Infant Rhinitis and Nasal Obstruction

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Introduction

In this chapter we will follow the history and management of Flavio who is 6 months and has a severe stuffy nose causing significant nasal obstruction. The features of the history which enable us to differentiate various causes of nasal obstruction in the neonate and infant will be discussed together with findings on examination, investigations, differential diagnosis and management. In the majority of infants, nasal obstruction is inflammatory. It is important to remember, however, that the nasal airway comprises almost 50% of infants total airway resistance and that the nasal valve area is the narrowest part of an infant's airway. Diagnostic techniques including the use of fibre optic nasendoscopy, CT scanning or MRI scanning can enable a definitive diagnosis.

History

When the parents present with an infant with nasal obstruction it is important to obtain a detailed history of the child's airway obstruction, particularly noting at what age it commenced, whether it is unilateral or bilateral, if it is associated with episodes of cyanosis and whether it improves when the child cries. The parent may note that the child has a nasal discharge, snoring and that there have been nasal infections, sleeping problems, issues with difficulty feeding, abdominal colic and/or epiphora. There maybe a family history of allergy and the child might have a condition or syndrome which predisposes to nasal obstruction such as Down Syndrome, craniofacial anomalies, muco-polysaccharoidoses or cerebral palsy.

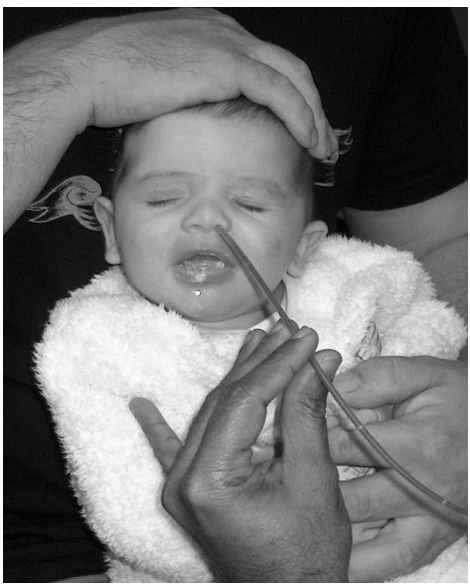
The parents should be questioned whether they have tried a decongestant nasal spray which reverses most of the nasal congestion symptoms. In the younger infant and neonate the mother should be asked regarding maternal medications which can cause nasal obstruction such as narcotics, anti hypertensives, beta blockers or antidepressants.

Examination

The child is examined closely to determine whether there is any underlying condition such as Down syndrome or craniofacial disorder as well as features of the atopic facies. Thorough examination of the ears, nasal passages and pharynx is performed to rule out associated conditions such as otitis media with effusion, palatal abnormalities, macroglossia, tonsillar hypertrophy or a mass within the nasal or oro-pharyngeal cavity. The external nose is examined for signs of an external mass such as a nasal dermoid and assessment of the nasal airflow by

placing a mirror under each nostril to determine if there is "misting" indicating airflow. If there is severely reduced mirror misting on one side this indicates significant airway obstruction on that side. In some instances decongestant nasal drops such as Phenylephrine 0.25% are necessary to decongest the airway prior to further complete examination. The fibreoptic naso-pharyngoscope (**Figure 1**) is the most useful method of visualizing the nasal cavity and nasal pharynx. The nose should be carefully examined for masses, enlarged turbinates which decrease in size after decongestion, septal deformities and at the posterior nasal cavity examination of the choana to see if there is a partial choanal atresia or choanal stenosis. In addition this view allows inspection of the adenoid in a dynamic fashion enabling assessment of the naso-pharyngeal airway. Rigid telescopes can be used but in most cases the flexible fibrescope is safer and easier to use.

Fig. 1. Fibre optic examination of the nose

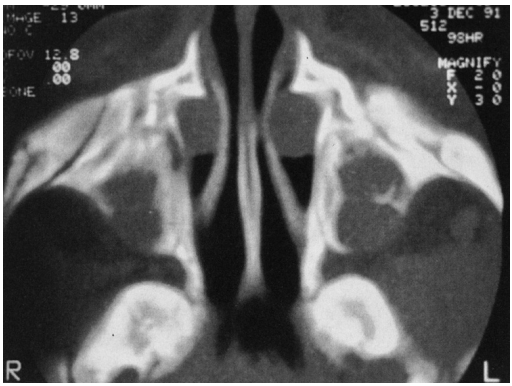


Investigations

Laboratory investigations may include a full blood count to differentiate inflammatory and infective causes of nasal obstruction and in the older infant a radio-allergosorbent (RAST test can be utilized looking for inhalant allergy such as house dust mite and grasses or ingestant allergens such as dairy products, wheat, yeast, egg, citrus fruit and soy. Immunologic testing and RAST testing may not be as accurate in this age group as in the older child. The most usual organisms detected on microbiologic testing include *H. influenzae, S. pneumoniae and M. catarrhalis* .In those cases where there is a strong history of snoring and obstructive apnoea, polysomnography may be indicated to determine the severity of the obstruction-this will also help differentiating central apnoea from obstructive sleep apnoea. If the infant has frequent obstructive episodes with desaturation below 90% and has an apnoea-hypoxia index (AHI) greater than 5, then adeno-tonsillectomy may be indicated and be beneficial in up to 80% of cases.

Radiologic examination includes plain x-ray, video fluoroscopy, contrast examinations, CT scans and MRI scans. A lateral x-ray of the postnasal space may show adenoid hypertrophy if nasendoscopy is not available. The CT scan and, to a lesser extent, the MRI examination are the radiologic investigations of choice in children with complex airway obstruction. These may demonstrate a choanal stenosis, piriform aperture stenosis, nasal dermoids, gliomas and other nasal and paranasal tumors (**Figure 2**).

Fig. 2. Bilateral Dacryocystocoele



Differential Diagnosis

In most cases the causes of nasal obstruction in the infant are related to nasal allergies, upper respiratory tract infections or bacterial infection. The other less common conditions include adenoid hypertrophy or adenotonsillar hypertrophy causing obstructive sleep disorder and obstructive sleep apnoea.

Rarer congenital anomalies may include choanal stenosis or unilateral choanal atresia. Bilateral choanal atresia is a neonatal respiratory emergency and would normally not present in later infancy - however a narrowing of the posterior choanae either by a stenosis or partial membrane or septal deformity may cause significant airway obstruction. Choanal atresia and choanal stenosis may be associated with other craniofacial anomalies or conditions such as CHARGE association. Piriform aperture stenosis is associated with overgrowth in the anterior nares of the medial aspect of the maxillae and this is confirmed by CT scanning. The congenital naso-lacrimal cyst or dacryocystocoele can cause significant nasal obstruction and the diagnosis is made clinically and with CT scan.

Further congenital abnormalities that can cause airway obstruction in the infant may include children who have had a cleft lip and palate with the cleft nose deformity, (nasal cartilage collapse and nasal tip and septal deformity). Nasal dermoids, gliomas and encephalocoeles may present with a mass on the external nose or within the nasal cavity extending to the brain. The differential diagnostic features of encephalocoele, glioma and dermoid are illustrated in **Table 1**.

Table 1. Diferential diagnostic features of encephalocoele, glioma and dermoid

Characteristic	Dermoid	Glioma	Encephalocele
Appearance	Dimple, Hair, Solid	Reddish-blue, solid. Noncompressible. Telangiectasia	Bluish, soft. Compressible
Location	Intranasal and external	Intranasal and external	Intranasal and external
Pulsation	No	No	Yes
CSF leak	Rare	Rare	Yes
Furstenburg Test	Negative	Negative	Positive
Transillumination	No	No	Yes
Cranial Defect	Rare	Rare	Yes
Past history	Local Infection	Rare	Meningitis

Inflammatory and Infective causes of nasal obstruction may include nasal allergy, ethmoid and maxillary sinusitis and rarely congenital syphilis. Iatrogenic causes of nasal obstruction include rhinitis medicamentosa with rebound nasal obstruction secondary to excessive use of topical nasal decongestant drops, early cleft palate repair with airway compromise and maternal medications in the breast feeding infant as mentioned previously.

Nasal obstruction may also occur with foreign bodies, nasal septal deformity and septal haematoma secondary to trauma to the nose.

Benign tumors such as hemangioma and malignant tumors such as rhabdomyosarcoma may present in this age group.

Management

The majority of nasal obstruction in infants will respond to simple measures such as saline irrigation, topical decongestants for 4-7 days or topical steroid sprays such as mometasone which has 0.1% cortisone absorption and is therefore safe to be used in this age group. Generally systemic antihistamine-decongestants are not as effective as topical treatment. In the more severe cases such as choanal stenosis or piriform aperture stenosis, surgical management will be necessary involving telescopic or microscopic repair of the stenotic area. In some cases correction of a unilateral choanal atresia or stenosis may be deferred until the child is 4-5 years of age but in the more severe instances early and urgent treatment is necessary. This is often the case with piriform aperture stenosis, the midline nasal masses and adenotonsillar hypertrophy with polysomnographic evidence of significant airway compromise.

Fortunately in this case Flavio had only mild adenoid hypertrophy and allergic rhinitis, improving dramatically after nasal steroid spray treatment.

Recommended readings

1. Coates H. Nasal Obstruction in Infancy in Cotton R, Myer C. (Eds) *Practical Pediatric Otolaryngology*. Lippincott-Raven Pub. Philadelphia. 1999.
2. Coates H. Neonatal Nasal Obstruction. *Japan Journal of Rhinology* Vol 38 No. 2:191-198. 1999.
3. Ahmed J, Marucci D, Cochrane L, Heywood RL, Wyatt ME, Leighton SE. The role of the nasopharyngeal airway for obstructive sleep apnea in syndromic craniosynostosis. *J Craniofac Surg*. 2008 May;19(3):659-63.
4. Contencin P, Guilleminault C, Manach Y. Long-term follow-up and mechanisms of obstructive sleep apnea (OSA) and related syndromes through infancy and childhood. *Int J Pediatr Otorhinolaryngol*. 2003 Dec;67 Suppl 1:S119-23.