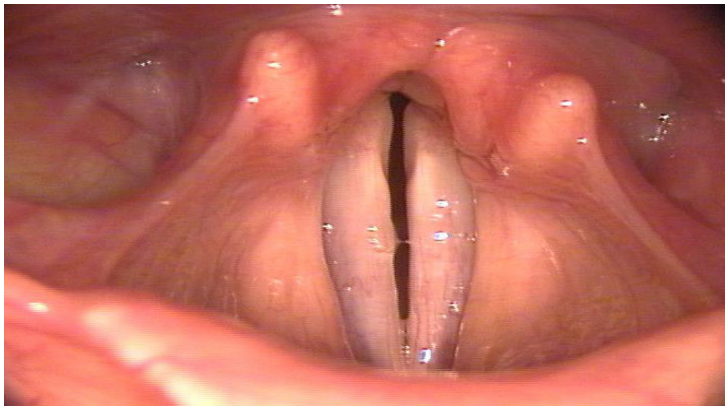
High pitch inspiratory stridor (level of glottis)

Treatment:

Tracheostomy in sever cases

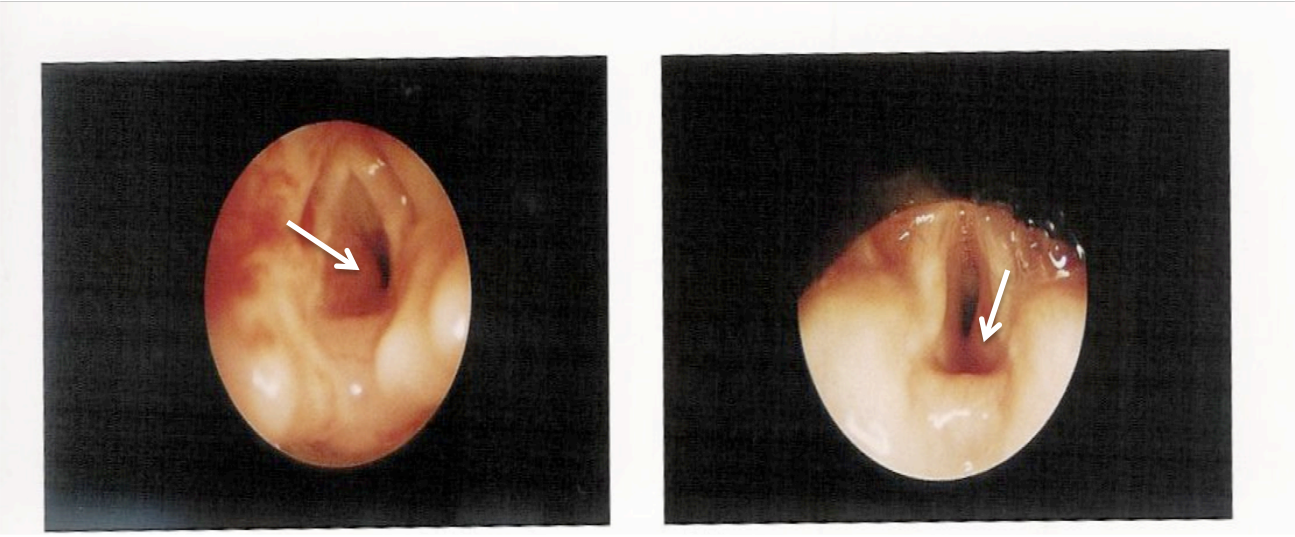
Spontaneous recovery occurs in half patients

Surgical intervention postponed until the patient become old **Vocal cord lateralization,** arytoidectomy and laser cordotomy



False vocal cord (vestibular fold, ventricular fold) between the true and false vocal cords we have a groove called (vestibule or saccule)

3. Subglottic haemangioma:



Congenital vascular lesion

Not present at birth but grow rapidly over the first few months of life

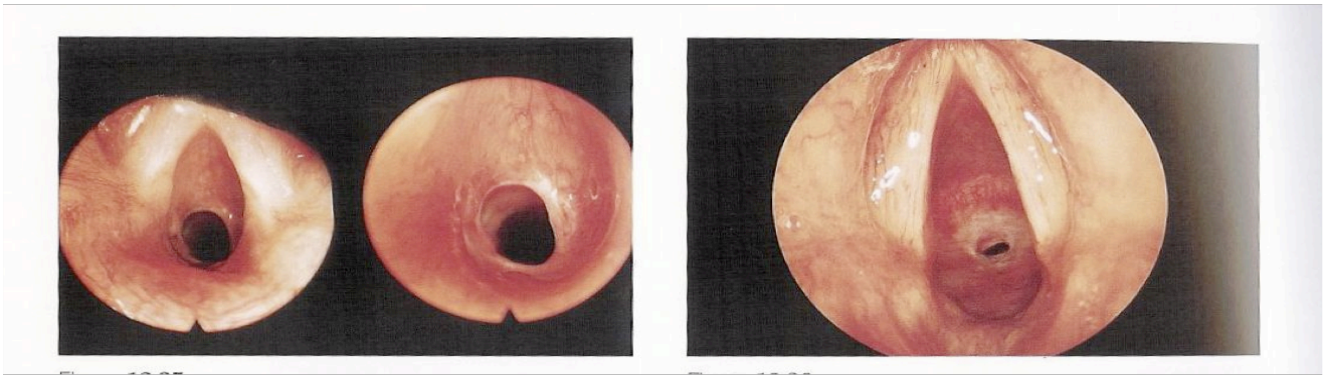
Symptoms:

- Biphasic stridor
- Tend to involute slowly after one year
- 50% of the patients have cutaneous haemangioma in the head and neck

Treatment:

Systemic steroid, interlesional steroid, **Propranolol (new treatment),** laser ablation tracheostomy if not improving

4. Congenital subglottic stenosis:



Subglottic area is the narowest area in the airway (cause it is at the level of cricoid cartilage which is a complete ring), stenosis if the diameter less than 4 mm in term infant

Symptoms: depend on the degree of stenosis

- Biphasic stridor
- Respiratory distress
- Recurrent/prolonged croup

Diagnosis:

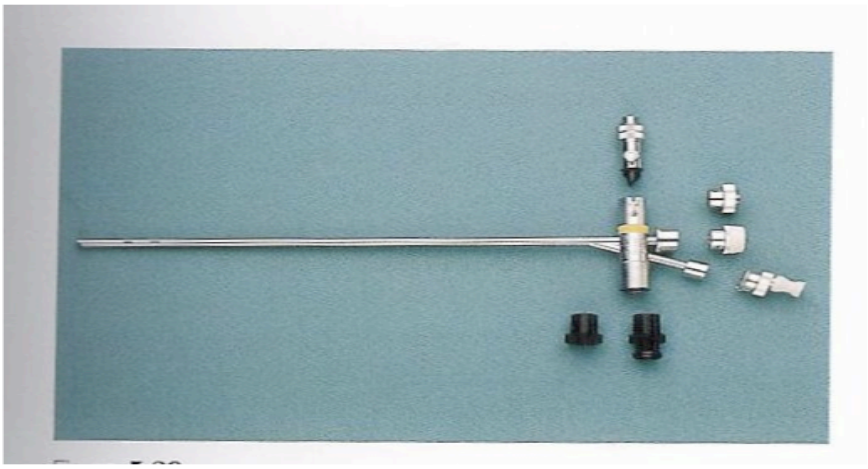
- Bronchoscopy: to grade the stenosis
- plain xray HKV (high kilo voltage x-ray: start with lateral x-ray to see narrowing of the air column)

New grading system starts from 70%:
Grade I: 70%
Grade II: 70-90%
Grade III: 91-99%
Grade IV: no detectable lumen

Treatment:
Depend on the degree of stenosis:
Grade I&II: endoscopic balloon dilatation
- Tracheostomy
- Laser excision (if soft tissue)

Grade III&IV: Laryngotracheal reconstruction (LTR) (if cartilage)
Criocotracheal resection (CTR)

- The maximum percentage of airway obstruction is determined and assigned a grade:
- Grade I <50% obstruction
- Grade II 51-70% obstruction
- Grade III 71-99% obstruction
- Grade IV no detectable lumen

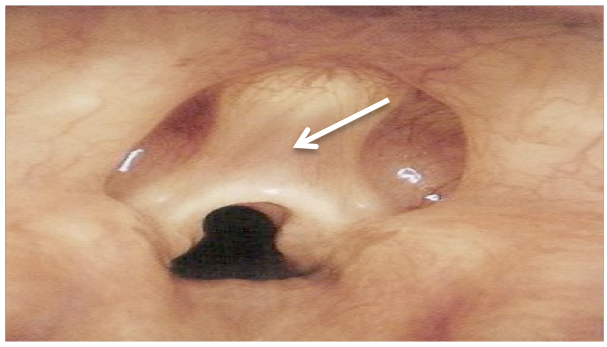


Instrument's name: bronchoscope
Indications: foreign body removal, biopsy

5. Laryngeal web:

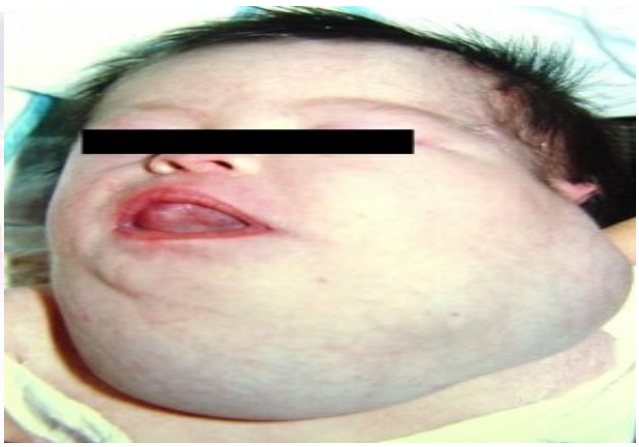
Symptoms depend on the grade of stenosis:
- ❑ Week cry
- ❑ Stridor

Treatment: **endoscopically**
- ❑ Laser excisions
- ❑ Trachestomy



Extratracheal compression:

1. Cystic hygroma (lymphangioma)



Definition: lymphatic malformation arising from vestigial lymph channels of neck
Clinical features:

- Usually present by age 2
- Thin walled cyst extending from floor of mouth to mediastinum, in posterior triangle or supraclavicular area
- Painless, soft, compressible
- Infection causes a sudden increase in size

Diagnoses: intranatally by ultrasound
Treatment: surgical excision (debulking) if it fails to regress- difficult dissection duo to numerous cyst extensions cystic hygroma is consisting of lobulated masses when they open one another one appear

Acquired upper airway obstruction

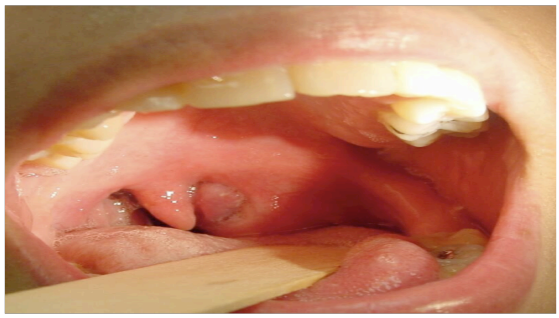
acquired upper airway obstruction are more common than congenital type
Subglottic area is the narrowest area
Causes:
Infectious

1. Peritonsillar abscess
2. Retropharyngeal abscess
3. Epiglottis
4. Croup
5. Bacterial tracheitis

noninfectious

1. FB aspiration
2. acquired vocal cord paralysis
3. Acquired subglottic stenosis
4. adenotonsillar enlargement
5. respiratory papillomatosis
6. malignancy
7. Angiodema
8. cautsic ingestion
9. trauma
10. laryngospasm

Q: patient have sore throat, fever, took antibiotics but didn't improve and it is getting worse with mass inside his throat, trismus
A: Peritonsillar abscess (quinsy)



1. Peritonsillar abscess (Quinsy):

Common deep infection in late childhood
Definition:
Cellulitis of space behind tonsillar capsule extending onto soft palate leading to abscess
Symptoms: low grade fever, sever sore throat, muffled voice (hot potato voice), drooling, trismus

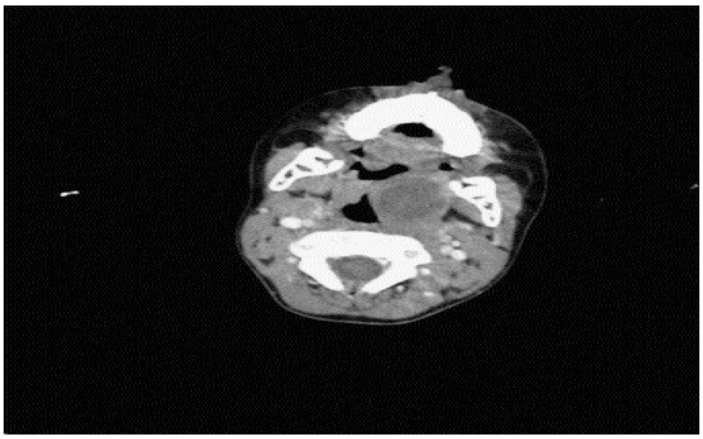
Diagnosis:

- Clinical diagnosis
- CT scan

Treatment:

- Aspiration
- Excision and drainge
- Later tonsillectomy
- IV ABX

The difference between tonsillitis and quinsy: in quinsy the soft palate bulge while in tonsillitis the tonsils themselves are enlarged



Axial CT scan the arrow shows a mass compressing the airway

Complication:

Retropharyngeal and parapharyngeal abscess

Parapharyngeal space is divided by styloid into two parts pre and post styloid. The post styloid contains cranial nerves and carotid artery.
Paraparyngeal abscess = neck mass
Retropharyngeal = intraoral mass

2. Retropharyngeal abscess:

Symptoms:

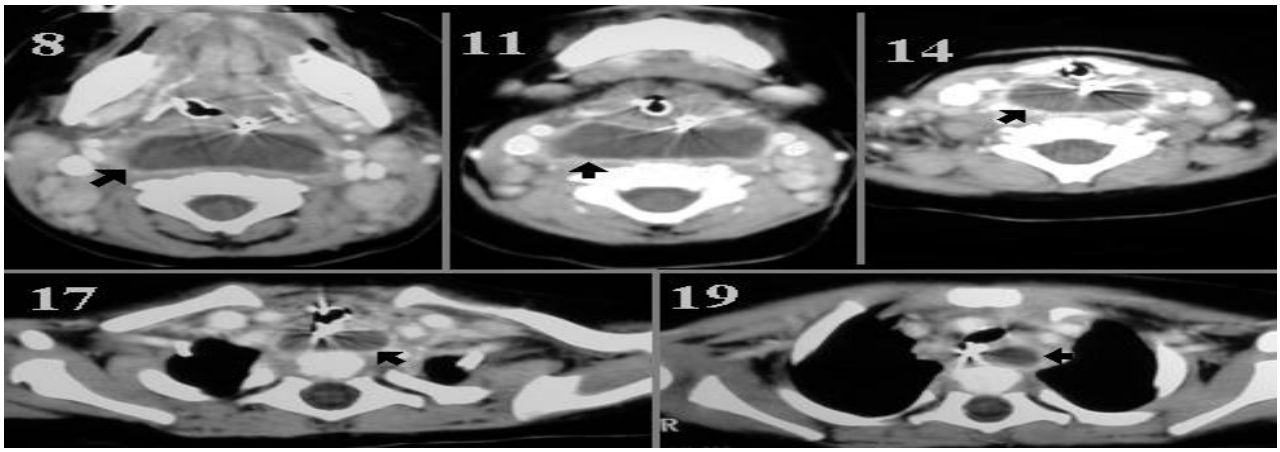
Fever, cervical adenopathy, stridor torticollis (cannot move his neck), drooling

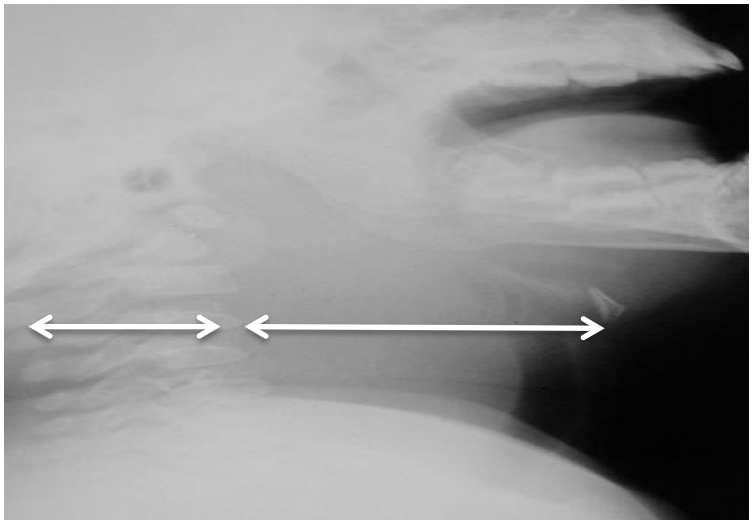
Causes:

Progressive pharyngitis S.aureus ,Haemophilus , group A beta haemolytic sterptococcus , bacteroides

Treatment:

- Transoral excision and drainge
- IV ABX
- INTUBATION
- Tracheotomy





lateral x-ray shows the diameter of the soft tissue is more than the diameter of the body of vertebra

Q: a child comes to the emergency with fever drooling of the saliva sitting in sniffing position
A: Epiglottitis:

3. Epiglottitis:

It is life threatening rapidly progressive condition

Cause: H influenzae typeB

Clinical features:

Any age most commonly: 2-7 years

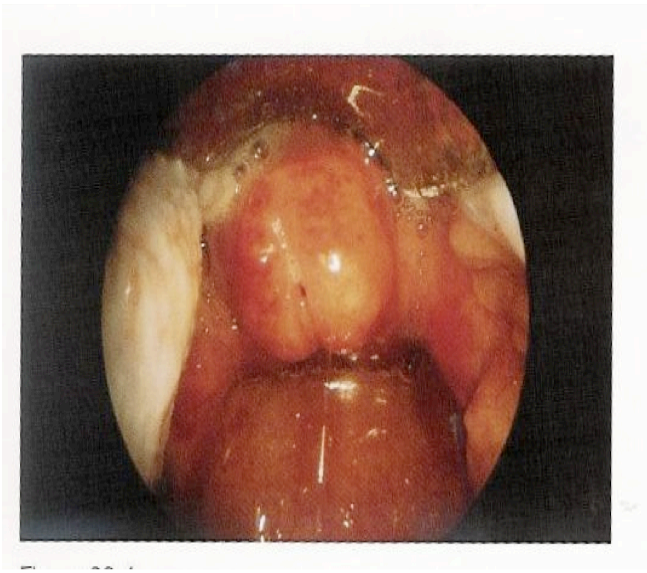
Rapid onset

High fever dysphagia, drooling, inspiratory stridor, toxic looking child (sit upright with head extended)

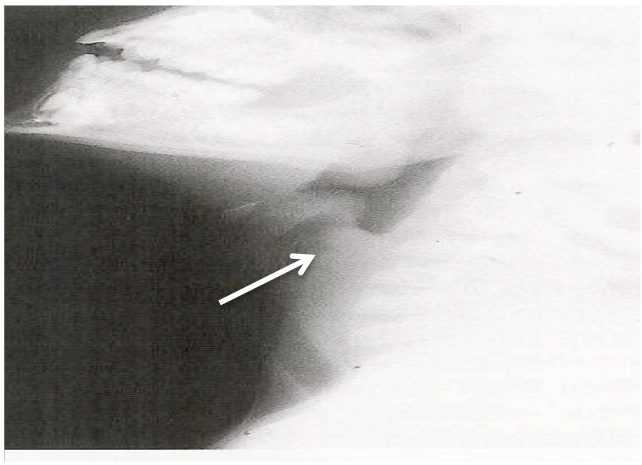
Thumb sign in lateral xray

Treatment: **NO EXAMINATION SHOULD BE DONE IN ER** take the patient to the OR maintain the airway:

- Intubation
- tracheostomy



- Start IV ABX cause it is caused by bacteria unlike croup which is caused by virus



Lateral x-ray of head and neck shows thumb sign

4. Croup (laryngotracheobronchitis):

Inflammation primarily involves tissue in the subglottic space +/- tracheobronchial tree

Cause: Parainfluenza 1 (most common), 2, 3

Clinical features: age group: 6 months-3 years

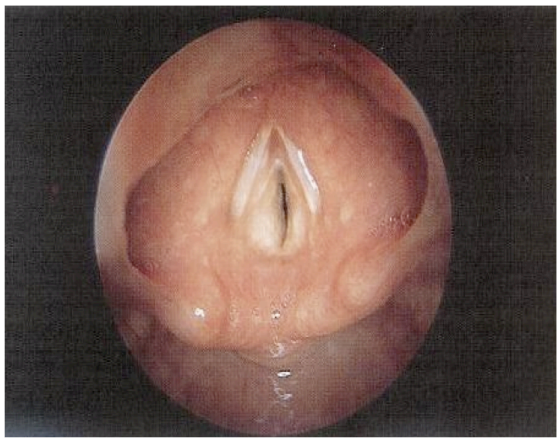
Preceded by URTI symptoms

Generally occurs at night

biphasic stridor, fever , brasssy cough (loud, sea-lion bark) hoarseness , no dysphagia (3 S's: stridor, subglottic swelling, seal bark cough)

supraglottic area normal

if recurrent croup, think subglottic stenosis

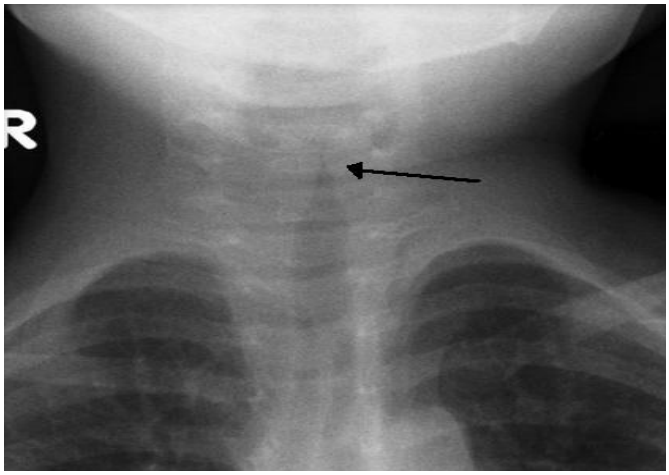


Diagnosis:

steeple sign on AP x-ray of neck

Treatment:

Humidified oxygen, racmic epinephrine ,steroid



The **steeple sign** is a radiologic sign found on a frontal neck radiograph where subglottic tracheal narrowing produces an inverted "V" shape within the trachea itself.

Non infectious causes:

1. FB aspiration

Foreign body aspiration is a common accident in children and represents an important cause of morbidity and mortality.

500 children die of FBA each year in the USA and 40% of lethal accident among children under 1year of age were caused by FBA

FBA is common among infants and preschool children

Clinical presentations:

Acute episode: period of choking , gagging, wheezing ,hoarseness

Inhalation or aspiration: goes to airways while ingestion means it goes to esophagus

Ingested usually stuck at cricopharyngous while aspirated stuck at right mainstem bronchus

Asymptomatic (mis-diagnosis?)

Cough , wheezing …

Complications:

Pneumonia, obstructive emphysema and bronchiectasis….

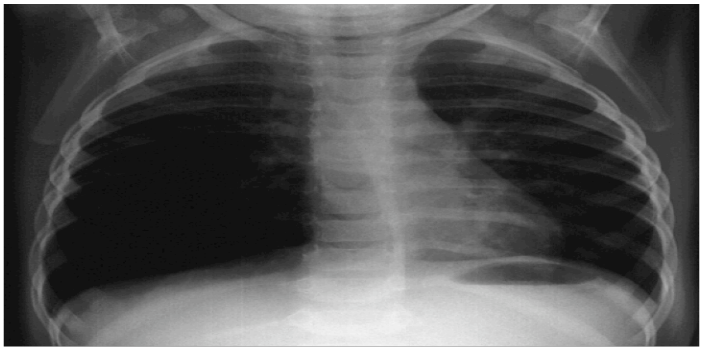
Medical history is the key to diagnosis FBA:

- Physical examination finding were abnormal in 80% of children with FBA , these were abnormal also in 40% of children without FBs (don't depend on examination).
- The sensitivity and specificity of physical examination were 80.4% and 59% respectively.

Radiological examination:

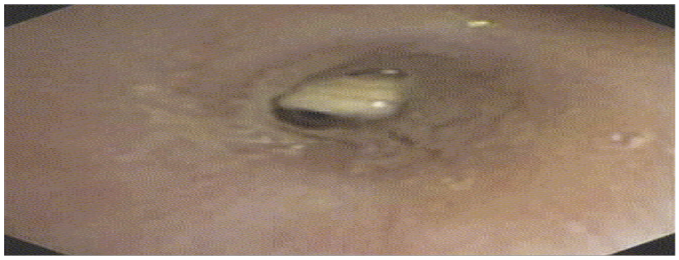
Many FB are not radiopaque and small FB may cause symptoms but not radiographic changes:

- Plain film (inspiratory expiratory)
- Air trapping,
- Obstructive emphysema, mediastinal shift
- Rt and LT lateral decubitus film



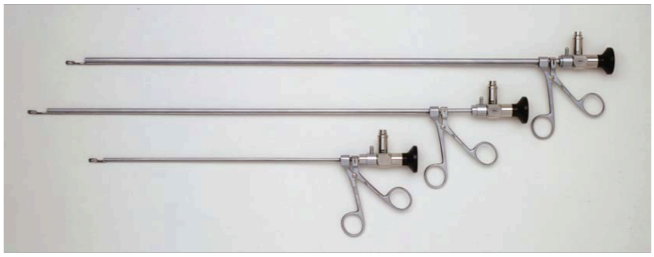
chest x-ray film shows air trapping

- The most common objects aspirated by young children are food products (peanuts ,seeds)
- Beans and seeds absorb water over time (organic things are more dangerous)
- Inert FB (Pieces of toys casuse less reaction)
- Batteries MUST be ruled out as foreign body as they are lethal and can erode into aorta

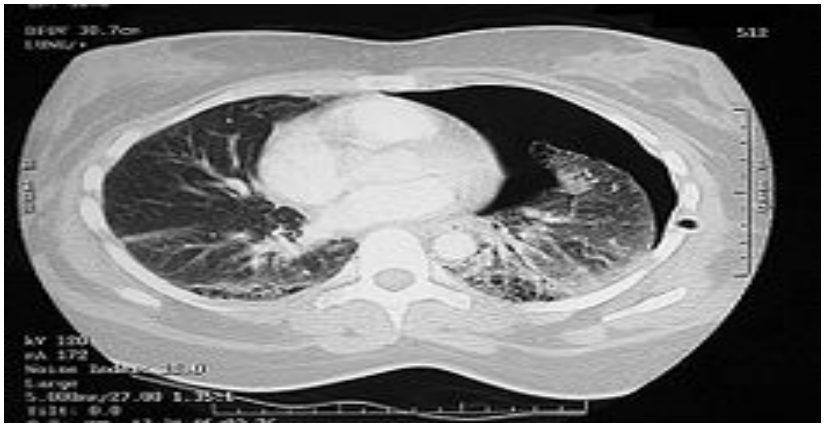


Bronchoscopy shows foreign body inside bronchus

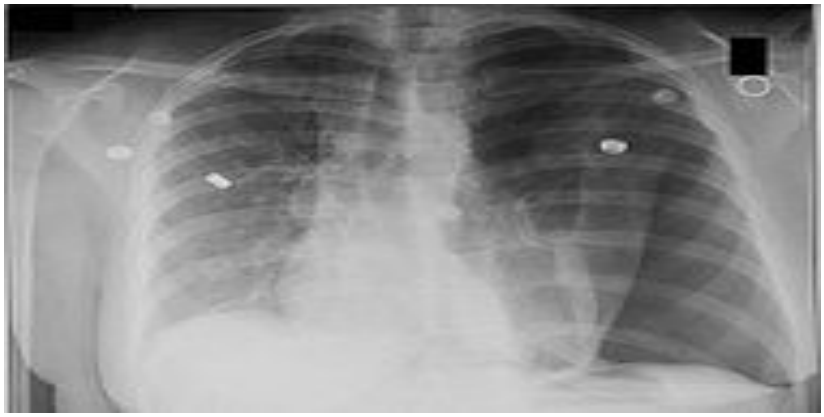
- Negative imaging studies do not exclude the presence of an FB
- **A High degree of clinical suspicion is the most important element in the diagnostic work –up**
- Airway foreign bodies are removed most safely under general anesthesia using the ventilating rigid bronchoscope



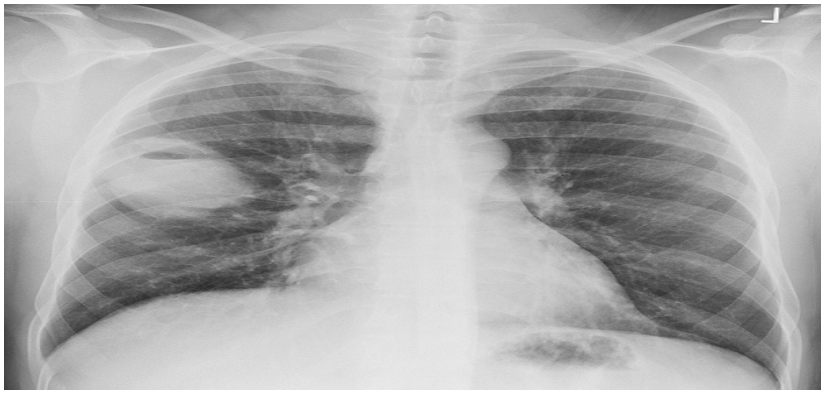
Bronchoscope with forceps: when removing the foreign body check the presence of other objects plus suction the secretion in that area.



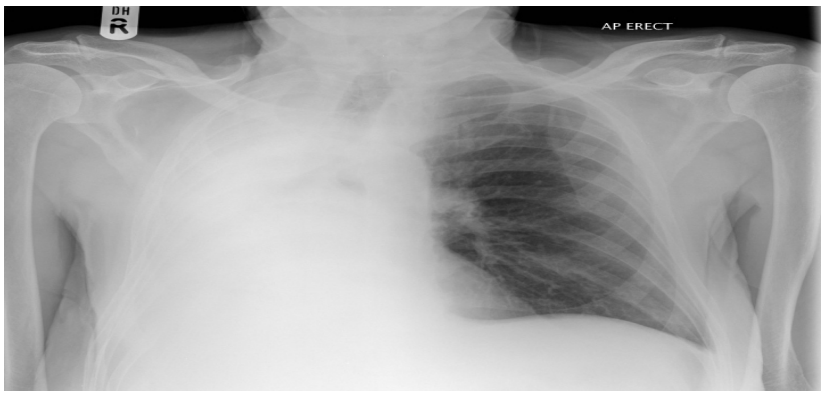
An axial chest CT scan shows pneumothorax



Chest x-ray of patient complaining of foreign body aspiration showing pneumothorax in the left lung



Chest X-ray shows abscess in the right lung



Chest x-ray shows atelectasis of right lung

2. Acquired vocal cord paralysis

- Unilateral
- Bilateral

Causes:

- Birth trauma
- (forceps delivery)
- Cardiac surgery(PDA repair)
- Mediastinal or neck surgery
- Tracheo-esophageal fistula repair
- Bilateral vocal cord paralysis (abduction type)

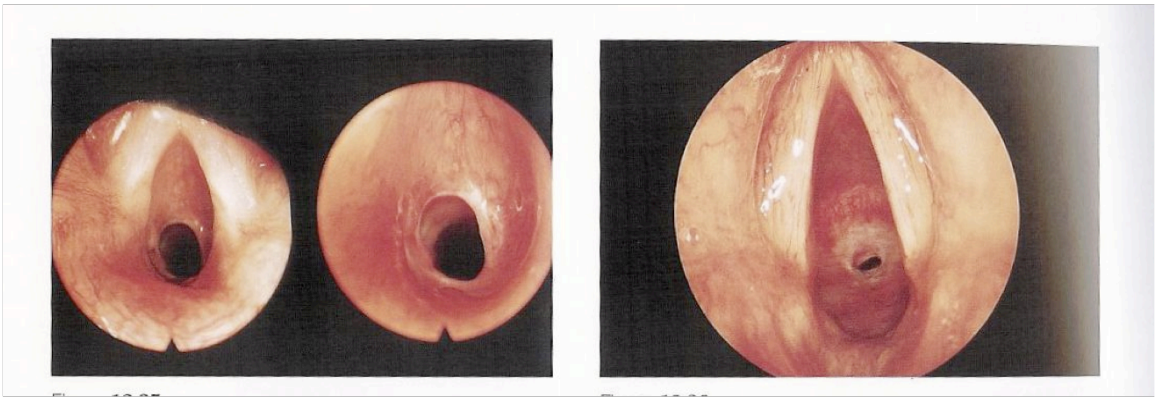
Symptoms:

Stridor

Treatment:

- Need temporary tracheotomy
- Vocal cord lateralization
- Cordectomy arytenoidectomy

3. Acquired subglottic stenosis:



Risk factors:

- Prolong intubation
- Size of the tube, material
- Care of intubated patient
- High pressure cuffs tube
- Difficult intubations
- Multiple intubation

- GERD
- Tracheobronchial infection

  Laryngeal → granulation tissue → ulceration → perichondratis → subglottic stenosis

Treatment:

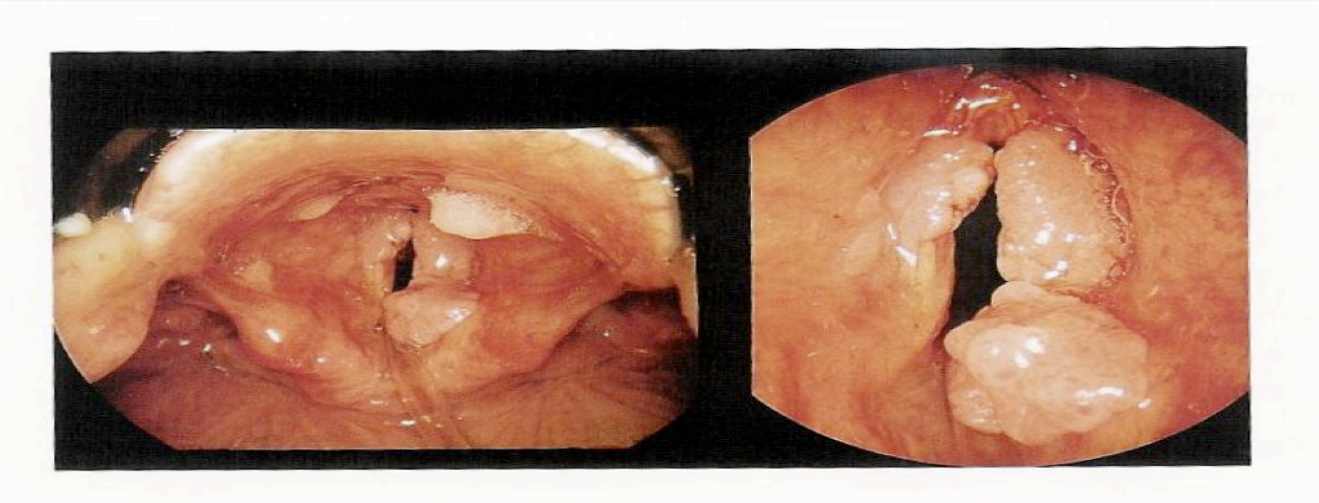
Grade I&II

- Observation
- Laser excision

Grade III&IV

- Trachestomy
- Laryngotracheal reconstruction
- Cricotracheal resection

4. Respiratory papillomatosis:



2/3 before age 15

rarely malignant change

Cause: HPV 6-11 (benign changes)

16-18 associated with malignancy

Risks: younger first time mother (condyloma acuminata)

Lesions: wart like (cluster of grapes)

Types:

- Juvenile (worst)
- Senile

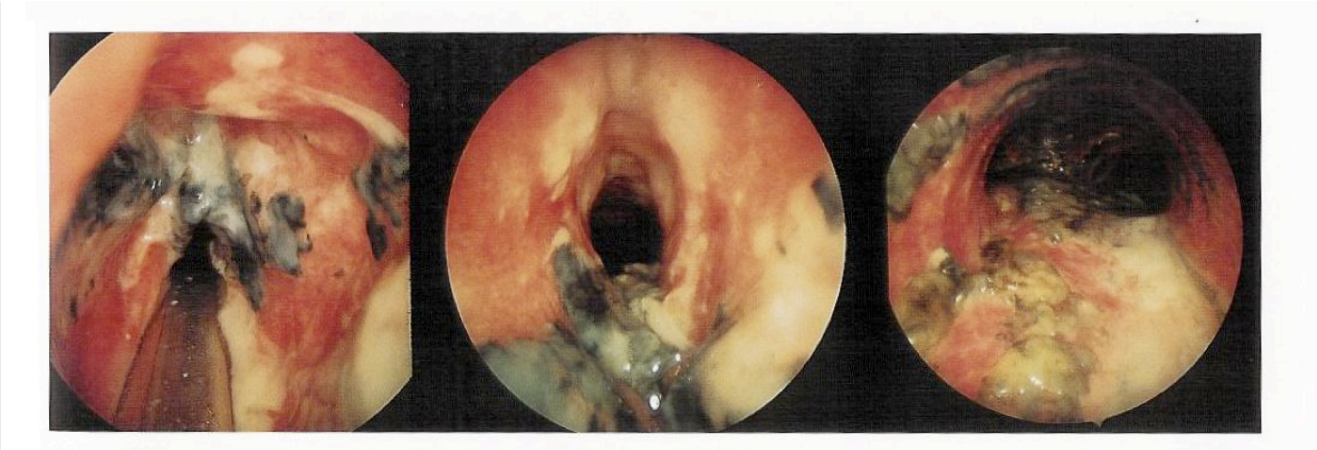
Signs and symptoms:

Hoarseness, stridor

Treatment

- laser excision ,microdebrider
- Adjunctive therapy:
- **Cidofovir,** acyclovir , interferon (very toxic drug given IV only in refractory cases which are aggressive reoccurring every one month and involving the trachea and lung)

5. Thermal injury:



Aspiration hot liquid, caustic fluid

Treatment:

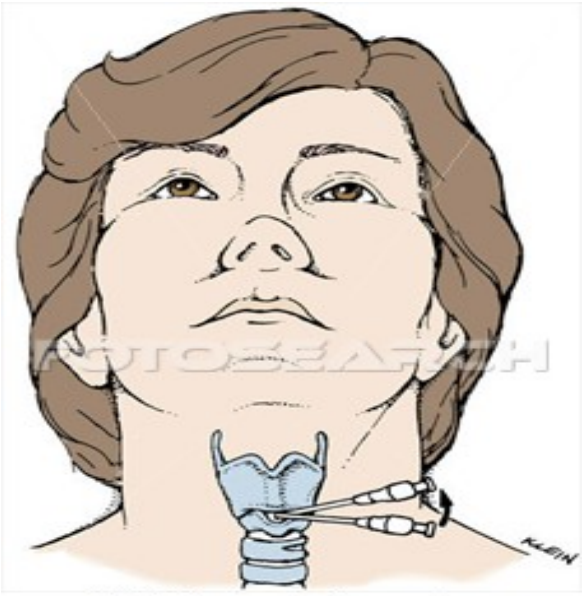
- Intubation
- Tracheostomy
- IV ABX and antireflux

Cricothyroidectomy:

- A technique for obtaining an emergency airway through the cricothyroid membrane(between thyroid and cricoid cartilages) when standard airway techniques have failed.
- In which a large-bore intravenous cannula is inserted directly through the membrane.
- Surgical cricothyroidotomy in which a surgical hole is made in the membrane and a cuffed tube, similar to a short endotracheal tube is inserted directly.

Indications:

- Need for an emergency airway where:
- Intubation is not possible
- Need to avoid neck manipulation
- Severe maxillofacial trauma
- Oedema of throat
- Severe oropharyngeal/tracheobronchial haemorrhage
- Foreign body in upper airway
- Lack of equipment for endotracheal intubation
- Technical failure of intubation Severe



Complications:

- Thyrohyoid membrane incision
- Intra/postoperative bleeding
- Subglottic stenosis
- Dysphonia/hoarseness
- Laryngeal damage
- Tube misplaced in bronchus
- Pulmonary aspiration
- Tracheal stenosis.

- Recurrent laryngeal nerve injury
- Esophageal perforation or tracheo-esophageal fistula.
- Tracheo-left brachiocephalic vein fistula
- Fracture of thyroid cartilage

Tracheostomy:

(Takes longer time to perform than cricothyroidectomy):

Performed between 2nd and 3rd or 3rd and 4th tracheal ring

Indications:

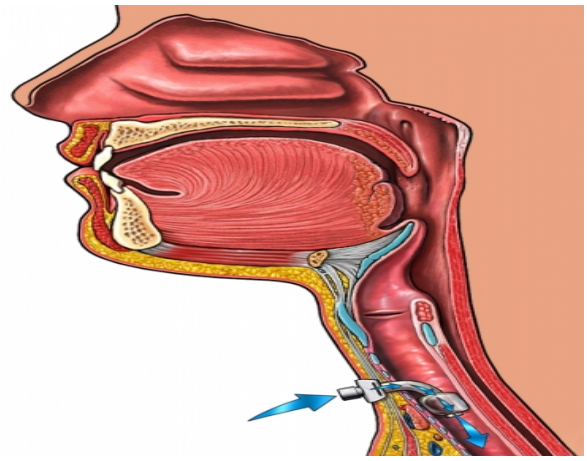
- Obstruction of the upper airway, e.g. foreign body, trauma, infection, laryngeal tumour, facial fractures
- Impaired respiratory function, e.g. head trauma leading to unconsciousness, bulbar poliomyelitis
- To assist weaning from ventilatory support in patients on intensive care longer than 3 weeks (more safer)
- To help clear secretions in the upper airway (lung lavage in COPD)

When removing the tracheostomy; cover the area with gauze, within 48hrs it will collapse and close full complete healing it takes from 1-3 weeks

Complications:

Immediate:

- Haemorrhage, e.g. from thyroid isthmus
- Hypoxia
- Trauma to recurrent laryngeal nerve
- Damage to oesophagus
- Pneumothorax
- Subcutaneous emphysema (3-4cm skin incision but when opening the trachea air will pass to the adjacent skin leading to crepitus when touched)

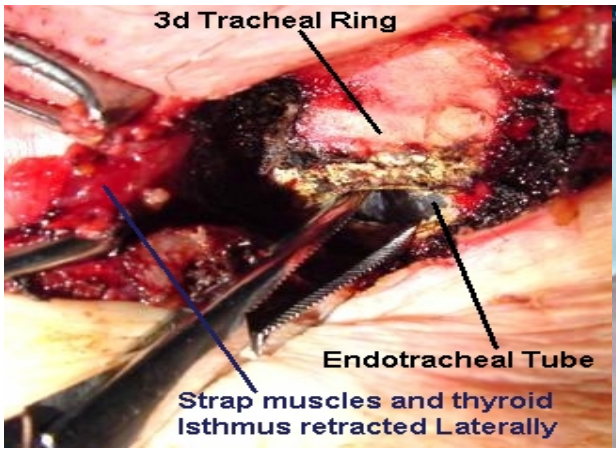


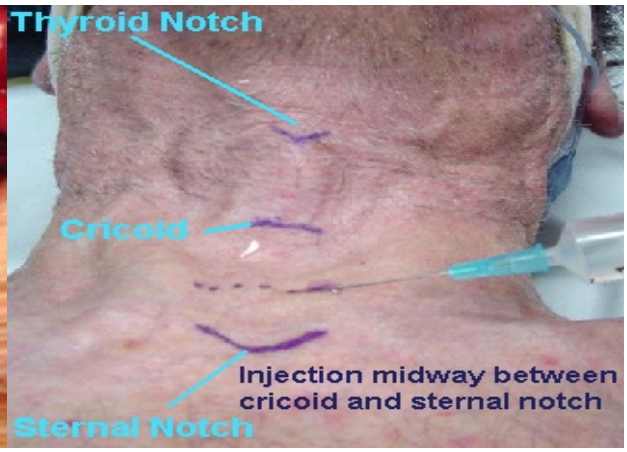
Early:

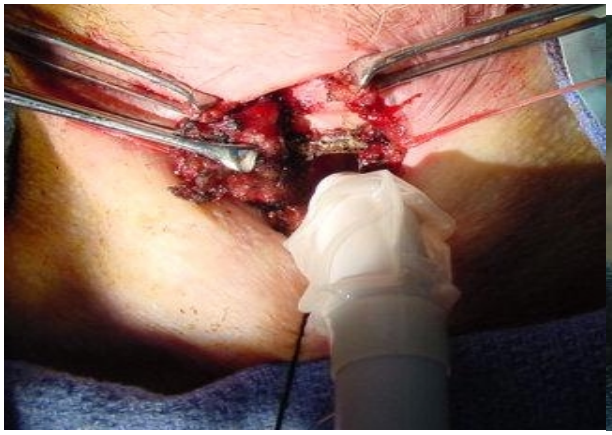
- Tube obstruction (dislodging) or displacement (stitch it to the skin to prevent this and remove after 5 days to one week)
- Aspiration
- Bleeding from tracheostomy site
- Infection

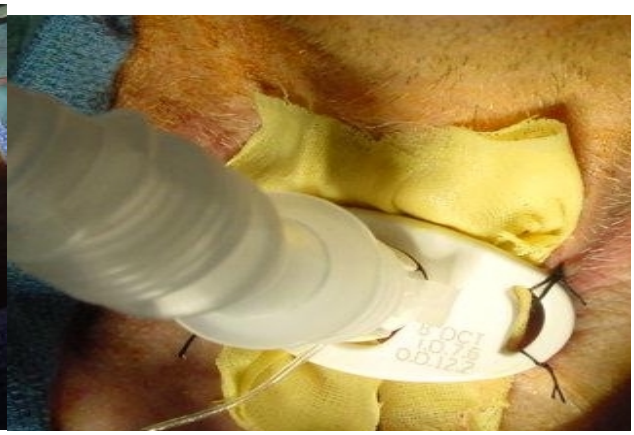
Late:

- Airway obstruction with aspiration
- Tracheomalacia
- Aspiration and pneumonia
- Fistula formation: e.g. tracheo-cutaneous (when the patient comes complaining of fistula that didn't close after a month of removing the tracgeostomy. This is commonly seen in patiants that had radiation for skin or neck tumors). or tracheo-oesophageal complain of regrugtation or trachea-pnemonitic artery complaining of bleeding from tracheal incision.
- Damage to larynx, e.g. stenosisTracheal stenosis









Recurrent laryngeal passes laterally but more laterally is the esophagus.
In kids innominate artery (brachiocephalic artery or trunk) is higher in position than in adults and it resembles the trachea in shape

In summary:

Clinical assessment of child with upper airway obstruction:

History:

- Age (congenital vs acquired)
- Speed of onset and precipitating event (crying, feeding..etc)
- Associated symptoms (fever, drooling. Hoarseness..)
- Feeding difficulty
- Past medical history (birth trauma, intubation…)

Examination :

Children examination should be from head to toe to check for syndromes

- Craniofacial anomalies
- Cutaneous haemangiomas
- Respiratory distress sign (using flaring of ala, suprasternal retraction, accessory muscle. Take immediately to OR)
- Neck mass
- Growth chart
- COMPLETE ENT EXAMINATION
- Flexible fibroptic examination

Investigation :

Physiological studies:

- ABG
- Spirometry

Imaging :

- Chest Xray (FB, complications such as pneumonia and atelectasis)
- HKV (subglottic stenosis)
- CT scan (choanal atrasia ,retropharyngeal abscess ,tumor)
- MRI (intracranial extension)
- Barium swallow (vascular ring trachea is compressed by big vessels)

Endoscopy: is the tool of examination