# Nasal obstruction in children

***Nasal obstruction is a common complaint in children. It usually is a self-limiting condition and resolves without treatment. Diagnosis is predicated on detailed history and a systematic clinical examination of the child. This article reviews the common causes of nasal obstruction encountered in children.***

Nasal obstruction is a common complaint in children. It usually is a self-limiting condition and resolves without treatment. Diagnosis is predicated on detailed history and a systematic clinical examination of the child.

Most cases are secondary to rhinitis and enlargement of the adenoids. Symptoms such as rhinorrhoea, mouth breathing, feeding problems, snoring and sleep disturbance are frequent but may cause significant discomfort for the child, and their importance can easily be underestimated.

Occasionally, children may present with failure to thrive, significant nocturnal obstruction, intermittent cyanosis or sleep apnoea. Such symptoms should raise alarm bells as these may be a prelude to potentially more serious conditions such as pulmonary hypertension and cor pulmonale.

As with most conditions, the many causes of nasal obstruction in children can be categorized into congenital and acquired. However, a more practical approach to understanding nasal obstruction in children is to consider common aetiologies within each age group. The purpose of this article is to provide a succinct yet useful review of the most prevalent causes of nasal obstruction which may be encountered by non-ear, nose and throat specialists in hospital and the community.

## Neonate (0–30 days)

### Choanal atresia

Choanal atresia is the developmental failure of the nasal cavity to communicate with the nasopharynx. Since infants are obligate nasal breathers, the complete nasal obstruction resulting from bilateral choanal atresia (*Figure 1*) presents as a neonatal emergency. Typically, neonates present with cyclical cyanosis relieved by crying (Corrales and Koltai, 2009).

Choanal atresia is a relatively rare congenital anomaly and occurs in approximately 1 in 5000 to 8000 live births. It is more common in girls (female to male ratio of 2:1) and is associated with other congenital anomalies in up to 50% of cases.

The most common associated congenital anomaly is the CHARGE syndrome (C = coloboma, H = heart disease, A = atresia of choanae, R = retarded growth and development, G = genital hypoplasia, E = ear deformities or deafness). Other anomalies associated with choanal atresia include polydactyly, nasal-auricular and palatal deformities, Crouzon's syndrome, Down syndrome, Treacher–Collins syndrome, DiGeorge syndrome, craniosynostosis, microencephaly, meningocele, meningoencephalocele, facial asymmetry, hypoplasia of the orbit and mid-face, cleft palate and hypertelorism.

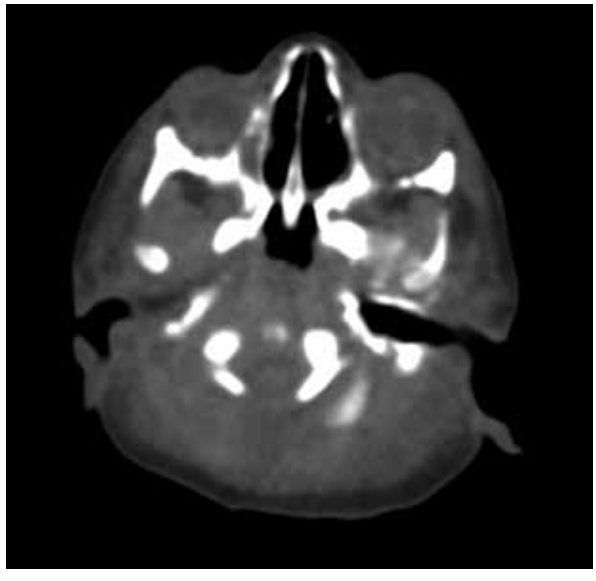
The diagnosis is confirmed by inability to pass a fine nasal catheter. There is also a lack of misting on a cold metal spatula held under the nose. The differential diagnosis includes neonatal rhinitis and the very rare piriform aperture stenosis.

Unilateral choanal atresia will only obstruct one side of the nose and so it does not present as a neonatal emergency but manifests itself as unilateral nasal obstruction and discharge in an otherwise well but older child (*Figure 2a*).

In the emergency situation in bilateral choanal atresia, a McGowan nipple is used to maintain the airway, particularly during transfer to a tertiary centre, until emergency surgery can be performed.

A preoperative computed tomography scan is helpful in assessing the atresia before surgery (*Figure 2b*).

***Figure 1. Axial computed tomography scan of bilateral choanal atresia in a newborn child.***



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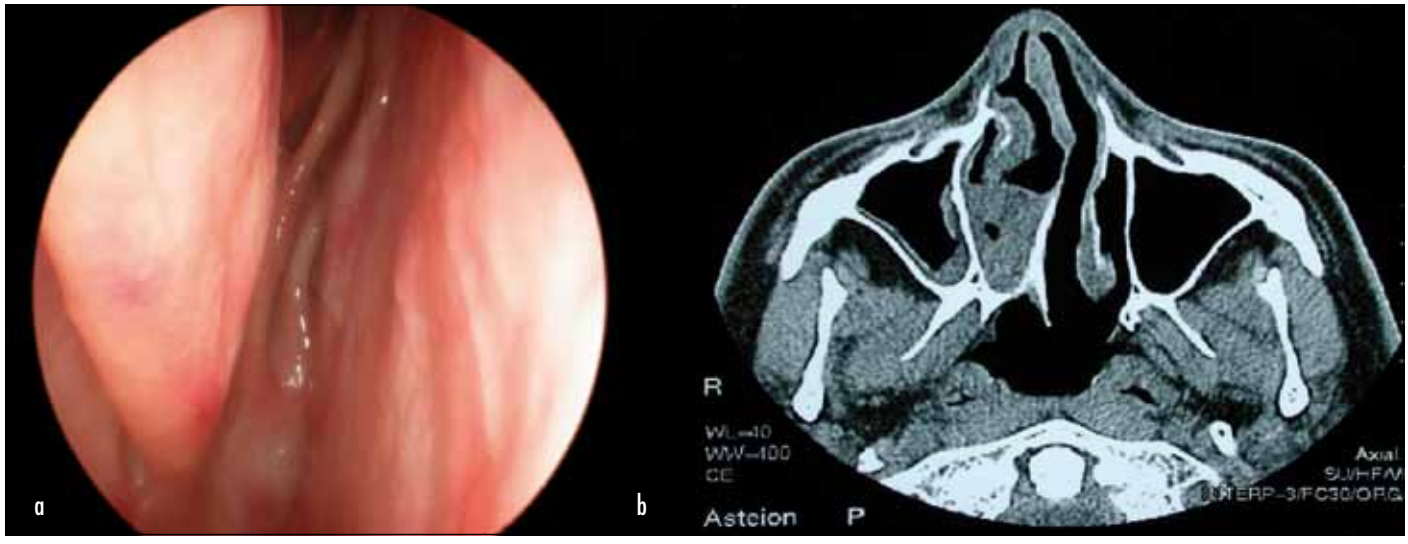



*Figure 2. a. Endoscopic view of the obstructed nasal cavity as a result of choanal atresia. b. Corresponding axial computed tomography scan of the same patient demonstrating unilateral choanal atresia.*

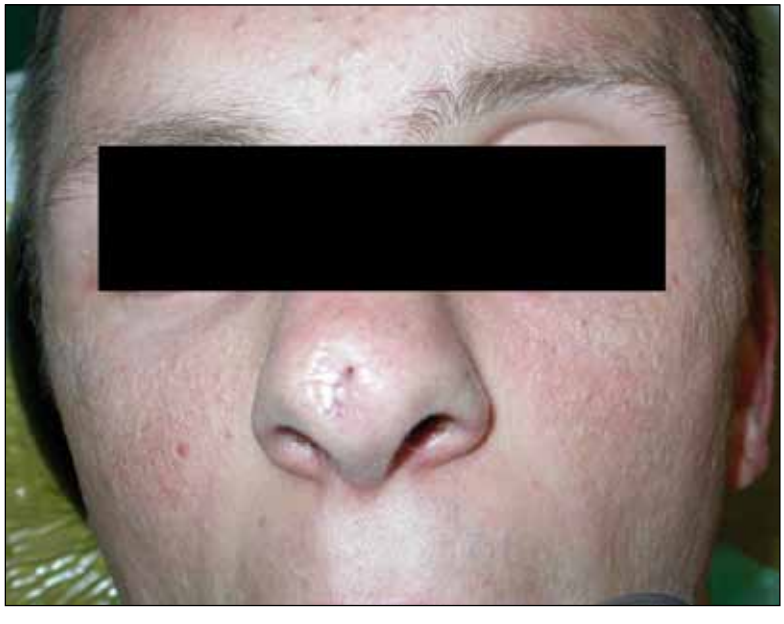
The mainstay of treatment is surgery to open the nasal airway to the nasopharynx. Traditionally this used to be performed entirely through the roof of the mouth. However, the current surgical management involves dilatation of the atretic segment with a urethral sound and/or drilling the bony section of the stenosis under direct guidance while observing the atretic segment with a 120° rigid endoscope. Patency is maintained with a stent until healing has taken place, following which further dilatations may be necessary with increasing age.

## Infants (birth–12 months)

### Congenital midline nasal masses

Congenital midline nasal masses are rare congenital anomalies that include nasal dermoids (*Figure 2*), nasal gliomas and encephaloceles. These are estimated to occur in only 1:20 000–40 000 of live births but they are clinically important because of their potential for communication with the intracranial cavity.

*Figure 3. Clinical photograph of a nasal dermoid with a sinus tract opening at the tip of the nose.*



**Nasal dermoid**

This is a cystic sac-like growth that is usually sited over the bridge of the nose. Dermoid cysts can contain a combination of hair, fluid, teeth or skin glands. The cyst may exist in isolation as a smooth mass over the nasal dorsum or there may be a sinus tract opening onto the nasal dorsum, with hair around the external opening and discharge of pus or sebaceous material (*Figure 3*). Dermoid cysts are slow growing but are prone to infection, when they will then enlarge acutely and become tender (Blake et al, 2006).

**Meningo-encephaloceles**

These are extracranial herniations of the meninges and/or brain which maintain a connection with the subarachnoid space. Herniation of the meninges only is termed a meningocele (*Figure 4*), whereas if brain is present, the term meningo-encephalocele is used. Encephaloceles may present externally as nasal broadening, as a blue pulsatile compressible mass near the nasal bridge that enlarges with crying or with bilateral compression of the internal jugular veins (Furstenberg test), or as an intranasal mass arising from the cribriform plate.

**Gliomas**

These consist of neuroglial elements with glial cells in a connective tissue matrix with or without a fibrous connection to the dura. Nasal gliomas are typically firm non-pulsatile masses that present on the nasal dorsum and/or the lateral nasal wall. There may be telangiectasia of the overlying skin and they do not enlarge with bilateral compression of the internal jugular veins. In contrast to

encephaloceles, nasal gliomas do not transilluminate (Okumura et al, 2012).

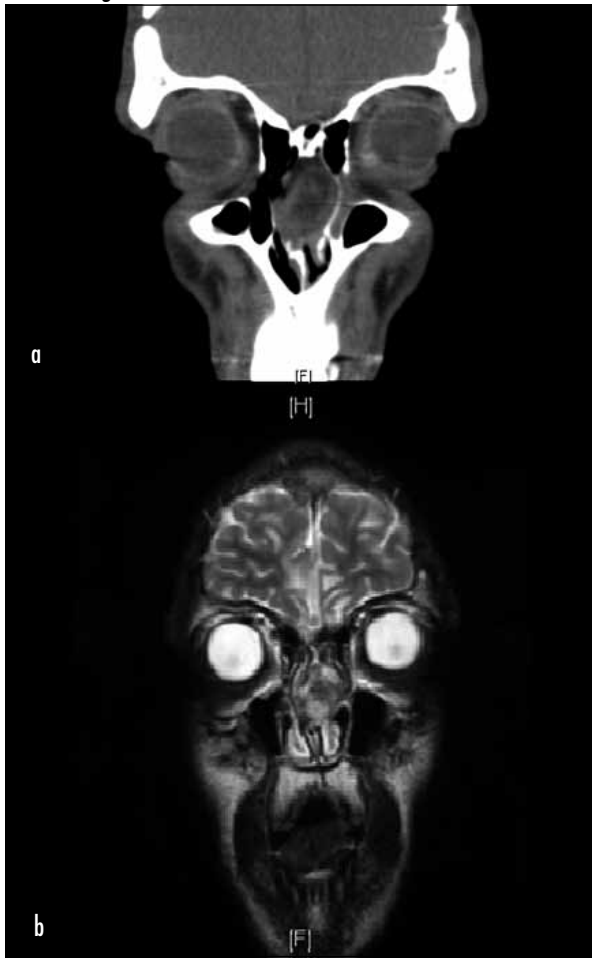
Preoperative assessment for intracranial extension is essential. A computed tomography scan of the sinuses with brain settings is helpful for bony anatomy while magnetic resonance imaging will delineate intracranial extension (*Figure 5*).

The treatment of mid-line nasal masses is surgical excision. Early surgical excision is recommended to prevent complications such as meningitis or further expansile destruction of local tissue. Intranasal lesions can be approached via endoscopic techniques but combined endonasal and external approaches are often required, particularly in dermoids with an external sinus and punctum. Masses that have an intracranial connection will require a combined approach with a neurosurgeon. The extracranial mass is excised, the intracranial portion of the mass is removed via a frontal craniotomy and the bone-dura defect is repaired.

### Thornwaldt's cyst

This is a rare developmental anomaly in which a visible cyst or discharging sinus forms in the midline on the posterior wall of the nasopharynx. This causes a foul-smelling discharge from the nasopharynx (Magliulo et al, 2001).

***Figure 4. a. Coronal computed tomography and (b) magnetic resonance image of a child with a large dermoid cyst presenting with meningitis.***




## Toddler (1–3 years)

### Foreign bodies

This age group is notorious for putting objects in their noses. Usually, the object is placed only in one nostril. The parents may well be aware of the problem at the time, but more often than not, the child presents with a unilateral discharge. Occasionally, an inert object can remain in the nose for years and form a nidus for the development of a rhinolith.

The treatment of nasal foreign bodies is removal, and may require a short general anaesthetic.

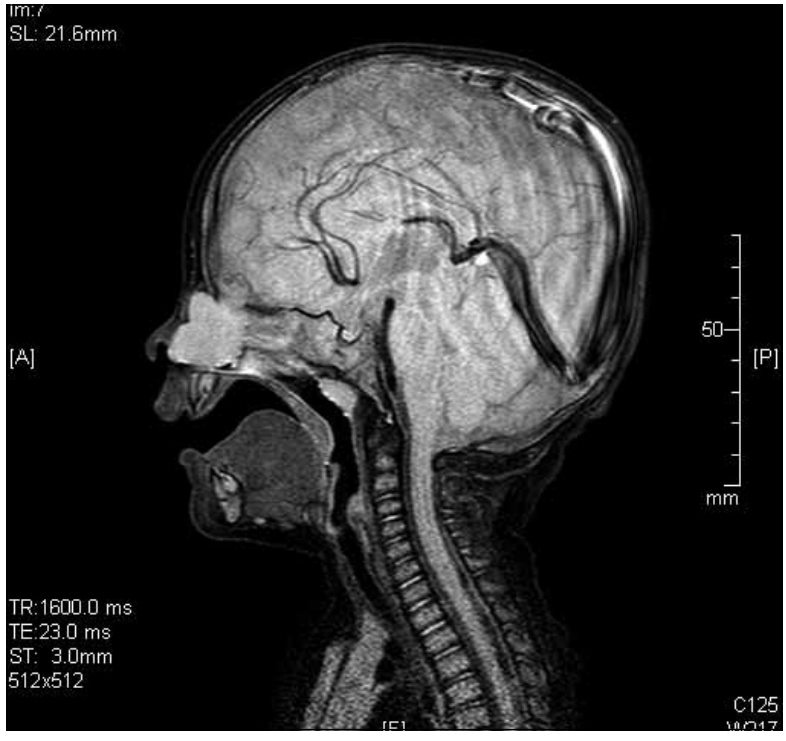
## Pre-school (3–5 years)

### Adenoidal hyperplasia

The adenoid refers to a mass of lymphoid tissue on the posterior wall of the nasopharynx that forms part of Waldeyer's ring. At birth, the adenoid is normally small and does not impinge of the nasal airway. Frequent exposure to recurrent upper respiratory infections during early in life may lead to adenoidal hyperplasia. Eventually large adenoids will impinge on the nasopharyngeal airway. They may also induce mucociliary stasis with concomitant local inflammation, infection and near-total obstruction.

Large adenoids will necessitate chronic mouth breathing and lead to the classic appearance of 'adenoid facies' with an open mouth and blank expression. It has been

***Figure 5. Sagittal magnetic resonance imaging scan demonstrating a large meningocele prolapsing into the nasal cavity of a child.***



suggested that chronic mouth breathing during the age of active facial skeleton growth results in facial structural changes. The features of adenoid facies include elongated face, pinched nostrils, open mouth, high arched palate, shortened upper lip and a vacant expression. The teeth of the upper jaw are often irregular and crowded and there is malocclusion of the upper and lower jaws.

A Cochrane review (Zhang et al, 2008) concluded that evidence derived from five randomized controlled trials suggests that intranasal steroids may significantly improve symptoms of nasal obstruction in children with adenoidal hypertrophy and that this improvement may be associated with the reduction of adenoid size. The relative size of the adenoid compared to the space in the nasopharynx will generally get less with growth and a 'watch and wait' policy is often a wise decision in these children.

The alternative method of treatment to intranasal steroids is adenoidectomy. This can be done with sharp curettes, coblation or suction diathermy. The operation is often combined with tonsillectomy if the child has recurrent acute tonsillitis or large obstructing tonsils.

Large adenoids are not restricted to this age group and are often seen in school-age children. They become less common in teenagers but occasionally persist into adulthood. However, such patients often have significant problems with allergy that drive the inflammatory response in the adenoid.

## School age (6–12 years)

### Rhinitis

The commonest cause of nasal obstruction in this age group is rhinitis, often combined with adenoidal hypertrophy. This is most often caused by allergy, and presents as a blocked runny nose with significant congestion of the nasal mucosa. On occasions, the inferior turbinate may be so large that it becomes easily visible in the anterior nares and can be mistaken for a nasal polyp.

Rhinitis is one part of the spectrum of chronic rhinosinusitis in which there may well be associated sinus inflammation and sometimes infection.

A significant number of these children will either have asthma or go on to develop asthma, and it has been demonstrated that actively treating the rhinitis can prevent the development of asthma.

Treatment consists primarily of topical steroid sprays and oral antihistamines. The latter are easier to administer in children but are usually not as effective on their own.

### The large inferior turbinate

This is not a disease but more a feature of gross nasal congestion secondary to rhinitis. The inferior turbinates naturally vary in size with the nasal cycle in most people, but when chronically congested they can remain large constantly.

In most patients they will reduce in size once the rhinitis is under medical control. However, in resistant cases it may be necessary to reduce the size of the turbinate surgically. There are many techniques for doing this, including partial anterior third excision, submucosal diathermy and coblation. The authors prefer to preserve the mucosa and reduce the bulk of the soft tissue by a mini-microdebrider passed submucosally.

### Antrochoanal polyp

An antrochoanal polyp is a unilateral solitary polyp with a cystic component that arises within the maxillary sinus. A large polyp will enlarge the sinus ostium and encroach on the nasal cavity, sometimes hanging dependently in the nasopharynx and oropharynx. The aetiology is not known, but it is thought that infection may be a common causative association.

Antrochoanal polyps normally present with unilateral nasal obstruction and sometimes unilateral nasal discharge. Occasionally they may prolapse sufficiently to be visible through the mouth as they hang down from the nasopharynx.

The management of an antrochoanal polyp is endoscopic excision with specific removal of the tissue at the site of origin in the base of the maxillary sinus, otherwise recurrence will ensue.

## Adolescent (13–18 years)

### Septal deformity

Deviation of the nasal septum to some degree is the norm, but sometimes this is of a degree that it causes significant impairment of airflow on one side of the nose. However, some children will have a gross deformity of the septum such that it causes disfigurement of the external nose and blocks both sides of the nasal airway.

Trauma may be the cause of some of the deformities but severe deformities can occur in the absence of any trauma.

The general principle of managing septal deformity in children is to leave it alone unless absolutely necessary. However, in some children the nasal airway is so obstructed that surgery is justified. This is a controversial area in which many surgeons will support a limited approach to minimize surgical trauma to the nose. However, this may lead to partial incomplete correction of the deformity that will require revision surgery at a later date. The authors therefore believe that when nasal surgery is necessary because of the difficulty with the airway, a radical approach should be taken to facilitate full correction of the deformity. However, the septal skeletal tissues should be preserved and reconstructed.

### Nasal polyps

Bilateral nasal polyps are a completely different condition to the antrochoanal polyp. Nasal polyps generally occur in the adult population and are uncommon in childhood. They are the end-result of a chronic inflammatory condition of the sinonasal mucosa and the correct terminology is now chronic rhinosinusitis with nasal polyposis (Fokkens et al, 2012). Should nasal pol-

yps be seen in young children, this should immediately raise the suspicion of underlying cystic fibrosis, and referral to a paediatric chest physician and a clinical geneticist should be instigated.

Treatment is with topical nasal steroid sprays and endoscopic sinus surgery in intransigent cases. A computed tomography scan of the sinuses would be necessary before contemplating endoscopic sinus surgery.

### Nasal tumours

Nasal tumours are rare in children and young adults, but occasionally they do occur. They may be benign or malignant, and the clinical behaviour and presentation is usually a good marker of this before confirmation of the pathology by nasal biopsy. Benign bony tumours can arise in children and are generally slow growing, but can be large by the time they present. In young children, the most likely malignancy is a rhabdomyosarcoma and these present with rapid growth, facial deformity and discharge.

Complete rapid work-up is necessary, often with a combination of computed tomography and magnetic resonance imaging scans as well as nasal endoscopy and biopsy.

## Conclusions

Nasal obstruction is a common complaint in children. It usually is a self-limiting condition and resolves without treatment. Diagnosis is predicated on detailed history and a systematic clinical examination of the child. Where there is concern, early referral to the ear, nose and throat specialist for further investigation is recommended. **BJHM**

*Conflict of interest: none.*

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## KEY POINTS

- Most cases of paediatric nasal obstruction are secondary to rhinitis and enlargement of the adenoids.
- Unilateral nasal obstruction and discharge may be caused by a foreign body, which warrants further investigation.
- Nasal and sinonasal neoplasms are best managed in tertiary paediatric centres.