Rhinology, 27, 91-96, 1989

Nasal obstruction in the neonate

Sally R. Shott, Charles M. Myer III, Robert Willis and Robin T. Cotton

Dept. of Pediatric Otolaryngology, Children's Hospital Medical Center, Cincinnati, Ohio, U.S.A.

SUMMARY

At birth, the neonate is an obligate nasal breather and any compromise of the nasal passages is potentially life threatening. It is important for the otorhinolaryngologist to quickly recognize and manage even subtle constrictions or obstructions of the nasal passages in this age group. Many times the nasal airway is disregarded as the source of airway difficulty if small catheters can be passed. Conversely, the inability to pass nasal catheters is often arbitrarily diagnosed as choanal atresia or stenosis. This limited outlook can delay appropriate therapy.

The differential diagnosis of nasal obstruction in the neonate is presented with emphasis on evaluation of nasal obstruction in anatomically normal appearing noses.

At birth, the neonate is an obligate nasal breather. Though mouth breathing becomes learned behaviour sometimes within a few months after birth, prior to this time any compromise of the nasal passages is potentially life threatening. Total obstruction is not required before problems occur in this age group. Because the resistance to the flow of air is inversely proportional to the fourth power of the diameter of the tube through which it flows, even though there may be only partial obstruction, the level of patency may be below that critical diameter rendering the patient with total physiologic nasal obstruction. Neonates with partial nasal obstruction may exhibit irregular breathing patterns and feeding difficulties as they try to suck and breathe through the same orifice. This can be associated with recurrent aspiration and failure to thrive.

Many times, if small nasal catheters can be passed, the nasal airway is disregarded as the source of airway difficulty. Conversely, the inability to pass nasal catheters is arbitrarily diagnosed as choanal atresia. This limited outlook can delay appropriate therapy.

Paper presented at the 12th Congress of the European Rhinologic Society including the VIIth I.S.I.A.N., Amsterdam (The Netherlands), June 1988.

Table 1. Nasal obstruction in the neonate – differential diagnosis.

most common	uncommon	rare
septal deviation	choanal atresia or stenosis	congenital syphilis
"stuffy nose" syndrome	anterior nasal stenosis	median nasal cleft anomalies
enlarged turbinates	rhinitis medicamentosa	bifid nose
	adenoid hypertrophy	cebocephaly
	septal haematoma	proboscis lateralis
	nasolacrimal duct mucocele	facial retrusion
	nasal dermoid	polyrhinia
	glioma	nasal agenesis
	encephalocele	
	vascular malformations	
	hypothyroidism	
	nasopharyngeal tumours	
	nasopharyngeal stenosis	

As seen in Table 1, nasal obstruction is associated with some obvious anatomic abnormalities of the mid-face. However, we will only review those that occur in normal appearing neonates.

CHOANAL ATRESIA

Choanal atresia can be anterior or posterior in location. Posterior atresia occurs because of failure of the bucconasal membrane to rupture. Between normal size choanae and atresia is a continuum of stenosis. If the cross-sectional area falls below a critical level, total physiologic obstruction will occur (Poiseuille's law). However, if there is stenosis and only mild airway problems with feedings, observation may be the only treatment required. The nasal cavity continues to enlarge after birth and the problem may spontaneously resolve.

Anterior atresia can be either bony or membranous and is associated with undeveloped nostrils. Between the second and sixth week of gestation, the anterior nares are closed by an epithelial plug. Failure of resorption of these plugs results in anterior atresia or stenosis. It is important to differentiate this from the diagnosis of unilateral agenesis by the presence of posterior choanae or a partial nasal chamber on radiologic evaluation.

CONGENITAL SEPTAL DEFORMITY

A deviated septum can cause respiratory distress. Deviated septums occur in 1% of newborns and are felt to be secondary to trauma to the nose during a vaginal birth or by misplaced forceps (Jaffe, 1981). Chronic pressure to the nose within the womb can cause septal deviation and, therefore, babies born through C-sections can have obstructing nasal septa.

The obstruction can be clinically obvious and easily attributed to trauma or can

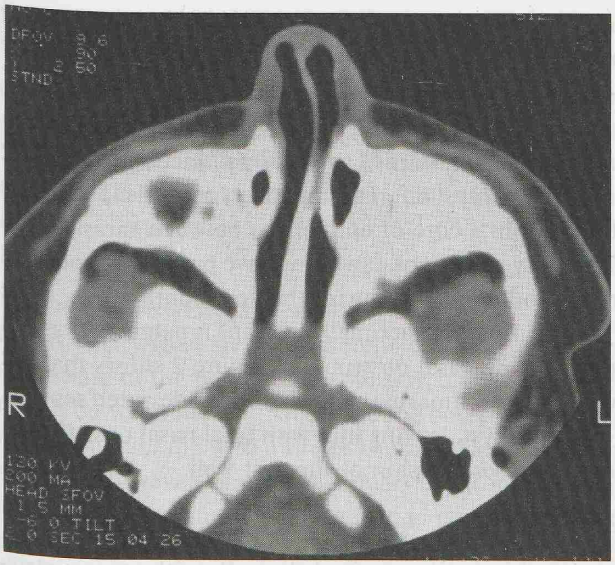

Figure 1. Posteriorly located nasal septal deformity with nasal obstruction.

be diagnosed only after radiologic evaluation, as in Figure 1 showing a posteriorly located septal obstruction.

Treatment by closed septal reduction with no need for anaesthesia should be done during the first week of life. It is important to recognize this cause of nasal obstruction as it can easily be corrected at the bedside. Delay in treatment will subject the patient to needing more surgery.

SEPTAL HAEMATOMA

Septal haematomas can also be caused by birth trauma. Treatment with proper incision and drainage should be done before chondritis of the septal cartilage occurs causing loss of nasal support and gross cosmetic deformity.

STUFFY NOSE SYNDROME

The "stuffy nose syndrome" is secondary to hypertrophy of the turbinates in the newborn and is of undetermined etiology (May, 1973). The nasal obstruction and associated respiratory problems last for several days to weeks and usually resolve spontaneously. Symptomatic treatment is with nasal decongestants, McGovern nipple, or nasal stents if more prolonged.

ADENOID HYPERTROPHY

Adenoid hypertrophy in a child born with a craniofacial malformation can cause serious nasal obstruction. Newborns with craniofacial dysostosis, high arched

palate or Down's syndrome will have a contracted nasopharynx and even mild adenoid hypertrophy can cause nasal obstruction (Holinger, 1981).

NASOLACRIMAL DUCT CYSTS

Nasolacrimal duct cysts are caused by failure of the lacrimal duct to perforate at the distal end, resulting in not only a cyst but recurrent dacryocystitis. The entire nasolacrimal apparatus forms from a core of epithelium between the skin and nasal mucosa (Lusk, 1987). Thirty percent of newborns have patent nasolacrimal ducts at birth; the remainder should canalize during the first month of age. If the distal end is imperforate but the proximal lacrimal apparatus is patent, a cyst will form in the inferior meatus causing nasal obstruction. Figure 2 shows that not only the child was born with a nasolacrimal cyst, but also with a deviated septum, possibly due to pressure from the cyst, leaving him with total nasal obstruction. Treatment is by cup forceps or laser excision of the cyst wall.

RHINITIS MEDICAMENTOSA

Rhinitis medicamentosa occurs in neonates treated clinically with vasoconstrictor nasal drops who then develop rebound nasal congestion secondary to oedema of the turbinates. While this can be an annoyance to an adult, it can cause serious airway problems in the nasal dependent neonate. The tachyphylaxis associated with these drops is not understood by most parents who easily abuse the drops. Topical vasoconstrictors can also cause cardiac and pulmonary side effects, hypertension, over-sedation or even coma in neonates (Osquthorpe, 1987). The drops should be discontinued and water or normal saline drops and suctioning used. Nasal stents and apnea monitors should be used if nasal oedema and obstruction are severe.

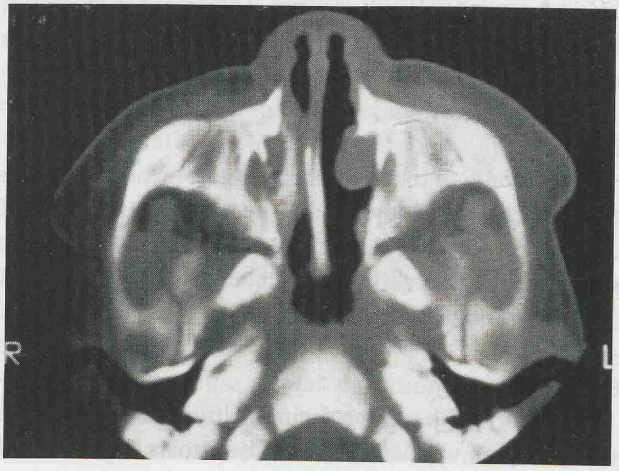

Figure 2. Nasolacrimal duct cyst with concomitant nasal septal deformity.

VASCULAR MALFORMATIONS

Vascular malformations can present in the nose and cause obstruction. Haemangiomas are the most frequently observed tumour in the head and neck in children. Recently, obstruction from a venous angioma was reported (Myer, 1988). Because of the high likelihood of nasal trauma and the possibility of catastrophic haemorrhage, vascular malformations in the nose should be excised if at all possible.

NASOPHARYNGEAL STENOSIS

In nasopharyngeal stenosis, there is complete or incomplete attachment of the soft palate to the posterior nasopharynx. Diagnosis is easily established by palpation between the soft palate and the posterior pharyngeal wall. Bluntly breaking the membrane with a finger is usually all that is required in true congenital stenosis. However, stenosis secondary to chronic inflammation (e.g. secondary to syphilis) or post-surgical changes (e.g. post tonsillectomy and adenoidectomy) usually requires a series of mucosal flaps (Myer, 1983; McDonald, 1973).

NASAL ENCEPHALOCELES, GLIOMAS, AND DERMOIDS

Nasal encephaloceles and gliomas are due to faulty closure of the anterior neuropore. Gliomas have no direct communication with the meninges, though there may be herniation of brain tissue into the nose. Encephaloceles freely communicate with the intracranial spaces. Thirty percent present intranasally. CT scans are mandatory to delineate intracranial involvement (Hughes, 1980).

CT scans are also needed before operating on nasal dermoids (Hughes, 1980). Nasal dermoids will frequently present as a pit on the nasal dorsum with an extruding hair. They can be quite superficial or may extend through the nasal bone and superior nasal septum up towards the pituitary or up through the cribriform plate.

CONCLUSION

In summary, when a neonate presents with nasal obstruction, emergency measures need to be taken to establish an oral airway. These include placement of an oral airway, McGovern nipple, endotracheal intubation and even tracheotomy if a secure airway cannot be achieved.

Evaluation of the nose is then undertaken to establish the exact etiology of the nasal obstruction. While passing catheters, use of cotton wisps, mirrors and radiologic evaluation using radiopaque dyes have been used in the past, flexible and rigid nasopharyngoscopy examination and CT evaluation are now more helpful in establishing the diagnosis. Once the proper diagnosis is established, specific definitive treatment can be planned.

REFERENCES

1. Benjamin B. Evaluation of choanal atresia. Ann Otol Rhinol Laryngol 1985; 94: 429-432.
2. Holinger LD, Weis KS. Diagnosis and management of airway obstruction in craniofacial anomalies. Otolaryngol Clin North Am 1981; 14:1005-1017.
3. Hughes GB, Shapiro G, Hunt W, Tucker HM. Management of the congenital nasal mass: A review. Head Neck Surg 1980; 1:222-233.
4. Jaffe BF. Classification and management of anomalies of the nose. Otolaryngol Clin North Am 1981; 14:989-1004.
5. Lusk RP, Muntz HM. Nasal obstruction in the neonate secondary to nasolacrimal duct cysts. Int J Ped Otol 1987; 13:315-322.
6. May M, West JW. The "stuffy" nose. Otolaryngol Clin North Am 1973; 6:655-674.
7. McDonald TJ, Devine KD, Hughes AB. Nasopharyngeal stenosis following tonsillectomy and adenoidectomy. Arch Otolaryngol 1973; 98:38-41.
8. MacKenty JE. Nasopharyngeal atresia. Arch Otolaryngol 1972; 6:1-27.
9. Myer CM, Cotton RT. Nasal obstruction in the pediatric patient. Pediatrics 1983; 72:766-777.
10. Myer CM, Miller R, Gray S. Nasal presentation of an intracranial vascular anomaly. (In press)
11. Osquthorpe JD, Shirley R. Neonatal respiratory distress from rhinitis medicamentosa. Laryngoscope 1987; 97:829-831.
12. Theogaraf SD, Huehn JG, Hagan KF. Practical management of congential choanal atresia. Plast Reconstr Surg 1983; 72:634-640.

Sally R. Shott, M.D.
Children's Hospital Medical Center
Dept. of Pediatric Otolaryngology
Bethesda and Elland Avenues
Cincinnati, Ohio 45229-2899
U.S.A.