

# Approach to paediatric nasal obstruction

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## Background

Paediatric patients with nasal obstruction are frequently encountered in general practice. The differential diagnosis is distinct from that of adult nasal obstruction and necessitates more judicious use of radiological and invasive investigations. Most cases of nasal obstruction in children result from benign disease, although there is a significant quality of life impact that must be addressed with prompt diagnosis and symptomatic management.

## Objective

The aim of this article is to outline the workup and management of paediatric nasal obstruction in primary care and suggest where referral to a relevant specialist is warranted.

## Discussion

Although the differential for paediatric nasal obstruction is broad, a thorough history and physical examination yields the diagnosis in most cases. Diagnoses not to be missed include nasal foreign body, lesions suspicious for neoplasia and intracranial complications of severe rhinosinusitis. Further investigation and ear, nose and throat referral should be considered when there are surgical targets for nasal obstruction, red flag signs or symptoms or failure of conservative therapy.

**NASAL OBSTRUCTION** in children is frequently encountered in general practice. Causes of paediatric nasal obstruction are diverse, and differentiating the benign from the worrisome can be challenging because of symptomatic overlap and non-specific clinical presentations. Knowledge of developmental anatomy, distinguishing clinical features and appropriate investigations allows accurate diagnosis and management of paediatric nasal obstruction in primary care.

## Developmental sinonasal anatomy

The four paired paranasal sinuses develop as outpouchings from the nasal cavity.<sup>1</sup> The maxillary and ethmoid sinuses are present at birth, the sphenoid sinuses become pneumatized between the ages of one and three years, and the frontal sinuses commence development from the age of five years.<sup>2,3</sup> Growth through pneumatization is complete by late adolescence to early adulthood.<sup>2,4</sup> The posterior ethmoid cells drain into the superior meatus, and the sphenoid sinus drains into the sphenoidal recess. The remaining sinuses drain through the ostiomeatal complex into the middle meatus.<sup>5</sup> Obstruction to physiological mucus drainage at these sites is a key factor leading to sinus disease.<sup>5</sup> The inferior turbinates humidify, filter and sense nasal airflow; their reactive mucosal

coverings can become hypertrophied and oedematous, contributing to nasal obstruction.<sup>3</sup> As a result of relative differences in paediatric nasal anatomy, resistance to nasal airflow in a child aged seven years is twice that of an adult.<sup>6</sup> The adenoids enlarge until 5–7 years of age, potentially obstructing nasal airflow through the postnasal space, before regressing in size by the age of 12 years.<sup>7</sup>

## Presenting complaint

The way in which nasal obstruction presents in children depends largely on age group. As obligate nasal breathers, newborns may present with feeding difficulties and cyanotic spells secondary to incoordination of breathing. The preverbal paediatric population may present with carer concerns about noisy nasal breathing, sniffing or poor sleep quality.<sup>8</sup> Older children present similarly to adults and may complain of subjective nasal or sinus congestion, facial pain, rhinorrhoea, anosmia and dysgeusia, and features of atopy such as pruritis, epiphora and sneezing.<sup>9</sup> In all age groups, children may present feeling generally unwell with constitutional and coryzal symptomatology.

## History and physical examination

A detailed history and focused examination are key in differentiating the

causes of paediatric nasal obstruction. Specific features that are suggestive of common and not-to-be-missed differentials are outlined in Table 1. Red flags prompting consideration of urgent ear, nose and throat referral include recurrent severe epistaxis, unilateral progressive obstruction, facial swelling or features suggestive of intracranial disease extension. Assessment of the nose begins by observing the breathing pattern during quiet respiration. Mouth breathing at rest suggests bilateral nasal obstruction. The next step is performing anterior rhinoscopy by tilting the head back and gently pressing the tip of the nose superiorly from above. Using a light source, the nose should be inspected for nasal crusting, rhinorrhoea, alignment of the nasal septum and inferior turbinate hypertrophy. Complete examination should include otoscopy evaluating for middle ear effusion, which may indicate Eustachian tube outflow obstruction from adenoid hypertrophy or postnasal space neoplasm, as well as assessment for tonsillar hypertrophy, which may contribute to sleep-disordered breathing.

## Investigations

### Imaging

Radiological imaging for paediatric nasal obstruction is generally pursued under specialist guidance only. Axial computed tomography (CT) can be useful in confirming the diagnosis of sinusitis as well as defining inferior turbinate hypertrophy and septal deviation. However, its utility is limited because of radiation conferred to the developing child, and results rarely change management, which is largely medical. Magnetic resonance imaging (MRI) better defines soft tissue structures and is useful in cases where soft-tissue lesions are suspected.<sup>9</sup> However, MRI is poorly tolerated in the paediatric population and may require admission for general anaesthesia to obtain images without movement artefact.

### Pathology and microbiology

There is no role for routine blood testing in a child presenting with nasal

obstruction. However, when children display prolonged or severe symptoms, elevated inflammatory markers may suggest bacterial complications of acute viral rhinosinusitis.<sup>10</sup> Serum-specific immunoglobulin E (IgE) testing and skin prick testing can be considered in children with features of allergic rhinitis, although non-general practitioner specialist interpretation and management of these investigations is often warranted. If mucopurulent nasal discharge is present, this can be sent for microscopy, culture and sensitivity to guide antimicrobial therapy.<sup>11</sup> However, caution must be taken when interpreting results, as organisms such as *Staphylococcus aureus* and *S. epidermidis* constitute normal flora of the nasal cavity, while other potential pathogens such as *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis* have been isolated in well patient populations.<sup>12,13</sup>

## Differentials and their management

### Allergic rhinitis

Allergic rhinitis results from an IgE-mediated immune response to seasonal or perennial allergens and typically presents with sneezing, clear rhinorrhoea, nasal itch and itchy, watery eyes. Enquiry into associated asthma and atopic dermatitis should be made as well as elucidating any family history of atopy. Symptomatic management of allergic rhinitis includes intranasal or oral antihistamines for immediate relief as well as saline sprays/rinses and intranasal corticosteroid (INCS) for recurrence prevention. Severe or persistent symptoms warrant consideration of adjunct therapy such as leukotriene receptor antagonists, especially in children with concomitant asthma.<sup>14</sup> Refractory cases may warrant allergen skin and blood testing with appropriate referral to consider targeted immunotherapy. In all cases, allergen avoidance is advised.

### Adenoid and inferior turbinate hypertrophy

Hypertrophy of the adenoids and inferior turbinates commonly results in symptomatic nasal obstruction. Inferior

turbinate hypertrophy is readily assessed on examination; findings such as mouth breathing, sleep-disordered breathing, middle ear effusions and recurrent otitis media suggest adenoid hypertrophy.

Children with adenoid and inferior turbinate hypertrophy commonly have concomitant allergic rhinitis and chronic rhinosinusitis (CRS), and an initial trial of medical management is reasonable. Failure of medical therapy warrants referral to an otolaryngologist for consideration of adenoidectomy, adenotonsillectomy and/or cauterization of inferior turbinates. Arranging formal audiometric testing with tympanometry prior to referral can facilitate simultaneous insertion of grommets, if required.

### Foreign bodies

Insertion of nasal foreign bodies is typically brought to the attention of the general practitioner by a concerned caregiver who has witnessed or been notified of the event. Unilateral nasal discharge should be considered secondary to a foreign body until proven otherwise. If not removed promptly, retained foreign bodies can result in significant nasal obstruction, rhinosinusitis, aspiration or systemic infection.<sup>15,16</sup> For occlusive nasal foreign bodies, the mother's kiss technique can be employed whereby a caregiver occludes the unaffected nostril with a finger and provides a short burst of exhaled air to the child's mouth with sealed lips. This has shown to be more effective than invasive instrumentation for occlusive foreign bodies.<sup>17</sup> For further techniques and equipment to aid removal of nasal foreign bodies, the reader is referred to a recent review by Grigg and Grigg.<sup>15</sup> Referral to the emergency department should be made if initial attempts at removal are unsuccessful; urgent referral to the nearest otolaryngology service is required for suspected button battery foreign bodies.<sup>15</sup>

### Acute rhinosinusitis

Acute rhinosinusitis comprises acute viral, acute post-viral and acute bacterial rhinosinusitis, as defined in Table 2.<sup>10</sup> Acute bacterial rhinosinusitis (ABRS)

**Table 1. Features of the history and physical examination findings supporting specific differentials for paediatric nasal obstruction**

Differential diagnosis	Features in history	Physical examination findings
Allergic rhinitis	<ul style="list-style-type: none"> <li>• Bilateral nasal obstruction</li> <li>• Nasal itching</li> <li>• Sneezing</li> <li>• Cough or scratchy throat</li> <li>• Seasonal or allergic triggers</li> <li>• Personal or family history of atopy</li> </ul>	<ul style="list-style-type: none"> <li>• Associated conjunctivitis</li> <li>• Clear rhinorrhoea</li> <li>• Infraorbital oedema</li> <li>• Erythematous nasal mucosa</li> </ul>
Adenoid/inferior turbinate hypertrophy	<ul style="list-style-type: none"> <li>• Bilateral nasal obstruction</li> <li>• Sleep-disordered breathing (apnoeas, snoring, unrefreshing sleep, daytime somnolence)</li> </ul>	<ul style="list-style-type: none"> <li>• Mouth breathing</li> <li>• Middle ear effusions</li> <li>• Tonsillar enlargement</li> <li>• Enlarged obstructive inferior turbinates</li> </ul>
Foreign bodies	<ul style="list-style-type: none"> <li>• Unilateral nasal obstruction</li> <li>• Unilateral foul-smelling rhinorrhoea</li> <li>• Admission/observation of foreign body insertion</li> <li>• Previous foreign body insertion</li> <li>• Abrupt onset of nasal obstruction</li> </ul>	<ul style="list-style-type: none"> <li>• Nasal crusting</li> <li>• Epistaxis</li> <li>• Visible foreign body</li> </ul>
Acute rhinosinusitis	<ul style="list-style-type: none"> <li>• Bilateral nasal obstruction</li> <li>• Cough</li> <li>• Discoloured rhinorrhoea</li> <li>• Duration &lt;12 weeks</li> <li>• Upper respiratory tract infection</li> </ul>	<ul style="list-style-type: none"> <li>• Anterior rhinorrhoea</li> <li>• Nasal crusting</li> </ul>
Acute bacterial rhinosinusitis	<ul style="list-style-type: none"> <li>• Bilateral nasal obstruction</li> <li>• Severe local pain</li> <li>• Subjective fevers</li> <li>• Double sickening (refer to text)</li> </ul>	<ul style="list-style-type: none"> <li>• Purulent rhinorrhoea</li> <li>• Systemically unwell</li> <li>• Documented fevers</li> </ul>
Chronic rhinosinusitis	<ul style="list-style-type: none"> <li>• Bilateral nasal obstruction</li> <li>• Facial pain/pressure</li> <li>• Cough</li> <li>• Discoloured rhinorrhoea</li> <li>• Postnasal drip</li> <li>• Duration ≥12 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• Discoloured rhinorrhoea</li> <li>• Nasal crusting</li> <li>• Classified by presence or absence of nasal polyps</li> </ul>
Neoplastic lesions	<ul style="list-style-type: none"> <li>• Unilateral progressive nasal obstruction</li> <li>• Foul rhinorrhoea</li> <li>• Iterative epistaxis</li> <li>• B symptoms – weight loss or failure to thrive, subjective fevers, night sweats</li> </ul>	<ul style="list-style-type: none"> <li>• Significant crust or dried blood</li> <li>• Visible lesion on rhinoscopy</li> <li>• Cervical or distant non-tender lymphadenopathy</li> <li>• Cranial nerve palsies, especially trigeminal sensory deficits</li> </ul>
Intracranial or orbital complication of sinonasal disease	<ul style="list-style-type: none"> <li>• Rapid deterioration in symptomatology</li> <li>• Photophobia</li> <li>• Phonophobia</li> <li>• Neck pain or subjective stiffness</li> <li>• Retro-orbital pain or pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Diplopia, extra-ocular palsy or visual acuity loss</li> <li>• Cranial nerve palsies, especially trigeminal sensory deficits</li> <li>• Meningism</li> <li>• Proptosis</li> </ul>

complicates approximately 7.5% of upper respiratory tract infections in children and is characterised by a prolonged course of illness, more severe illness or a clinical deterioration following initially mild or improving symptoms, referred to as 'double sickening'.<sup>10,18</sup> Differentiating this double sickening of ABRS from the natural course of post-viral rhinosinusitis can be difficult, although more severe disease favours ABRS.<sup>19</sup>

The mainstay of acute rhinosinusitis management is supportive therapy. Simple analgesia, saline nasal sprays/rinses and INCS should be considered. Short-term intranasal and oral decongestants should not be used in children under six years of age and must be used with caution in children under 12 years of age because of reported adverse effects including insomnia, irritability and rhinitis medicamentosa.<sup>20</sup> While there is limited evidence to recommend these measures in reducing illness time, individual patients may receive symptomatic benefit, and shared decision making should be employed to facilitate an informed treatment plan.<sup>20</sup> Antibiotic therapy for presumed bacterial rhinosinusitis should

be reserved for cases with persistent illness despite supportive measures, worsening clinical course or severe onset of symptoms, because ABRS is typically self-limiting.<sup>19</sup>

### Chronic rhinosinusitis

CRS indicates persistence of symptoms for 12 weeks or longer, as outlined in Table 2.<sup>10</sup> The incidence of CRS in children is lower than in adults, although it carries a greater burden on quality of life than common paediatric conditions such as asthma and epilepsy.<sup>21</sup> Asthma frequently co-exists with CRS in children, and chronic cough in CRS may be exacerbated by gastro-oesophageal reflux. These conditions require specific enquiry and targeted management. The presence of nasal polyps should prompt consideration of cystic fibrosis and sweat chloride testing, as well as consideration of primary ciliary dyskinesia.

There is no evidence to recommend the use of short- or long-term antibiotics for CRS in children, although they are commonly prescribed under specialist guidance as part of maximal medical therapy.<sup>10</sup> Intranasal corticosteroids and

saline sprays/rinses are recommended in paediatric CRS despite a lack of high-level evidence for efficacy as they are safe to use.<sup>10</sup> By contrast, chronic use of oral steroids is not recommended as they may impair growth and cause weight gain.<sup>22</sup> Short courses of oral steroids are occasionally prescribed in conjunction with antibiotics for acute exacerbations, although this should be undertaken with specialist involvement. Troublesome symptomatology refractory to a trial of medical therapy warrants referral to an otolaryngologist for consideration of adenoidectomy to reduce bacterial biofilm load or, occasionally, endoscopic sinus surgery.<sup>3</sup>

### Neoplastic lesions

Neoplastic lesions represent a rare cause of paediatric nasal obstruction. Red flags warranting their consideration include progressively worsening obstruction, unilateral nasal discharge, iterative epistaxis, nasal pain and altered sense of smell, although these are non-specific. Anterior rhinoscopy revealing a unilateral nasal mass should prompt consideration of neoplasia or congenital malformations, as unilateral nasal polyps are highly uncommon in the paediatric population.<sup>23</sup> Benign lesions include antrochoanal polyp of Killian, typically occurring in adolescence with a large polyp developing on the anterolateral maxillary sinus wall; juvenile nasopharyngeal angiofibroma, a richly vascularised mass occurring exclusively in preadolescent males; and nasopharyngeal teratomas.<sup>24,25</sup> Malignant nasal masses are rarer again in children, although differentials include rhabdomyosarcoma, nasopharyngeal carcinoma, lymphoma and squamous cell carcinoma.<sup>25</sup> Urgent referral to an otolaryngologist is paramount.

### Conclusion

Children with nasal obstruction commonly present to general practitioners. The differential diagnosis spans benign disorders warranting supportive therapy, chronic conditions affecting quality of life and lesions necessitating timely specialist referral. Diagnostic dilemmas can arise in

**Table 2. Diagnostic criteria for acute and chronic rhinosinusitis as outlined in the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) 2020<sup>10</sup>**

Condition	Diagnostic criteria
Acute rhinosinusitis in children	Sudden onset of two or more symptoms for <12 weeks: <ul style="list-style-type: none"> <li>• nasal blockage/obstruction/congestion</li> <li>• discoloured nasal discharge</li> <li>• cough (daytime and night-time).</li> </ul>
Post-viral acute rhinosinusitis	As above for acute rhinosinusitis, though with increase in symptoms after five days or persistent symptoms for >10 days.
Acute bacterial rhinosinusitis	Defined by at least three symptoms/signs: <ul style="list-style-type: none"> <li>• discoloured mucus</li> <li>• severe local pain</li> <li>• fever &gt;38°C</li> <li>• raised C-reactive protein or erythrocyte sedimentation rate</li> <li>• double sickening pattern.</li> </ul>
Chronic rhinosinusitis in children (with or without nasal polyps)	Presence of two or more symptoms for ≥12 weeks, one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior or posterior nasal drip): <ul style="list-style-type: none"> <li>• +/- facial pain/pressure</li> <li>• +/- cough.</li> </ul>

young children as accurate diagnosis relies largely on clinical history. This requires close attention to disease course, subtle examination findings and response to conservative therapy to achieve optimal patient outcomes in this challenging area of paediatric primary care.

### Key points

- The presentation and differential for paediatric nasal obstruction is unique when compared with adults.
- Imaging and blood testing are rarely required in the workup of paediatric nasal obstruction.
- Benign causes are common and require largely symptomatic management.
- Worrisome causes are rare and include neoplastic lesions and intracranial complications of rhinosinusitis.
- Specialist referral should be considered if conservative therapy fails or if red flags are present.

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### References

- Cherry J, Kuan E, Shapiro N. Rhinosinusitis. In: Feigin and Cherry's Textbook of Pediatric Infectious Diseases. 8th edn. Philadelphia, PA: Elsevier, 2018.
- Cappello Z, Minutello K, Dublin A. Anatomy, head and neck, nose paranasal sinuses. Treasure Island, FL: StatPearls Publishing, 2020.
- Campbell RG. Paediatric sinonasal surgery: A literature review. *Australian J Otolaryngol* 2021;4:31. doi: 10.21037/ajo-21-16.
- Badr DT, Gaffin JM, Phipatanakul W. Pediatric rhinosinusitis. *Curr Treat Options Allergy* 2016;3(3):268–81. doi: 10.1007/s40521-016-0096-y.
- Momeni AK, Roberts CC, Chew FS. Imaging of chronic and exotic sinonasal disease: Review. *AJR Am J Roentgenol* 2007;189(6 Suppl):S35–45. doi: 10.2214/AJR.07.7031.
- Peksis K, Unger J, Paulauska S, et al. Relationships among nasal resistance, age and anthropometric parameters of the nose during growth. *Rhinology Online* 2018;1:112–21. doi: 10.4193/RHINOL/180.32.
- Fujioka M, Young LW, Girdany BR. Radiographic evaluation of adenoidal size in children: Adenoidal-nasopharyngeal ratio. *AJR Am J Roentgenol* 1979;133(3):401–04. doi: 10.2214/ajr.133.3.401.
- Quach A. Common neonatal presentations to the primary care physician. *Aust J Gen Pract* 2018;47(4):193–98. doi: 10.31128/AFP-09-17-4326.
- Esmaili A, Acharya A. Clinical assessment, diagnosis and management of nasal obstruction. *Aust Fam Physician* 2017;46(7):499–503.
- Fokkens WJ, Lund VJ, Hopkins C, et al. European position paper on rhinosinusitis and nasal polyps 2020. *Rhinology* 2020;58(Suppl S29):1–464. doi: 10.4193/Rhin20.600.
- Brown C. Chronic rhinosinusitis – 'It's my sinus doc!' *Aust Fam Physician* 2008;37(5):306–10.
- Hoggard M, Wagner Mackenzie B, Jain R, Taylor MW, Biswas K, Douglas RG. Chronic rhinosinusitis and the evolving understanding of microbial ecology in chronic inflammatory mucosal disease. *Clin Microbiol Rev* 2017;30(1):321–48. doi: 10.1128/CMR.00060-16.
- Brook I. Microbiology of chronic rhinosinusitis. *Eur J Clin Microbiol Infect Dis* 2016;35(7):1059–68. doi: 10.1007/s10096-016-2640-x.
- Neighbour H, McIvor A. Montelukast in the treatment of asthma and allergic rhinitis. *Clin Pract* 2013;10(3):257–63. doi: 10.2217/CPR.13.4.
- Grigg S, Grigg C. Removal of ear, nose and throat foreign bodies: A review. *Aust J Gen Pract* 2018;47(10):682–85. doi: 10.31128/AJGP-02-18-4503.
- Kalan A, Tariq M. Foreign bodies in the nasal cavities: A comprehensive review of the aetiology, diagnostic pointers, and therapeutic measures. *Postgrad Med J* 2000;76(898):484–87. doi: 10.1136/pmj.76.898.484.
- Cook S, Burton M, Glasziou P. Efficacy and safety of the 'mother's kiss' technique: A systematic review of case reports and case series. *CMAJ* 2012;184(17):E904–12. doi: 10.1503/cmaj.111864.
- Leung AK, Hon KL, Chu WC. Acute bacterial sinusitis in children: An updated review. *Drugs Context* 2020;9:2020–9–3.
- Wald ER, Applegate KE, Bordley C, et al. Clinical practice guideline for the diagnosis and management of acute bacterial sinusitis in children aged 1 to 18 years. *Pediatrics* 2013;132(1):e262–80. doi: 10.1542/peds.2013-1071.
- Shaikh N, Wald ER. Decongestants, antihistamines and nasal irrigation for acute sinusitis in children. *Cochrane Database Syst Rev* 2014;2014(10):CD007909. doi: 10.1002/14651858.CD007909.pub4.
- Cunningham MJ, Chiu EJ, Landgraf JM, Gliklich RE. The health impact of chronic recurrent rhinosinusitis in children. *Arch Otolaryngol Head Neck Surg* 2000;126(11):1363–68. doi: 10.1001/archotol.126.11.1363.
- Hox V, Lourijzen E, Jordens A, et al. Benefits and harm of systemic steroids for short- and long-term use in rhinitis and rhinosinusitis: An EAACI position paper. *Clin Transl Allergy* 2020;10:1. doi: 10.1186/s13601-019-0303-6.
- Brown OE. Current management of pediatric nasal airway obstruction. *Curr Opin Otolaryngol Head Neck Surg* 1995;3(6):402–07.
- Smith MM, Ishman SL. Pediatric nasal obstruction. *Otolaryngol Clin North Am* 2018;51(5):971–85. doi: 10.1016/j.otc.2018.05.005.
- Leboulanger N. Nasal obstruction in children. *Eur Ann Otorhinolaryngol Head Neck Dis* 2016;133(3):183–86. doi: 10.1016/j.anorl.2015.09.011.

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