

Snotty-nosed kids what can we do to help?

Blocked and discharging noses are a common presentation for clinicians who care for children. Modern management involves a progressive evaluation of relevant symptoms and signs with appropriate medical treatment. Surgical intervention may be of benefit when medical therapy fails.



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There is no doubt that parents weigh the impact of rhinosinusitis on their child's overall health as severe and often have high expectations of their local doctor as their first port of call. Complaints like 'my child always has a cold' or 'what can you do to fix this snotty nose?' are all too familiar to the GP, paediatrician and ENT surgeon alike. This article focuses on the common causes of the 'snotty nose' and discusses differential diagnoses and complications of disease. A practical management flowchart designed for use in general practice is given on page 20.

involution usually occurs after the age of 8 to 10 years. The increased size of the adenoid, relative to the postnasal airway, can result in obstruction. In addition, the adenoid tissue can become a nidus for infection, leading to nasal discharge.

Allergy can be either seasonal or perennial. Apart from a blocked and snotty nose, children may present with sneezing, itchy eyes and other manifestations of atopy such as dermatitis, eczema and asthma.

What are the causes?

Common causes

The most common causes of a snotty nose in a child are 'the two As': adenoids and allergy.

Adenoids enlarge as a result of lymphoid tissue hyperplasia from around the age of 2 years;

Less common causes

Other causes of anatomical obstruction include nasal foreign bodies, a deviated nasal septum, congenital problems (such as craniofacial syndromes or unilateral choanal atresia), and previous nasal surgery. Environmental factors include attendance at childcare facilities, smoking or using recreational drugs (in older children), passive



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IN SUMMARY

- A snotty nose in a child is a common presentation to the GP, and the problem is usually chronic. The most common causes are 'the two As': adenoids and allergy.
- Chronic rhinosinusitis may exist alone or in combination with adenoid hypertrophy or allergy.
- A clinical history and examination are the cornerstones of diagnosis, appropriate treatment and exclusion of atypical causes.
- Treatment for allergy is conservative, involving allergen avoidance as well as use of intranasal saline and/or corticosteroids and non-sedating antihistamines. Appropriate courses of antibiotics are given when infective rhinosinusitis is suspected.
- Referral to an ENT specialist is appropriate for children with likely adenoid enlargement, recurrent or chronic rhinosinusitis that has failed medical treatment, or unusual clinical findings.

smoking (e.g. exposure from parents or by attending nightclubs), weather and inhaled irritants (e.g. medications, pollution).

Systemic problems causing a snotty nose include immunodeficiency, cystic fibrosis, ciliary dyskinesia, and thyroid or hormonal problems. Clinical findings may include chronic cough or bronchiectasis.

Gastro-oesophageal reflux has been cited as a possible causative factor in paediatric rhinosinusitis but has yet to be widely accepted. Clinical findings include intractable upper and lower airway symptoms, and cough or aspiration pneumonia may be present. Given that both reflux and paediatric rhinosinusitis are common, their occurrence together may be coincidental.

What is rhinosinusitis?

Rhinitis and sinusitis refer to inflammation of the epithelium lining the nose and sinuses, respectively. Given that these linings are continuous, rhinitis and sinusitis cannot occur alone – hence the term ‘rhinosinusitis’.

The major symptoms of rhinosinusitis are nasal discharge, nasal obstruction, postnasal drip, facial pain and pressure, and loss of the sense of smell. Cases can be classified as acute (symptoms lasting fewer than four weeks), subacute (four to 12 weeks) and chronic (more than 12 weeks).

What causes rhinosinusitis?

Children are prone to upper respiratory tract infections (URTIs) – particularly of viral origin – and up to six or eight infections per year is considered normal. In addition, an immature immune system may combine with anatomical features and an allergic predisposition to produce chronic symptoms. The combination of these factors may produce mucosal oedema that obstructs the natural drainage of the sinuses. Negative pressure is created within the sinuses that may allow bacteria to enter and colonise pooled secretions; acute or chronic infection may then develop.

Diagnosing the problem

History

The history will often give clues to the underlying cause and help in making the important differentiation between adenoid enlargement and allergy. Children who are described as having

Snotty-nosed children

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Snotty-nosed children are a very common sight in the waiting rooms of general practices. Inhaled aeroallergens and adenoid hypertrophy are the two most common causes, and can lead to symptoms of nasal discharge, nasal obstruction, postnasal drip, facial pain and pressure, as well as loss of the sense of smell. Appropriate management relies on a detailed clinical evaluation as well as an accurate diagnosis.

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‘good and bad periods’ may be experiencing recurrent URTIs or seasonal allergy. Persistent symptoms may suggest perennial allergy or anatomical obstruction secondary to adenoid or nasal turbinate hypertrophy. Adenoid enlargement is one of the most common and most overlooked causes of snotty-nosed children – typical presenting symptoms and a guide to diagnosis are given in the box on page 21.¹

Unilateral nasal discharge (often foul smelling) dictates that a nasal foreign body be excluded. A history of snoring associated with apnoeic episodes warrants specialist review. The possibility of rhinitis medicamentosa should be considered, and a medication history taken that includes use of nasal sprays.

A GP's guide to diagnosing and managing snotty-nosed kids

A child with a snotty nose

Take a detailed clinical history and perform a thorough examination

Acute presentation

Chronic presentation*

Presence of atypical findings
(see Table A below)

Are the features severe?

Does the patient have a history or any features of allergy (e.g. nasal crease, pale enlarged turbinates)?

Refer to specialist urgently

No

Yes

Refer to specialist

Are adenoids a causative factor?

No

Yes

Yes

No

Investigate for:

- common aeroallergens by skin prick testing (children over 4 years) or RAST

Treat with:

- allergen avoidance
- saline douches or drops
- intranasal corticosteroid sprays
- nonsedating antihistamines

Treat with:

- saline douches or drops
- topical decongestants
- directed course of antibiotics (10 to 14 days)[†]

Treat for chronic rhinosinusitis:

- saline douches or drops
- three-week course of appropriate antibiotics
- topical decongestants

Complications or no improvement

Improvement

Refer to specialist

Review as required

No improvement over 48 to 72 hours

Improvement

Complications or no improvement

- Perform clinical re-evaluation
- Trial a different antibiotic

Review as required

Complications or no improvement

Refer to specialist

Table A. Findings that warrant immediate referral

- Thick purulent nasal discharge
- Severe upper airway obstruction
- Significant facial pain or headache
- Visual changes
- High fever, chills/rigors
- Unilateral or bloody discharge
- Facial swelling or cellulitis
- Discoloured or necrotic inferior turbinates
- Nasal polyps in a child under 10 years of age
- Eye or orbit signs (periorbital oedema or cellulitis, double vision, pain on eye movement, loss of vision, eyeball protrusion)
- Neurological changes

* Most common type of presentation. † Can be extended if symptoms improve but do not completely resolve.



Figure 1. The typical 'allergic salute' seen in children with allergic rhinitis.

Examination

The examination, like the history, aims to differentiate adenoid hypertrophy from allergy. Complete examination of the ears, nose, throat, head and neck will also exclude less common causes and complications of sinonasal disease.

Overall facial appearance may reveal the classic 'adenoid facies': a wide open-mouth, small sunken cheekbones, and high arched palate. Such changes, however, are not specific to adenoid hypertrophy. Craniofacial anomalies may point to an anatomical cause for rhinosinusitis or obstruction – these commonly result in narrowing of the nasal airway due to midfacial underdevelopment. In a child with allergic rhinitis, an 'allergic crease' may be visible just above the tip of the nose. The 'allergic salute' is also a common finding (Figure 1).

Gently lifting the nasal tip often permits adequate visualisation of the anterior nose with a headlight or otoscope. It is important to inspect the appearance of the inferior turbinates and to look for discharge, any abnormality of the nasal septum and the presence of nasal polyps. A nasal discharge may be clear, suggesting the absence of bacterial infection; a purulent mucoid discharge may suggest infection but may also be found in the recovery phase of viral infections or in severe allergic disease (Figure 2).² Nasal polyps in a child are unusual and suggest



Figure 2. Chronic rhinosinusitis with pus and oedema of structures forming the lateral nasal wall.

an underlying systemic disorder such as cystic fibrosis (Figure 3). Boggy, pale inferior turbinate or septal mucosa may suggest allergy (Figures 4a and b). Other discolouration, obvious necrosis of the inferior turbinates or a bloodstained nasal discharge is abnormal and requires specialist evaluation.

A headlight can be used to examine the oral cavity and the oropharynx for changes of URTI such as tonsillitis, pharyngitis or the presence of secretions running down behind the soft palate from the postnasal space. Palpation of the neck may reveal the presence of lymph nodes. An otoscope is used to assess the eardrums for effusions or associated acute otitis media. Mucoid discharge in the external ear canal may suggest an infective perforation of the drum.

The complications of bacterial rhinosinusitis are rare but should always be excluded. Periorbital swelling is always abnormal and may indicate underlying orbital cellulitis, abscess formation, or a frontal subperiosteal collection of pus. Fitting, drowsiness, confusion or intense headache may herald intracranial extension of disease. Patients with these features require urgent specialist review.

Investigations

Investigations arranged by the GP will centre on allergy testing, using either

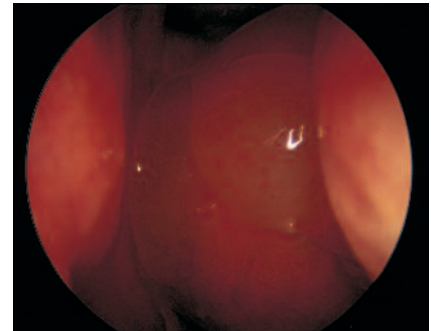


Figure 3. Nasal polyps. Grape-like structures in the nasal cavity warrant specialist review in children.

Clinical assessment for adenoid hypertrophy¹

Adenoid hypertrophy is commonly overlooked in children. The clinical scoring system shown below can be a useful tool in diagnosis, and has a higher overall correlation with endoscopically confirmed nasopharyngeal airway obstruction than does radiological assessment.¹

To use the system, assess the patient for the presence of each of the following six symptoms. Score 1 point for an answer of yes and 0 for an answer of no.

Symptoms while awake

- Mouth breathing
- Stertor (upper airways 'snuffling' noise)

Symptoms while asleep

- Mouth breathing
- Snoring
- Restlessness or difficulty breathing
- Sleep apnoea

A total score of 3 or more has been shown to equate with obstructive adenoid hypertrophy in patients without allergic rhinitis.

continued

skin prick testing (in children over the age of 4 years) or radioallergosorbent testing (RAST) against a panel of common inhaled aeroallergens. The latter is useful in children with eczema or other skin conditions and those who have been taking antihistamine medications.³

Microbiological testing is rarely indicated for rhinosinusitis that is uncomplicated. There is controversy about the value of nasal swabs and even aspirates from the middle meatus as regards whether these are an accurate representation of bacterial pathogens in the sinuses.

Radiological investigations in the snotty-nosed child have a limited role. The lateral cephalometric film component of sinus x-rays may be useful in assessing the residual nasopharyngeal airway (not the adenoid size) for physicians who feel more comfortable with an objective assessment of airways obstruction. Figure 5 demonstrates the method of Cohen and Konak which has been shown to have the greatest radiological correlation with nasopharyngeal obstruction.¹ Plain sinus radiographs have poor sensitivity and specificity for rhinosinusitis because they may show the often reported 'thickened mucosa' in asymptomatic individuals. CT scans require a general anaesthetic in small children, are relatively expensive and not indicated in routine workup. Most importantly, CT is not significantly superior to plain films in diagnosing paediatric rhinosinusitis and

should not be requested before specialist review.

Nasal endoscopy is an additional assessment performed by a specialist. In children who will tolerate the procedure (usually children over the age of 8 years), important diagnostic information may be obtained. Specifically, bacterial infection – heralded by mucopus flowing back from the middle meatus – may be identified.

Medical management

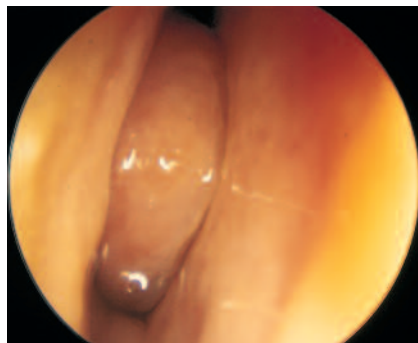
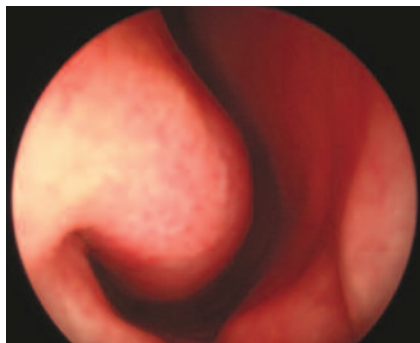
Medical management is the first line of treatment in the snotty-nosed child. The specific protocol used will depend on the most likely causative factors identified from the history and examination.

Allergic disease

If the history and examination are suggestive of seasonal allergic rhinosinusitis, a trial of intranasal corticosteroid sprays is often the best treatment. These are safe and effective in children from the age of 3 years. Mometasone furoate (Nasonex Aqueous Nasal Spray) is recommended because it has minimal systemic absorption. Other sprays, such as budesonide (Budamax, Rhinocort) and beclomethasone (Aldecin Aqueous Nasal Spray), have not been shown to affect childhood growth in a number of studies.^{4,5} The key to effective use is compliance for a period of months, which may be difficult to achieve.

Oral nonsedating, second-generation antihistamines can be added on an as required basis to help control annoying nasal itching, sneezing and watery rhinorrhoea – examples include loratadine (Claratyne, Lorastyne), fexofenadine (Telfast) and cetirizine (Zyrtec). Topical antihistamines such as levocabastine hydrochloride nasal spray (Livostin Nasal Spray) may also be beneficial, with typical duration of treatment being eight weeks. Intranasal mast cell stabilisers such as sodium cromoglycate are not particularly effective in children and are not usually prescribed.

Perennial allergy is treated with allergen avoidance and a combination of the above medications. Avoidance strategies are based on the results of allergy testing. House dust mite allergy usually dictates regular use of vacuum cleaners fitted with HEPA (high efficiency particulate air) filters, and use of pillow and mattress covers as well as allergy resistant



Figures 4a and b. The right inferior turbinate and nasal septum. a (left). Normal appearance. b (right). Pale and boggy mucosa typical of allergic rhinitis.



Figure 5. Lateral cephalogram showing the width of the soft palate 1 cm below the hard palate (a) and the width of the airway between the palate and the adenoid shadow (b). Postnasal airway reduction is implied if (b) is less than (a), as in this case.

quilts. Teddy bears and other stuffed toys should be removed from the child's bedroom. In the case of known allergy to animal danders, the ideal solution is to stop all dander-producing pets from entering the house; in reality, compromise is the usual state of play.

Immunotherapy or desensitisation can be used in children with allergen specific rhinosinusitis. This can be effective, but the requirement for regular needles make it unpopular with children.

Infective disease

The use of saline nasal drops, douches or sprays combined with nose blowing is the cornerstone of the medical treatment of chronic rhinosinusitis. These techniques reduce mucus viscosity and improve mucociliary clearance following a viral or bacterial URTI. A guide to preparing and using a buffered saline douche is given in the patient handout on this page.

Topical decongestants such as 0.05% xylometazoline HCl (Otrivin Junior) or 0.25 mg/mL oxymetazoline (Drixine Paediatric Nasal Drops) may help to open the sinonasal airways to allow douching and ventilation to be more effective. Course duration should not exceed five to seven days because rhinitis may be aggravated by rebound nasal congestion after prolonged use (rhinitis medicamentosa).

Antibiotic treatment is only required if conservative management fails and patients have clinical evidence of a bacterial infection. Bacterial causes of acute rhinosinusitis include:

- *Streptococcus pneumoniae* (which may be penicillin resistant)
- *Haemophilus influenzae* (which may be β -lactamase producing)
- *Moraxella catarrhalis* (which may be β -lactamase producing)
- *Streptococcus pyogenes*
- *Staphylococcus aureus*
- *Pseudomonas aeruginosa*.

The recommended duration of antibiotic treatment for acute rhinosinusitis is 10 to 14 days; this can be extended if

Buffered hypertonic saline douche recipe

Use of saline nasal douches combined with nose blowing can reduce the thickness of the mucus and improve clearance after an upper respiratory tract infection. To prepare the solution, mix together:

- 500 mL of tap water
- rock salt (not table salt) – start with one level teaspoon and increase to two level teaspoons (if this amount causes discomfort then revert to using 1 teaspoon)
- 1 teaspoon of bicarbonate of soda (baking soda).

Squirt the mixture into each nostril three times daily using a small bottle such as an emptied and washed steroid spray bottle. The child should be sitting or standing, not lying down. In young infants, an eye dropper can be used to drop the solution into the nose.

Store the solution in a clean glass jar at room temperature. Discard it after one week and make up a fresh mixture.

This patient handout was prepared by Dr S. Floreani and Professor P-J. Wormald.

symptoms have improved but not completely resolved. Amoxicillin is still considered first line treatment, and patients allergic to penicillin should be treated with either trimethoprim–sulfamethoxazole or roxithromycin (Biaxsig, Rulide). If the patient fails to respond to this regimen, second line therapy should be either an amoxicillin–clavulanate combination or cefaclor. Cefuroxime axetil is only available in 250 mg tablets that are bitter when crushed, limiting its use to older children.⁶

Chronic rhinosinusitis is typified by a higher proportion of anaerobic bacteria and *S. aureus* as causative organisms. Appropriate antibiotic treatment should extend over three weeks. Augmentin is a typical first line agent. Clindamycin or cephalexin plus metronidazole (Flagyl, Metrogyl, Metronide) are alternatives. Patients and parents should be instructed that the antibiotics be stopped if diarrhoea occurs because of the possibility of severe colitis – this is particularly important when prescribing clindamycin.

'Maximal medical therapy' for chronic rhinosinusitis should also include nasal saline douches or sprays, and short courses of topical decongestant may be added. Reducing dose oral corticosteroid,

which is often used in adults, is not usually used in young children.

Surgical management Adenoid hypertrophy

First line surgical management in the snotty-nosed child involves dealing with adenoids that are either obstructive or acting as a source of chronic sepsis. Adenoidectomy has been shown to be effective in children with adenoid hypertrophy manifesting as mouth breathing and bilateral nasal discharge that improves with antibiotics only to return on completion of the course. The procedure requires a general anaesthetic and, if it is performed on a morning operating list, the patient can often go home that day. Postoperative recovery is usually rapid and relatively pain free. The main complication is bleeding, which is rare.

Surgery for allergy

Several operative techniques are available to reduce the size of the inferior turbinates in children with obstruction or nasal discharge refractory to medical treatment. These range from simple submucosal diathermy to 'powered turbino-plasty' using microdebrider instruments. Ongoing medical treatment is important

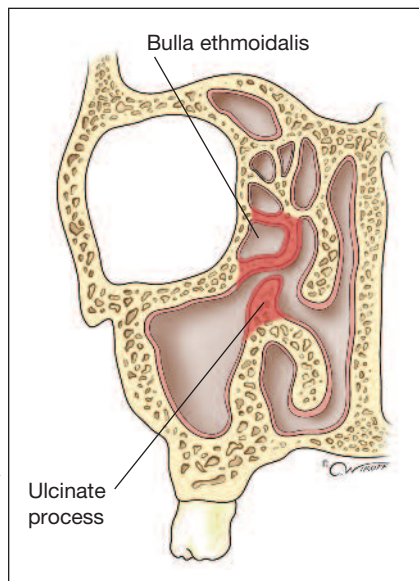


Figure 6. Coronal cross-section through the paranasal sinuses. The ostiomeatal unit (including middle meatus) is the final common pathway for drainage of maxillary, frontal and anterior ethmoid sinuses. The red sections are removed in conservative sinus surgery, facilitating drainage and ventilation.

after the procedure in order to prevent re-enlargement of the turbinates.

Surgery for chronic rhinosinusitis

Surgery is considered in patients with chronic rhinosinusitis who have failed

medical therapy. Adenoidectomy is still the procedure of choice in paediatric patients with chronic rhinosinusitis, even if the adenoid is not compromising the postnasal airway. The adenoid may be host to a variety of organisms which can re-colonise the upper airway after a course of antibiotics. Persistent symptoms after adenoidectomy combined with radiological evidence of chronic rhinosinusitis may lead to consideration of maxillary antral puncture with lavage (washouts), which requires general anaesthesia.

Functional endoscopic sinus surgery is considered only when medical treatment, adenoidectomy and washouts fail. In the paediatric population particularly, this should only be necessary in very rare instances. If it is performed, functional endoscopic sinus surgery should be limited to the middle meatus and bulla ethmoidalis initially (Figure 6).

Conclusion

The 'snotty-nosed child' is a very common presentation. Allergy and adenoid hypertrophy are common causes, and a thorough history and examination are the keys to accurate diagnosis and directed treatment.

Optimising management for allergy involves allergen avoidance and medical treatment with intranasal saline and corticosteroid sprays. Adenoids that are either

obstructive or acting as a chronic source of infection should be removed. Appropriate antibiotics are used when the clinical evidence points to likely bacterial infection.

Failure of medical treatment should result in early referral to a specialist. Sinus surgery for these children is rarely needed and is always initially conservative. **MT**

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