Nasal Obstruction in Neonates

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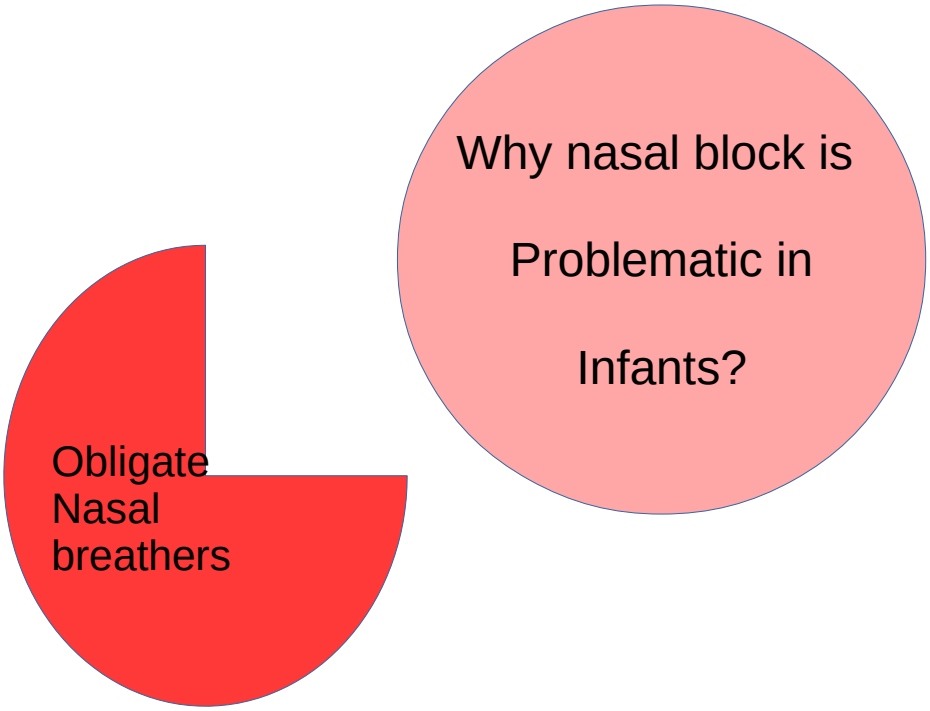
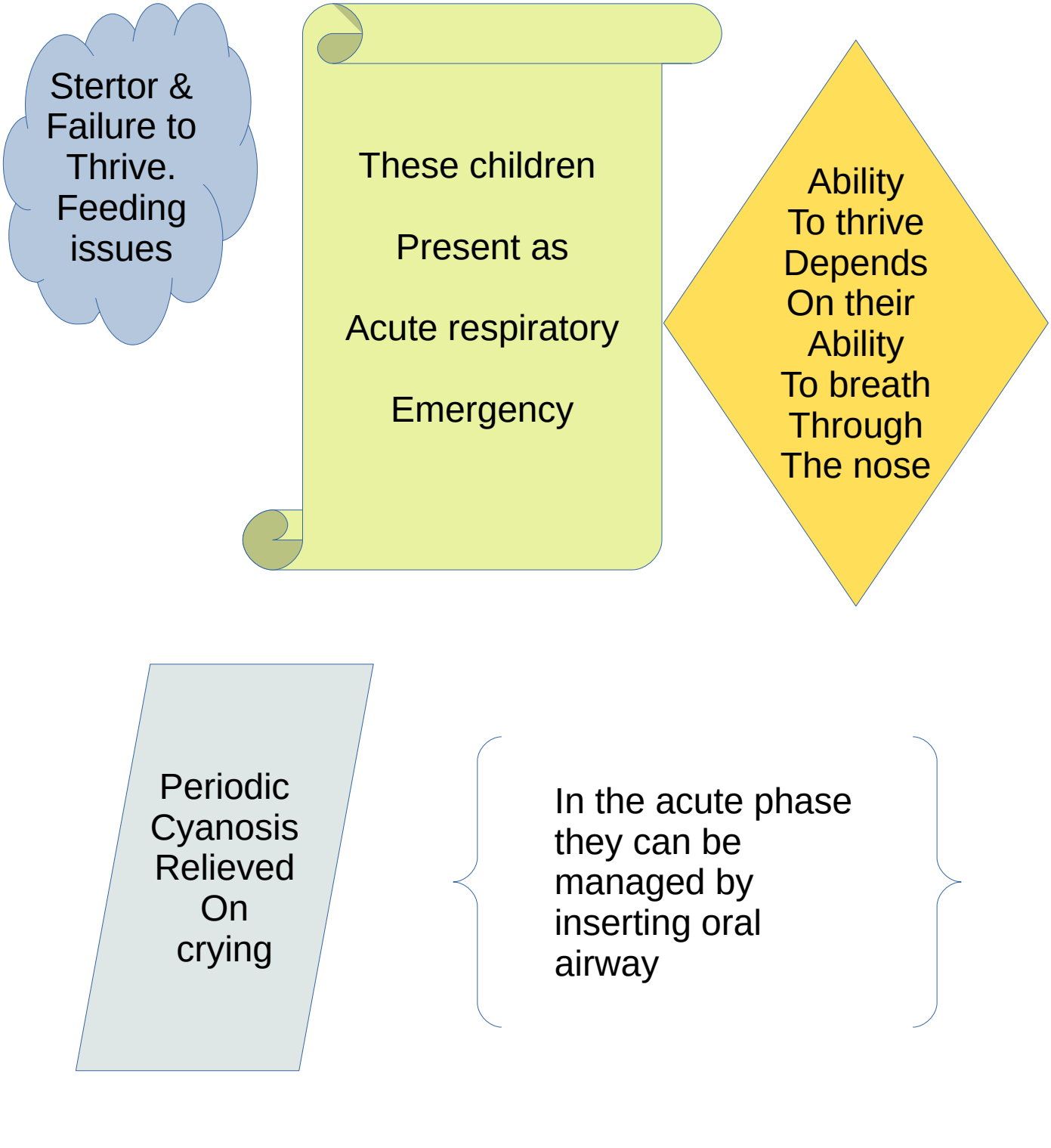


Nasal block is a problem during the first few months of life till such time the infant learns to breath through the oral cavity

The ability of a neonate to breath through the mouth depends on the level of neurological maturity

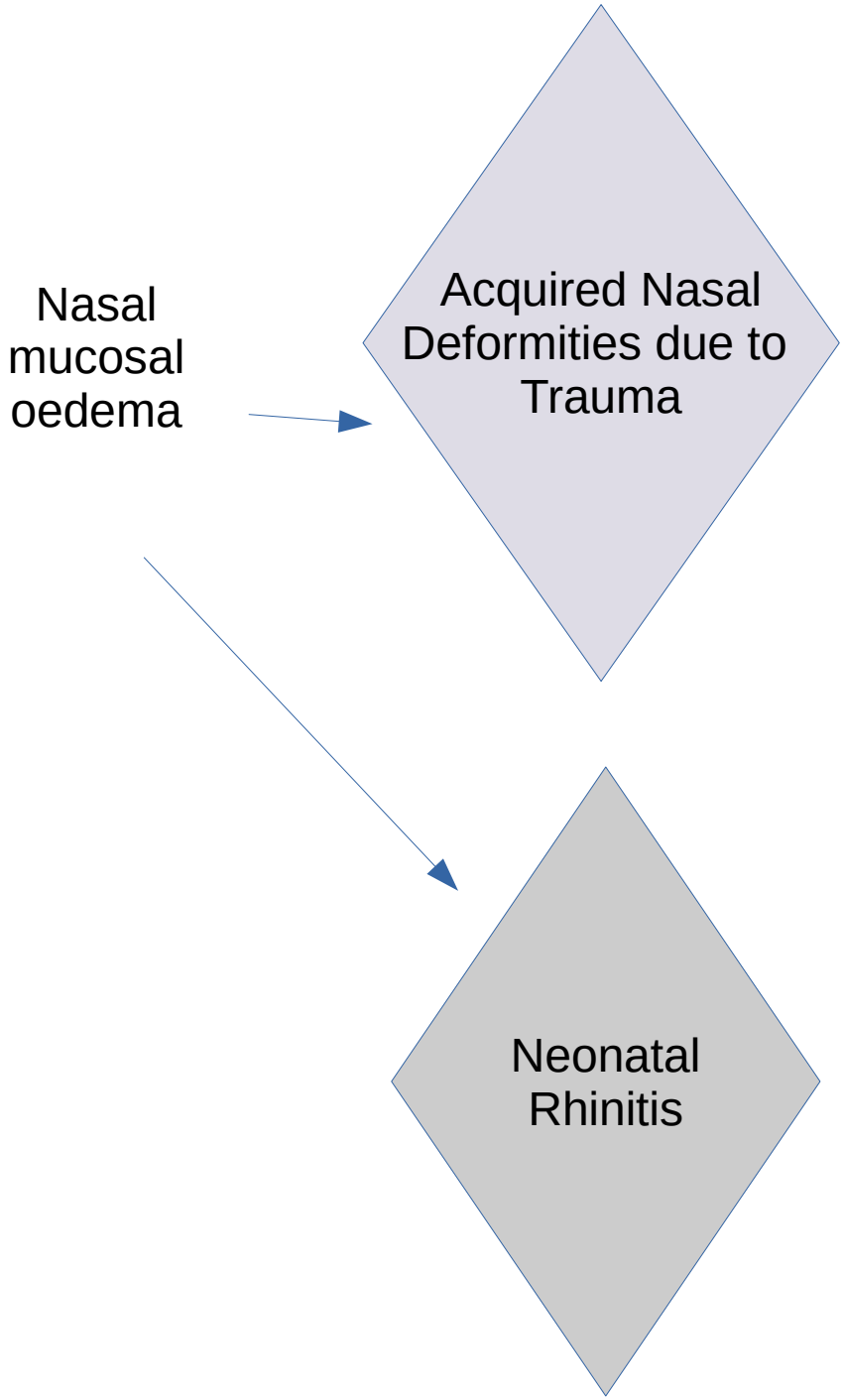
Clinical Features



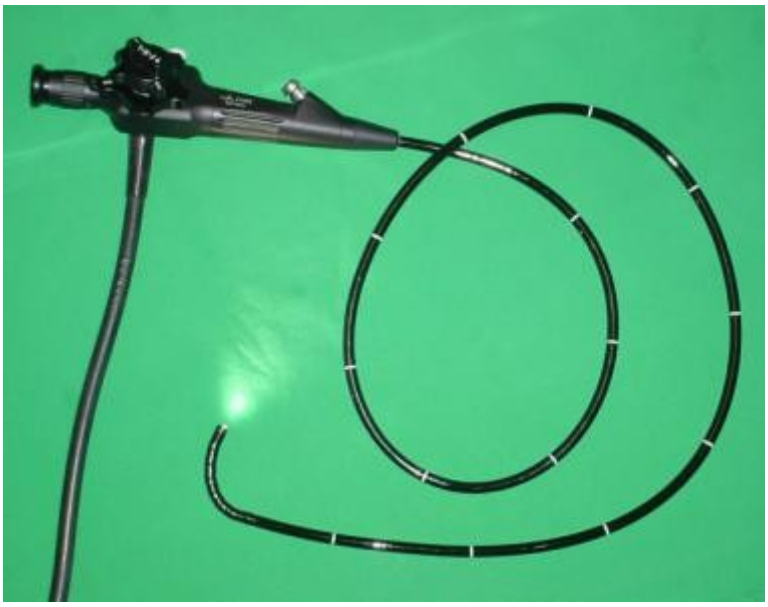
Congenital causes of nasal obstruction in Neonates

Anatomical / Skeletal Anomalies	Congenital Nasal cysts	Nasal Masses
Choanal atresia	Dermoid cysts	Glial heterotopia
Pyriform aperture stenosis	Nasolacrimal duct cysts	Meningo / encephalocele
Mid nasal stenosis	Thornwaldt's cyst	Hemangioma Teratoma
Nasal agenesis	Naso alveolar cysts	Hamartoma
Craniosynostosis	Dentigerous cysts	Chordoma
Cleft palate Nose	Mucous cysts	

Acquired causes of nasal obstruction in neonates



Evaluation



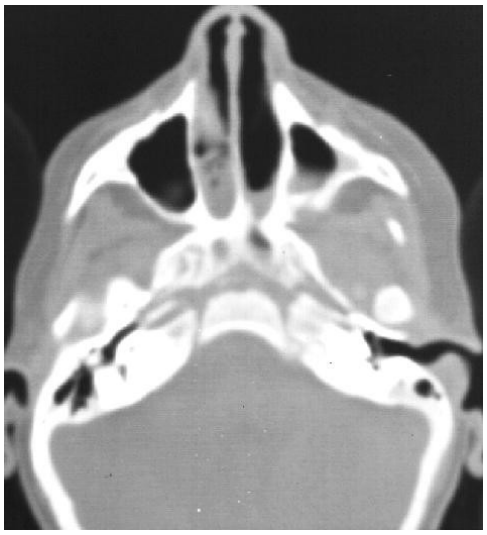
Flexible Nasal endoscopy

CT & MRI scans are very helpful in looking out for nasal as well as post nasal lesions

Congenital Disorders

Skeletal anomalies

Choanal atresia



1 in 7000 live births

Complete obstruction of posterior choana on one or both sides

Obstruction can be bony / membranous, can also be mixed (70%)

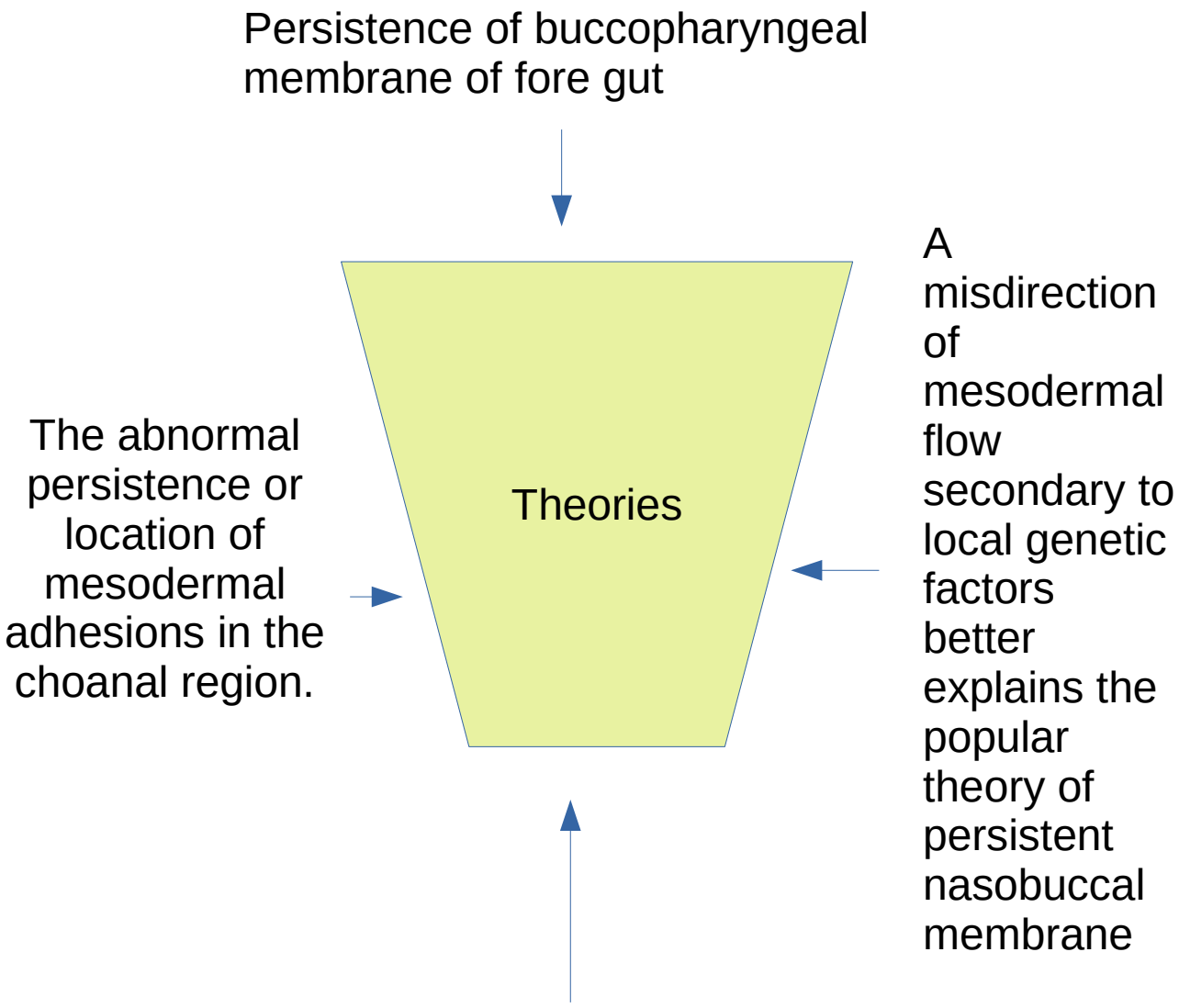
Caused due to persistence of bucco nasal membrane

Bilateral atresia presents as neonatal respiratory distress. Child will be cyanotic and it gets relieved on crying

Unilateral choanal atresia presents late in infant life

These children have feeding difficulties

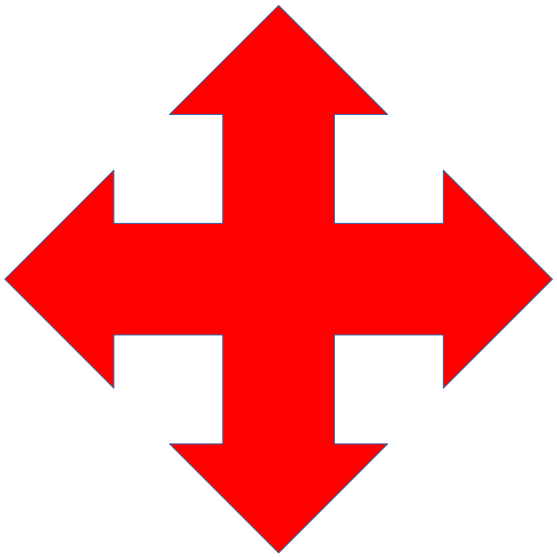
Theories of Choanal atresia



Boundaries of atretic plate

Superior – Under surface of body of sphenoid

Lateral – Medial pterygoid lamina



Medial - Vomer

Inferior – Horizontal plate of palatine bone

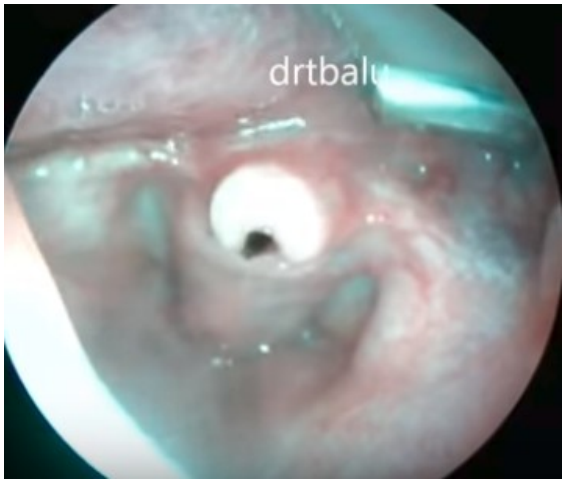
Other associated additional anomalies seen include:

1. Accentuation of palatal arch

2. Lateral & posterior nasal wall sweep inwards

3. Narrowing of nasopharynx

Neonates with choanal atresia will have feeding difficulties. It is more intense in bilateral choanal atresia. In normal neonates the uvula and epiglottis form the respiratory channel while lateral to these structures the food passes through and is known as the lateral food channel. In neonates with choanal atresia the respiratory channel is lost because of block at the level of choana. This leads to Cyanosis during feeds.



Use of McGovern Nipple has been found to be useful in neonates with bilateral choanal atresia to overcome feeding difficulties

Associated congenital abnormalities

Choanal atresia can occur in isolation or in association with other congenital malformations

CHARGE association - (C- coloboma; H- congenital heart disease; A- atresia choanae; R- retarded growth and development; G- genital anomalies in males; E-ear anomalies and deafness). 60% of these patients have bilateral choanal atresia while the rest present with unilateral atresia

Symptoms

Bilateral choanal atresia:

1. Mouth breathing
2. Inability to clear nasal secretions
3. Loss of sensation of smell
4. Rhinolalia clausa
5. Sucking difficulties
6. Cyclic cyanosis

Unilateral choanal atresia:

1. Unilateral nasal block
2. Thick secretions + in the affected side

Presence of misting when a metal cold spatula is held in front of the nose rules out choanal atresia

Clinical Examination

1. Failure to pass 6-8 FG plastic catheter via the nasal cavity into the pharynx. If obstruction is felt at 3-3.5 cm from anterior nares then it is at the level of choana. If obstruction is encountered at the level of 1-2cm from the nasal rim then it is due to traumatic deflection of septum during delivery. Difficulties in passing the tube due to mucosal edema can be overcome by administering oxymetazoline nasal drops.

2. Air movement will not be felt when wisp of cotton is placed in front of the nasal caivty.

3. Administration of methylene blue dye into the nasal cavity. The dye will not be seen trickling down the nasopharynx

Investigation

CT scan:

Provides information whether atresia is membranous / bony or combined one. It also demonstrates the thickening of vomer bone, bowing of lateral wall of nasal cavity and fusion of bony elements in choanal region. Congenital unilateral atresia is always associated with deviation of nasal septum and thickening of vomer bone.

MRI:

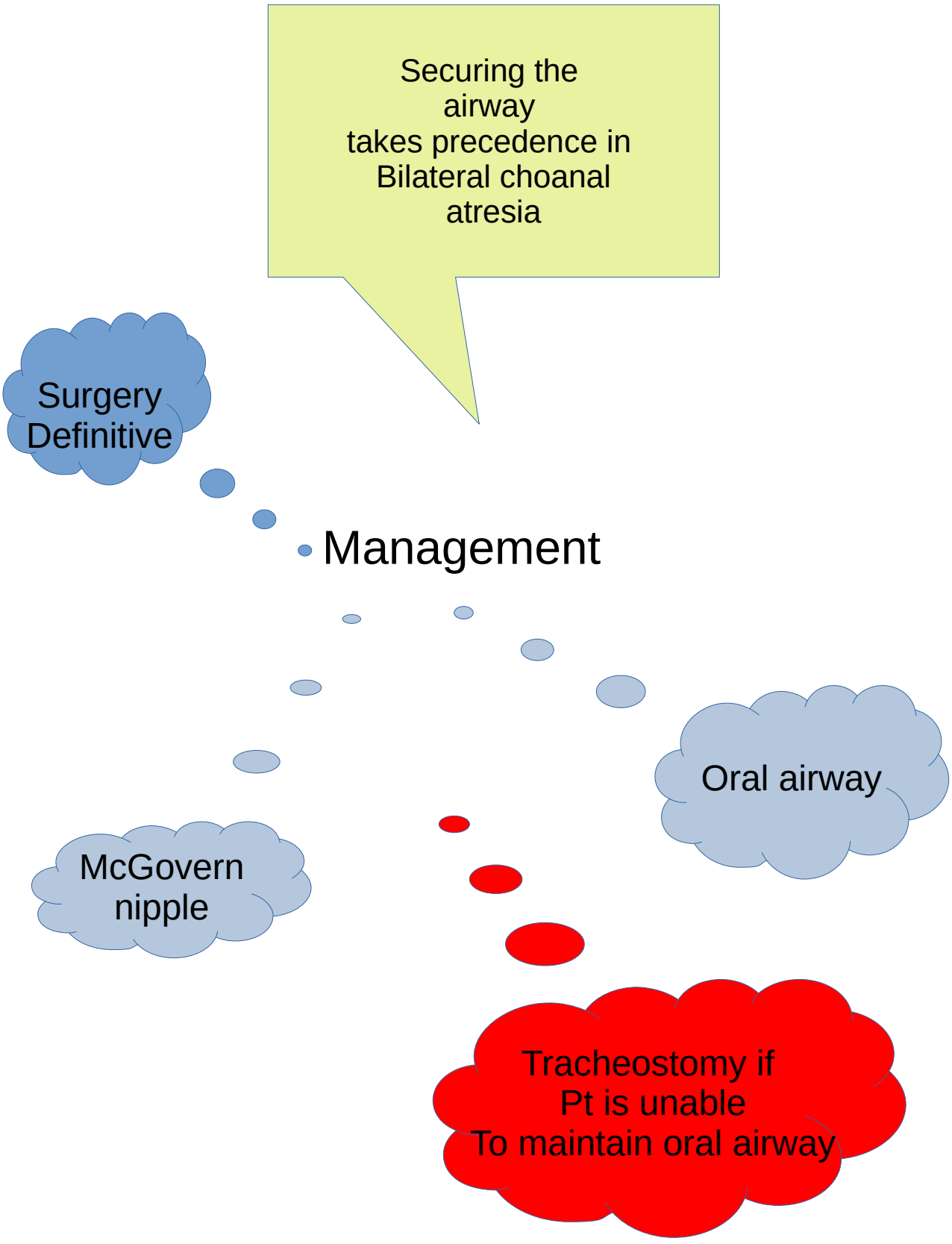
Provides details of other associated anomalies

Echo

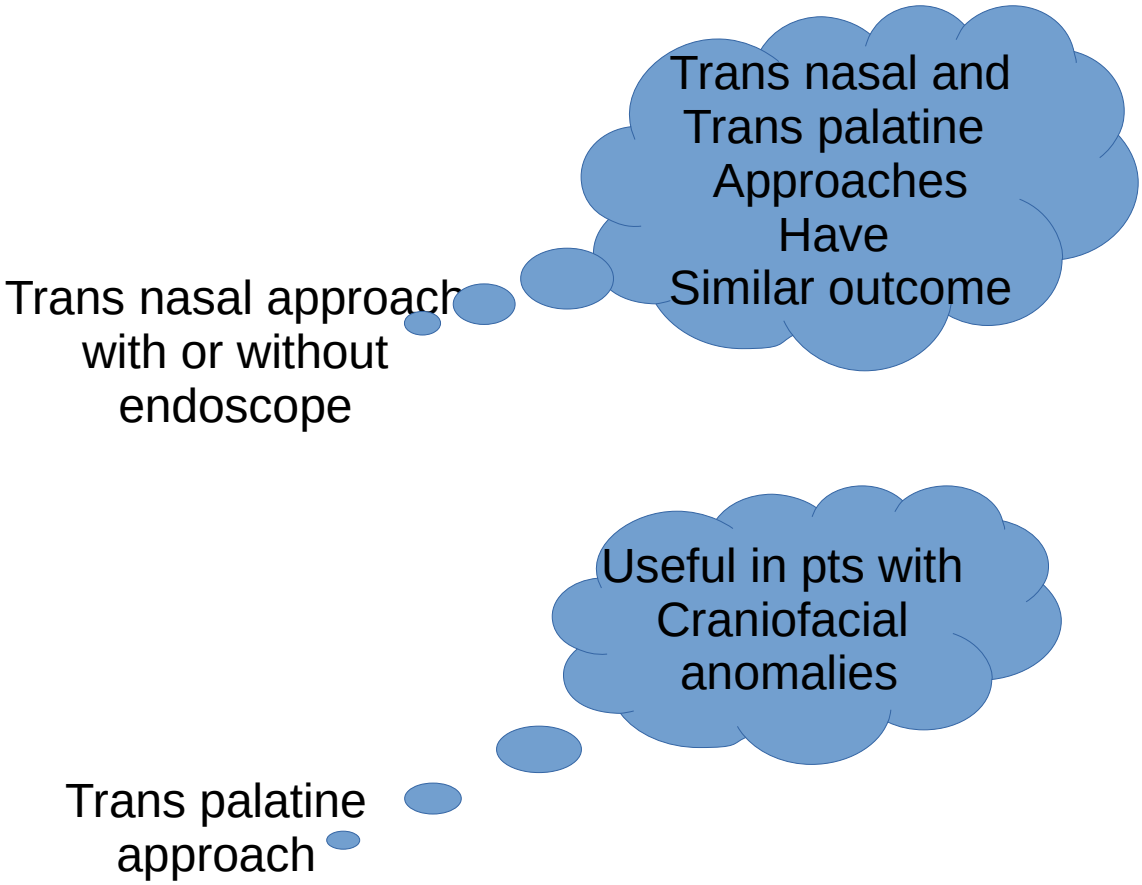
USG abdomen to rule out renal anomalies

Ophthalmological review

Audiological review


Securing the
airway
takes precedence in
Bilateral choanal
atresia
Surgery
Definitive
Management
Oral airway
McGovern
nipple
Tracheostomy if
Pt is unable
To maintain oral airway

Surgical correction



Sublabial

Transantral

Trans septal

Endoscopic Transnasal Approach

Two methods

1. Using 0 degree nasal endoscope

2. Using 120 degree endoscope

0 degree nasal endoscope

Using 0 degree nasal endoscope uterine sound can be passed into the nasal cavity beyond the atretic plate and serial dilatations needs to be performed. If the atretic plate is bony then it can be drilled out using a microdrill. If the nasal cavity is too small to accommodate two instruments I.e the scope and uterine sound then a septal window can be created in the posterior portion of nasal septum and both nasal cavities may be used to access the point of atresia. Nose should be stented after the procedure

120 degree nasal endoscope

A 120 degree endoscope is passed through the mouth and is placed behind the soft palate to visualize the post nasal space. Instruments like the drill / uterine sound may be passed through the nasal cavity. Nose should be stented

Advantages / Disadvantages of Transnasal approach

Advantages:

1. This process is faster and easier

2. Blood loss is minimal

3. Can be performed in children of all ages who do not have associated external nasal deformities

4. Child can be immediately breast fed

5. Child can be discharged on the 3rd day itself

Disadvantages:

1. Vision is highly limited especially in the new born

2.Inability to adequately remove enough of the posterior vomerine septal bone and prevent restenosis

3. Longer stenting time

4. Endoscopes do not offer binocular vision

5. Can not be done safely and with good results on patients with multiple nasal and nasopharyngeal anomalies.

Trans palatal Approach

This procedure is performed under general anesthesia. A Dingman-Denhardt mouth gag with the infant tongue blade is used. The palate is injected with 0.5% lidocaine with 1:200,000 epinephrine in the area of the mucosal incision. a Owens type(U-shaped) mucosal incision is made
beginning just behind the maxillary tuberosity on one side and then continued medial to the alveolar ridge up to the canine region and then angled back to the nasopalatine foramen. A likewise incision is made on the opposite side and the mucosal flap is elevated taking care not to damage the greater palatine arteries. Mucosa of the nose and nasopharynx is elevated and preserved. Then the palatine bones posterior to the greater palatine foramina, the atresia plates and the posterior vomer are carefully drilled away using a diamond burr. Two 14 or 16 French catheters are passed simultaneously into each nostril to check the patency of the newly created choana

The preserved mucosa is then used to cover the superior and inferior surfaces of the newly formed choana and then sutured in place to cover the bone. Stents are left in place for 4 weeks.

Advantages / Disadvantages of Transpalatal approach

Advantages:

1. Better visualization and exposure

2. Both hands are free

3. Less stenting period (a portex endotracheal tube can be cut and used as a stent)

4. Less failure rate

Disadvantages:

1. The incisions, which are identical to those for a cleft palate repair, may have a banding effect on maxillary growth due to scar formation. (Therefore, most surgeons prefer to wait to use this approach until some teeth are in occlusion - at approx.12-18 months).

2. Palatal growth can be stunted in 50 % of individuals

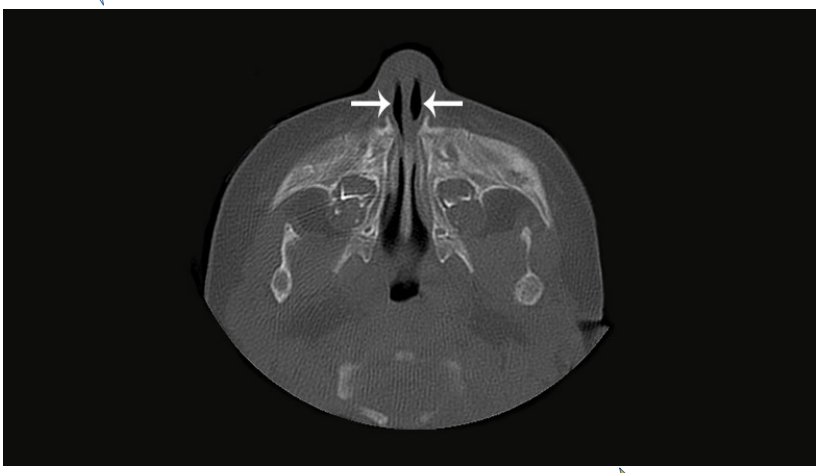
3. Increased blood loss

4. Increased risk of development of palatal fistulas post operatively

Pyriform aperture stenosis

PA is the narrowest
Part of nasal airway

First described in 1988



Even minimal reduction
Can cause problems

Caused by
Bony overgrowth
Of nasal
Process of maxilla

Signs & Symptoms

1. The child will be breathless similar to that of choanal atresia (bilateral). Since this area happens to be the narrowest portion of nasal airway even a small obstruction will cause enormous distress to the patient.

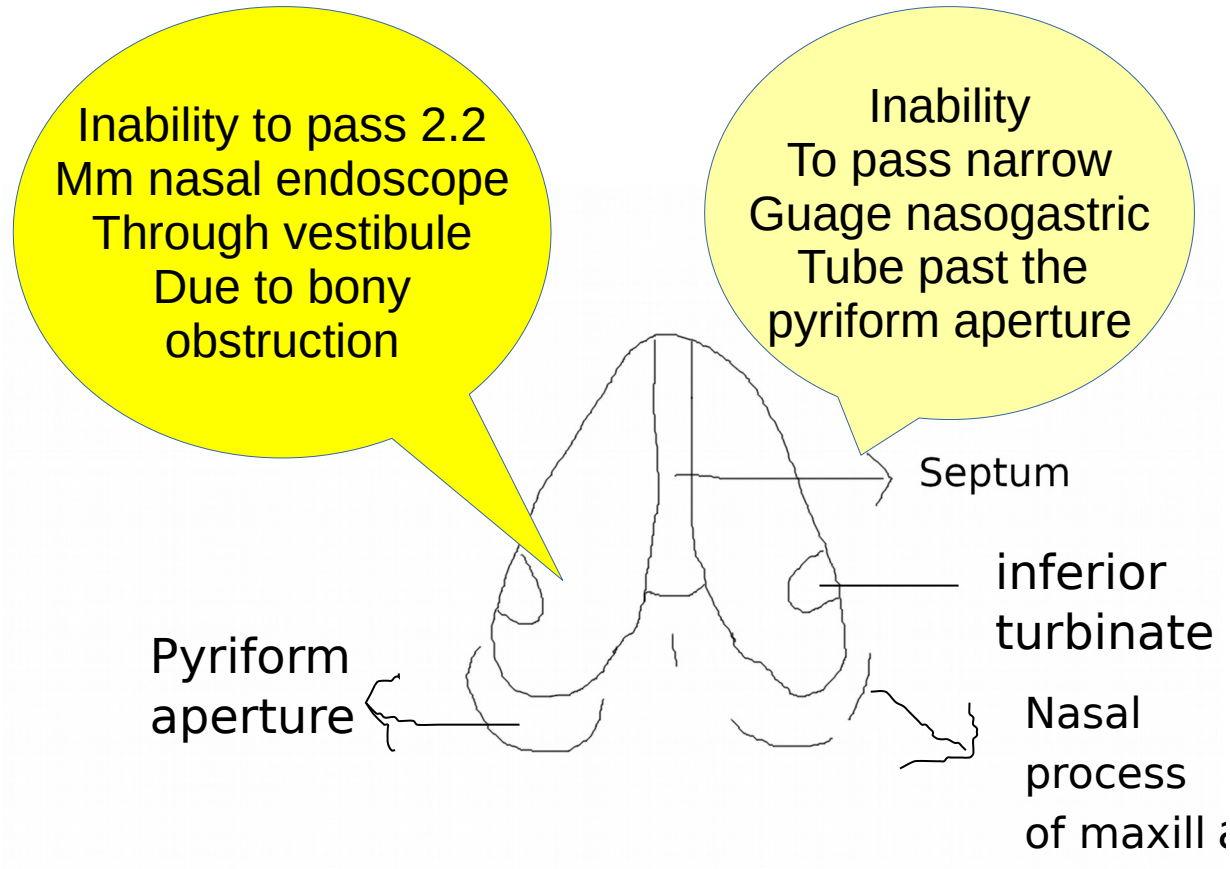
2. Watering of eyes is caused due to significant bony obstruction to the nasolacrimal duct

3. These children have cyclical Cyanosis which is relieved on crying

4. Difficulty in breathing during feeding

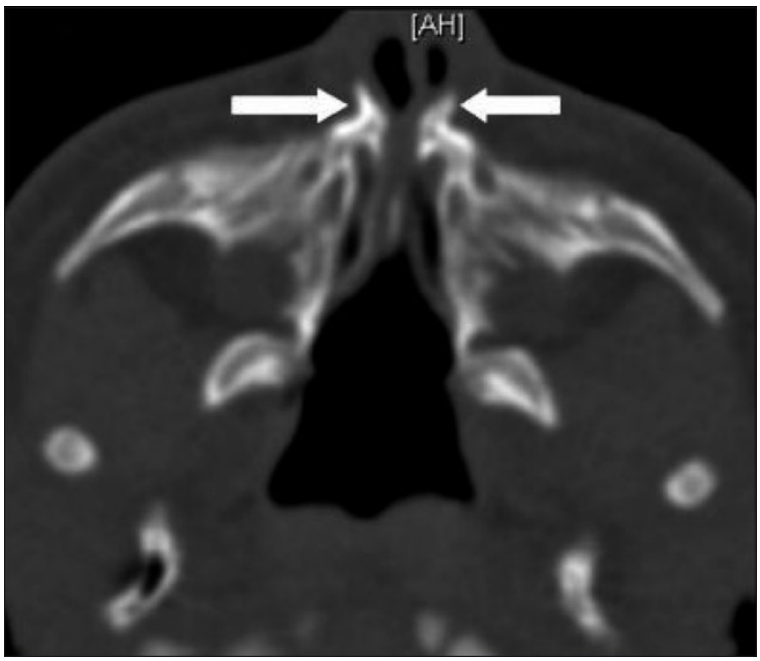
5. Pituitary insufficiency

Diagnosis

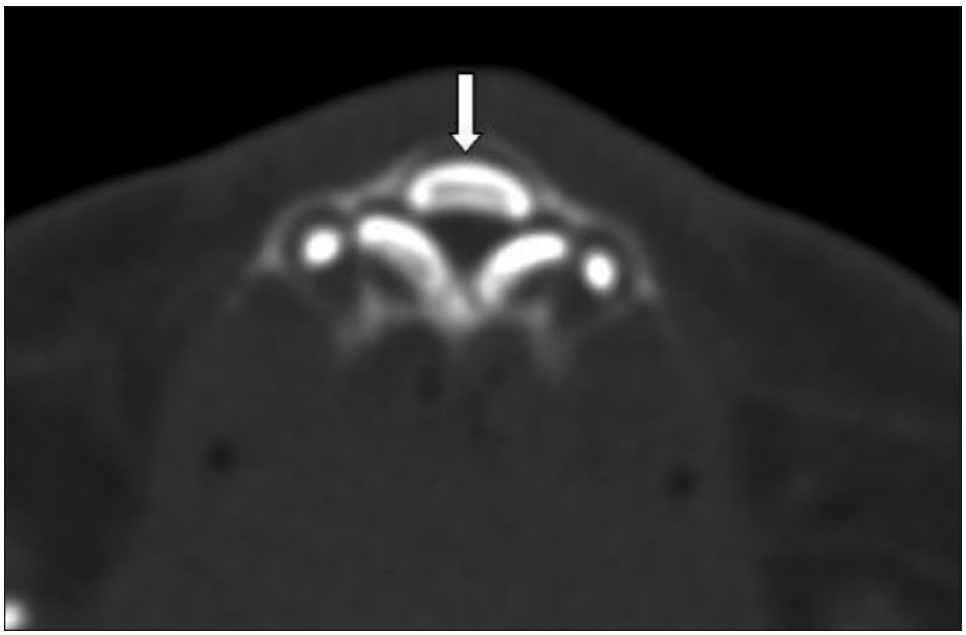


CT scan is confirmatory. The aperture width of less than 11 mm in axial CT at the level of inferior meatus in a term neonate is diagnostic

CT findings



Axial CT shows medial approximation of nasal process of maxilla causing narrowing of PA

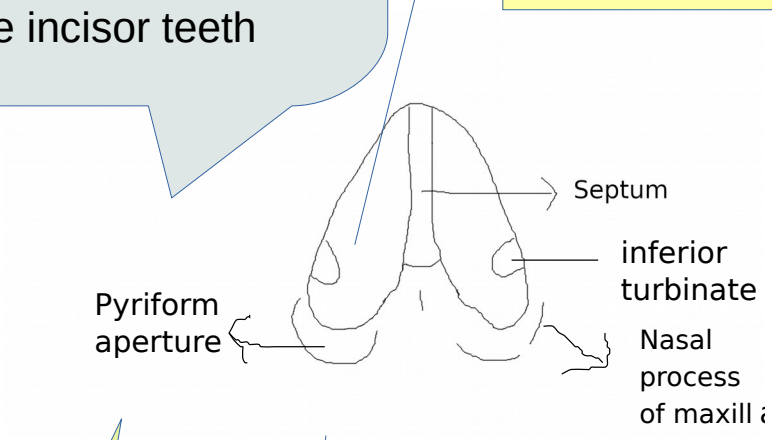


Axial CT scan shows an unerupted single central maxillary megaincisor

Anatomy of Pyriform Aperture

Primary palate
Is formed by
Merging of
Medial
Nasal
Prominences. This contains
The incisor teeth

The palate is formed from two
Primordia i.e. Primary and
Secondary palates



Secondary palate
Is formed from
Lateral
Palatine process
Of maxilla

Primary palate
Forms the floor
Of PA

Bounded laterally by
Nasal process of maxilla.

Inferiorly by the junction of
The horizontal processes
Of maxilla

Associated Abnormalities

Some of these patients have single central incisor with absent upper frenulum and arch shaped lower lip.

This subgroup of patients with megaincisors have also other associated lesions like:

Holoprocencephaly – Failure of forebrain to divide appropriately to form cerebral hemispheres, diencephalon, olfactory tracts and bulbs.

These patients should undergo further evaluation like MRI brain etc to rule out other anomalies.

Etiopathogenesis Theories

1. Deficiency of primary palate. This is associated with triangular hard palate.

2. Bony overgrowth in the nasal process of maxilla, here the palate is normal in shape

There are two forms of this disorder:

1. Isolated form without other skull and brain deformities

2. Form with associated skull and brain deformities

Management

Conservative:

Management is largely conservative with use of nasal steroid spray and saline drops. Saline nasal irrigation should in fact be the first line of management.

Surgery:

This is usually reserved for patients in whom the obstruction is very severe and there is a risk of failure to thrive.

Surgery can be performed via transnasal approach after providing an alar release incision. The abnormal bony structure could be drilled out using a diamond burr.

Another approach is by giving an incision in the bucco gingival sulcus, elevating the soft tissue thereby exposing the bony obstruction which can be drilled away.

Post operative nasal stents should be left in place for at least a month to prevent stenosis.

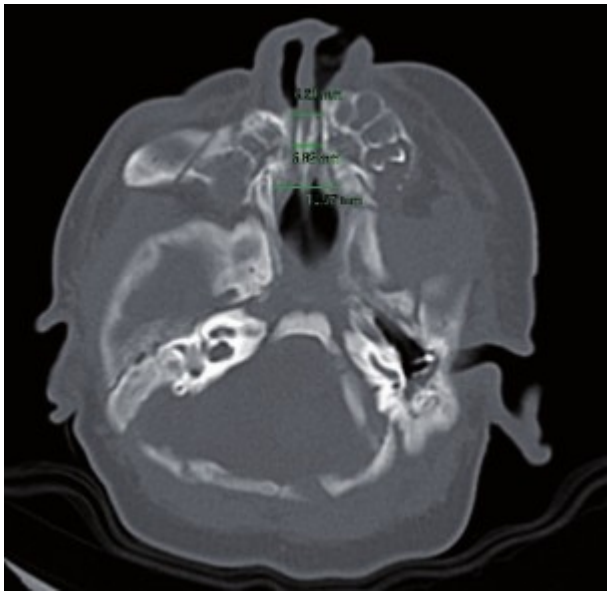
Periodic saline irrigation and prevention of gastro oesopheageal reflux really helps.

Adhesions, septal ulcerations and septal perforations are common complications.

Midnasal stenosis

Very rare

Caused by overgrowth Of nasal bones half Way along nasal cavity



Usually associated with syndromes characterized by mid facial hypoplasia such as Apert's syndrome. It has also been noted to occur in isolation also.

CT scan is diagnostic clearly showing midnasal narrowing.

Management

Ideally this condition is managed conservatively. The affected child's midface should be allowed to grow. Just 6 months of growth will alleviated symptoms drastically.

Children who still suffer from nasal obstruction and failure to thrive should receive periodical nasal cavity dilatation and stenting. Nasal stents should be left in place ideally for a minimum period of 3 months.

Nasal Agenesis

This is an extremely rare congenital deformity involving the nose. Complete arhinia is very rare. It can occur in isolation or part of a syndrome.

It originates during the 5th week of intrauterine life when the nasal placodes fails to canalize to form the nasal cavity.

These infants present with acute respiratory distress at birth. Immediate insertion of oral airway alleviates cyanosis. Tube feeding should be resorted to.

Tracheostomy may be required in rare cases.

Surgical treatment:

This is definitive in nature and involves a two stage procedure which are aimed at reconstructing the nasal cavity as well as the external nose. Surgery is usually delayed till development of face is complete.

Congenital nasal cysts

Dermoid cyst

Dacryocystocele

Thornwaldt cyst

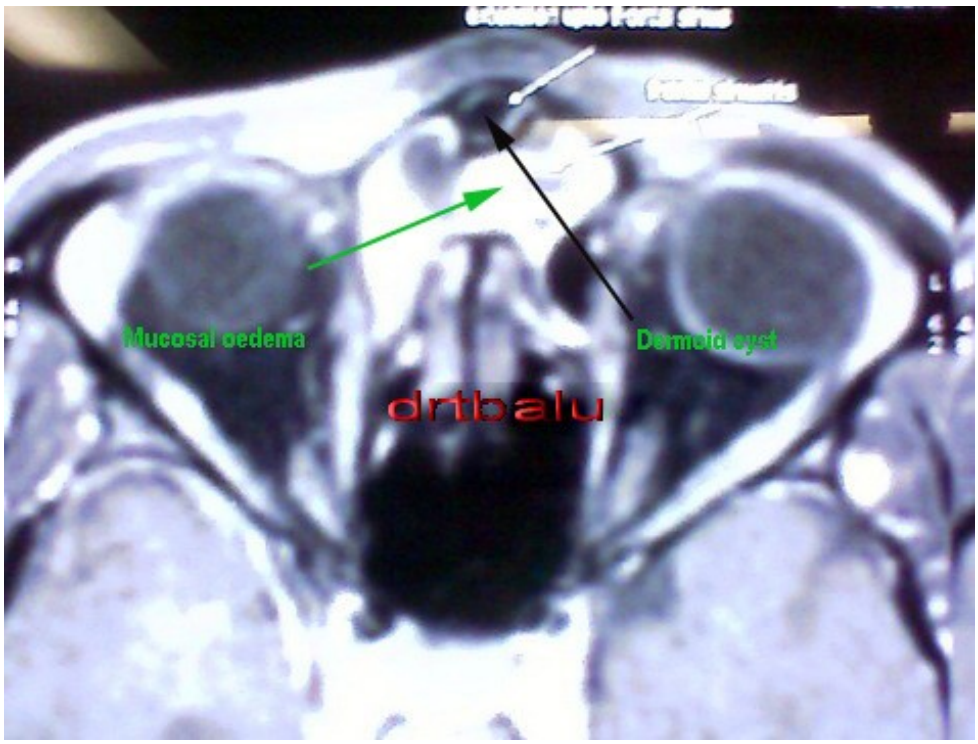
Nasoalveolar Cysts

Dentigerous cyst

Mucous cyst

Dermoid Cyst

Slowly growing cystic mass in midline of nose



Common Midline Nasal mass

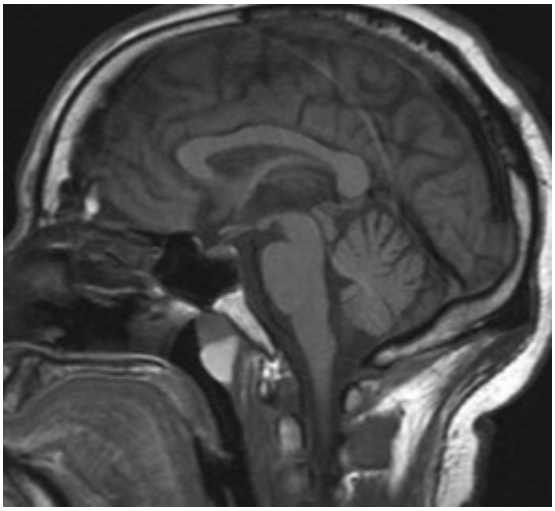
A pit can be Found in the Dorsum of nose

Infection can cause abscess

Management – Surgical excision

Thornwald cyst

This is a pharyngeal recess / bursa that is situated in the midline of posterior wall of nasopharynx.



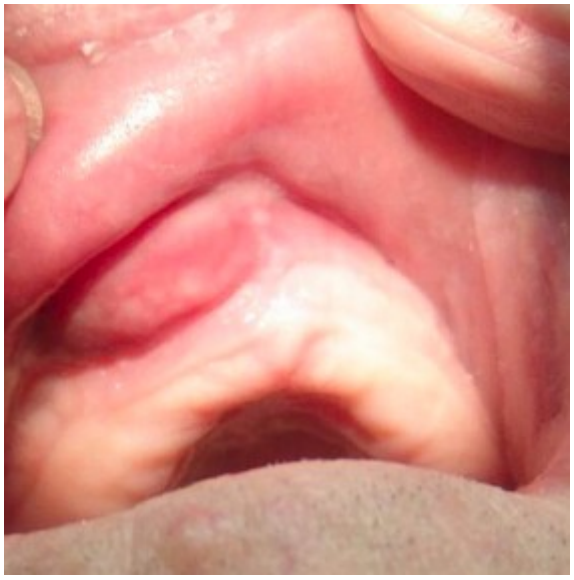
Inflammation of this cyst can cause acute nasal obstruction and ear fullness and pain.

CT scan and nasal endoscopy are diagnostic

Incision and drainage of cyst contents will give temporary relief. Complete excision needs to be performed using transpalatal approach.

Nasoalveolar cysts

These are non odontogenic cysts arising from incisive canal during the development of maxilla. These are also known as nasolabial cyst or Klestadt's cyst.



Bilateral Cysts Cause nasal obstruction

Can be unilateral Or Bilateral

Two theories of origin have been proposed:
1. These cysts develop from residues of nasolacrimal canal

2. These cysts could be embryonic fissure cysts

Managed by excision via sublabial approach

Mucous cysts

These cysts are known to appear anywhere in the nose. It is more common in the floor of the nasal cavity. These cysts are congenital. In adults it is more or less arises as a complication of rhinoplasty.

This condition is managed surgically by excision. Endoscopic / open approaches are possible.

Nasal Masses

1. Encephalocele / Meningocele / Glioma
2. Nasal Hemanigiomas
3. Teratoma
4. Hamartomas
5. Chordomas
6. Craniopharyngeomas

Encephalocele / Meningocele / Glioma

Nasal encephalomeningomyelocele represents herniation of meninges with or without associated brain herniation via defect in the skull base.

Meningocele consists of either meninges alone or with CSF.

An encephalocele contains brain tissue.

Combined incidence of these lesions – 1 in 4000 live births.

Encephaloceles can be frontoethmoidal or basal. Frontoethmoidal types are usually associated with craniofacial deformtities as they arise close to foramen cecum. Basal types cause nasal obstruction as they present intranasally through defects in the skull base. They also cause widening of nasal bridge.

Nasal gliomas are benign midline masses containing glial cells, fibrous and vascular tissue. They are similar to encephaloceles but have become separated from intracranial structures. Some 10% could retain their intracranial connection. There is no associated brain abnormality. These swellings appear are non compressible reddish masses.

Differences between gliomas & Encephaloceles

Gliomas	Encephalocele
Can arise from lateral nasal wall and hence cannot be probed laterally	Probe will pass laterally but not medially
Compression of internal jugular vein does not cause enlargement of gliomas	Compression of internal jugular vein causes encephalocele to enlarge (Frustenberg test)
MRI is effective as it could pick out unossified cartilage which could be seen as dehiscent area in CT	MRI will clearly show skull base dehiscence and continuity of the mass with intracranial structures

Management

Surgery:

This is curative. Surgical excision is recommended for lesions causing significant problems. Endoscopic approach is preferred to conventional external rhinoplasty approach. Glial tissue are easy to remove because they don't commonly have intracranial communication / skull base defect.

Encephaloceles and meningoceles require otolaryngological and neurosurgical expertise if surgery should be performed. VP shunt should be performed before the start of surgical procedure. Nasal component can be removed transnasally, while intracranial component can be removed using bicoronal approach and frontal craniotomy.

Endoscopic approach with repair of skull base defect can be performed without resorting to extensive intracranial surgical procedure.

Nasal Hemangioma

Vascular anomalies like hemangiomas, AV malformations and lymphatic malformations may present as intranasal mass lesions. Classically hemangiomas are absent / flat at birth. They undergo rapid expansion in size by 6 weeks of age. Growth continues till the child is 6 years of age following which it begins to involute gradually.

CT and MR imaging are diagnostic. Contrast administration ensures better visualization of the mass.

Can be managed conservatively as the lesion can undergo spontaneous involution.

Medical management:

Use of oral propranolol is really helpful. Use of chemotherapeutic agents like methotrexate and vincristine should be viewed with caution.

Surgery is indicated only when the mass encroaches into orbit threatening vision.

Teratoma

This is a true neoplasm consisting of all three germ cell layers. These cells could be of varying maturity. These lesions are known to occur in 1 – 4000 live births.

Maternal serum alpha fetoprotein levels and beta HCG levels could be elevated.

These lesions appear as heterogenous masses in MRI. They may be pedunculated giving them mobility in varying directions.

Management:

Surgical. Endoscopic / open approach depending on the size of the lesion.

Acquired pathologies

Osseocartilagenous septal deformities:

These are caused due to injuries sustained to nasal septum during delivery. If the deviation is severe then closed reduction within the first few days of birth has been found to be useful. Conservative management is ideal by inserting oral airway.

Surgical repair is deferred till the growth of middle third of the face is completed.

Neonatal rhinitis:

Swelling of nasal mucosa due to neonatal rhinitis can cause significant feeding problems. This condition can be managed conservatively by using saline douching and sucking out nasal secretions using a bulb suction. Rarely congenital syphilis can cause this problem in which case appropriate antibiotic should be administered