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# Allergic rhinosinusitis in children

***This common problem in children is best approached by building on your present knowledge and approach with an open mind as to other possibilities.***

## NEW DEFINITIONS

The European Academy of Allergology and Clinical Immunology (EAACI)<sup>1</sup> now state that the term hypersensitivity should be used for 'all reactions' which result in objectively reproducible symptoms and signs initiated by exposure to a defined stimulus at a dose tolerated by normal subjects.

Allergy is now classified as IgE-mediated or non-IgE-mediated. The same uniform classification is proposed for all the 'allergic' diseases, which means that allergic rhinitis is classified as IgE-mediated and non-IgE-mediated allergic rhinitis.<sup>2</sup> The terms 'seasonal' or 'perennial' have also been replaced with 'intermittent' or 'persistent'. Food allergies are often multisystem diseases and can affect the nose. Food intolerance should be replaced with 'non-allergic food hypersensitivity'.<sup>2</sup>

## THE PATHOLOGY OF ALLERGY

Acute and chronic airway inflammation is a result of recruitment and activation of a range of inflammatory cells including mast cells, eosinophils and T-lymphocytes, and the release of mediators which perpetuate the inflammatory cycle causing oedema formation and epithelial damage. The mucosa becomes colonised with inflammatory cells, which can react immediately to any immune stimulus. Remodelling occurs in chronic disease, inducing permanent changes in the mucous membrane structure such as hyperplasia, hypertrophy and thickening of the basement membrane as a result of sub-endothelial fibrosis.<sup>3</sup>

## CLINICAL PRESENTATION

How does this all fit into intermittent or persistent allergic rhinitis and the development of sinusitis in some patients?

Intermittent allergic rhinitis is usually an acute phase IgE-mediated response with the classic symptoms of bouts of watery rhinorrhoea, and itching of the nose, throat, palate and ears. Conjunctivitis may also be present. The symptoms will pass when the allergen exposure ceases.

Persistent allergic rhinitis, however, is a cellular inflammatory response. Some of these inflammatory cells are recruited constantly to the mucous membrane of the nose, leading to a minimal persistent inflammatory response,<sup>4</sup> which is characterised by the main symptom of a persistent blocked nose. The other symptoms are less than in an acute response.

## WHAT IS THE ASSOCIATION BETWEEN PERSISTENT ALLERGIC RHINITIS AND SINUSITIS?

The persistent inflammatory oedema present in persistent allergic rhinitis will eventually occur in the mucous membranes of the ostiomeatal units in the middle meati leading ultimately to allergic inflammation of the sinuses.

The other important factor is that sinusitis may also occur as a result of viral infections in these allergic children as it does in normal children. Most of these viral infections are self-limiting. Problems arise with constant exposure to a viral and bacterial pool as in a crèche, where many children also carry resistant organisms as

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a result of many courses of inappropriate antibiotics.

**SYMPTOMS AND SIGNS OF ALLERGIC RHINOSINUSITIS**

Presentation will be that of allergic rhinitis, but with a definite blocked nose and a thick postnasal drip. Nasal obstruction causes malaise, headaches, disturbed sleep and mouth breathing. Coughing, especially at night, and possibly secretory otitis media may be present in the more severe cases. These symptoms are usually not acute but are superimposed on the typical allergic rhinitis symptoms of nasal itch, anterior rhinorrhoea and sneezing, although the latter may not be severe.

On examination one is likely to see the nasal crease, nasal salute, Denne's eye lines, allergic shiners with dark rings under the eyes and the patient often sniffs repeatedly.

A chest examination may reveal wheezing or ronchi. Secretory otitis media is common in children with advanced allergic rhinosinusitis.

**IMPORTANT QUESTIONS IN THE HISTORY**

- Is there a family history of atopy?

This is a prime clue to possible allergic disease.

- Are there pets in the house, such as cats, dogs, birds, mice or other?
- Does the child attend a playschool or crèche? Remember the bacterial and viral pool.
- Is the child exposed to cigarette smoke at all? This is an important adjuvant to allergy.
- Is there mould growth on any inside walls of the house?
- Is the child exposed to exhaust fumes? This is also an important adjuvant to allergic disease.
- Repeated use of antimicrobials? Antimicrobials when given empirically for every runny nose,

**Performing anterior rhinoscopy**

Instil oxymetazoline nasal spray and use your otoscope. First slide the lens about half-way across the viewing port to allow vapour to escape. Insert the otoscope into the nose and you will have a very good view of the anterior nasal cavity and even perhaps the middle meatus through the lens. Look for swelling of the inferior turbinates. With secondary infection they may be slightly red instead of the usual pale boggy appearance of allergic rhinitis only. They may also be overlaid with thick mucus, even pus. An examination of the middle meatus reveals much swelling of the middle turbinate mucosa as well as that of the ostiomeatal unit. This is usually only seen with the aid of an endoscope. You will find the description and significance of the ostiomeatal unit in the *MIMS Disease Review*.<sup>5</sup> You may see poor oral hygiene as a result of mouth breathing. The throat's mucosa may have a typical granular appearance and there will be some thick post-nasal drip, with or without pus.

slight fever or cough without the confirmation of a bacterial cause pushes an atopic child deeper into a persistent inflammatory state. Many children present with poorly treated allergies and have received multiple courses of antimicrobials for non-bacterial inflammations. It must also be stated that not every bacterial infection needs to be treated with an antimicrobial. This is the prime responsibility of a healthy immune system.

- What does the child eat and drink on a daily basis? This includes all sweets, cold drinks and junk food. This is very important. It is not just about basic nutrition but also about non-allergic food hypersensitivities, which present as rhinitis. Rhinitis from this cause indicates mucosal distress of the bowel and of the sinonasal region. Both of these are caused by altered bowel flora and poor tight junctions between mucosal cells.

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**SPECIAL INVESTIGATIONS**

- Blood tests:
  - FBC in all cases.
  - ESR and CRP in infected cases.
  - Phadiotop for inhalant profile. A positive result indicates the need for individual evaluation of inhalants either by CAP RAST or skin-prick tests.
  - Fx5 for basic foods. If the child is older than 4 years more extensive CAP RAST can be done.

- Eosinophilic cationic protein in the serum and sputum.
- Iron studies.
- Protein electrophoresis.
- Skin-prick tests can be done on most children over the age of 6 months. These are excellent tests especially for inhalant allergens and should be done on every child where possible.
- Nasal smear. Eosinophils are usually present in allergic rhinitis; neutrophils are present in infection and basophils are present with food allergy.
- Radiology. This is not indicated for allergic rhinitis, but it is in chronic cases where sinusitis is a complicating factor, especially in the presence of chest and ear disease. A coronal CT of the paranasal sinuses is the gold standard radiological examination. Special emphasis is requested for the ostiomeatal units. The pilot study gives a good lateral view of the postnasal space as well and should always be examined if a CT is done. Plain X-rays are essentially a useless investigation in these cases.

## TREATMENT

Whereas one would treat a mild intermittent allergic rhinitis with a second-generation antihistamine, a complicated moderate to severe persistent allergic rhinosinusitis would need careful evaluation of preceding treatment.

Everything should be done to try to resolve the sinusitis leaving only a manageable allergic rhinitis. Early treatment, detection and avoidance may keep the antigen load below the threshold of overt disease and prevent ongoing sinus inflammation.

### Medical treatment

- Intranasal steroids would be a minimum requirement.
- A topical decongestant such as oxymetazoline spray may be used

for a week if the nose is very blocked.

- Aminophyllin is a very good ciliary stimulant of the sinus mucosa and it will also help for the secondary cough in acute cases.
- A 5-day course of oral prednisone is useful to diminish the inflammation rapidly and is also a very good ciliary stimulant.
- Antibiotics must be culture driven and given for a minimum of 10 days. Culture must be from the middle meatus or from the antrum itself. This necessitates an anaesthetic. If the antibiotic is given empirically to a toxic child, it should be an amoxicillin-clavulanate product in a high dose. To consider using anything else one would have to consult a local pathology laboratory for guidance and one must be sure that the infection is bacterial — most are not.
- Prebiotics and probiotics<sup>6</sup> must be given with the above and for twice as long as the antibiotics. Many excellent products are available — Biopro Reuteri, Culturelle, Infantiforte, Combiforte, Lactovita, Bifidobacterium infantis and Inteflora are some. These products have an immunomodulatory effect in the gut, are of general benefit for allergic children and can be used for extended periods.
- In cases of persistent allergic rhinosinusitis an H<sub>1</sub>-receptor blocker is required. The reason for this is that the inflammation is deep in the pre-chambers of the sinuses and the sinuses themselves, so only systemically administered treatment will have any effect. Some H<sub>1</sub>-receptor blockers have a proven anti-inflammatory effect. Early anti-inflammatory treatment improves the prognosis.

### Physical treatment

A physical nasal lavage with an isotonic saline solution such as Salex is helpful. Sterimar is an inexpensive sea salt preparation with a convenient means of application. Nasal aspiration can be done with Chicco or Pigeon aspirators at home.

### Physiotherapy

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### Dietary

The importance of dietary management in allergic disease cannot be over-emphasised — ‘junk in, junk out’. An atopic pregnant woman should avoid certain foods to prevent sensitisation of the fetus. An ‘at risk’ newborn should not be exposed to cow’s milk and should be breast-fed for the first 6 months. You are encouraged to read and have available in your rooms the excellent articles by Marcelle Groenewald<sup>7</sup> and Haus and Potter<sup>8</sup> on this subject. Many mothers will also find these articles of great help in managing their child’s disease.

### Nutrition

Many children in our society are overfed but undernourished. Many are simply malnourished. Basic nutrition consists of wholesome foods in as plain a state as possible. A nutritionist should be consulted in all children with allergic rhinosinusitis. Children who won’t eat properly should not be allowed any form of ‘comfort food’ or sweets or cold drinks. It is a question of

reprogramming and disciplining of the parent. Many excellent products are available as supplements, such as Milkara for infants (omega 3 and 6) and wild salmon oils for the older children. A mixture of low-fat, smooth cottage cheese and flax oil or fatty fish is of a high omega 3 and essential amino acid content and is easy to administer. A wise practitioner will listen to a mother's needs and be informed of these matters.

## Environmental

Bedding, floors, dampness, exposure to cigarette smoke and diesel fumes should all receive attention. No pets should sleep on an allergic child's bed or be allowed in their bedrooms.

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The incidence of allergic disease is rapidly rising in the Western world. Genetic factors for this increase are unlikely. New risk factors for allergy, which were unknown several decades ago, have become relevant in connection with nutrition, environmental exposure and lifestyle. Protective factors that were related to a more traditional lifestyle in the past have been lost. This has led to a greater susceptibility of the atopic individual.<sup>9</sup> One of these factors is the use of antibiotics for non-bacterial inflammation and the non-essential use of antibiotics for infections that the normal immune system could easily cope with if given a chance to do so. Antibiotics

influence the bowel flora, altering normal immunomodulation of allergen/antigen ingestion.

## FOLLOW-UP ASSESSMENT

The child should be followed up within 2 weeks to establish the effectiveness of treatment. The progress of treatment for the allergy can be monitored in 6 months by measuring eosinophilic cationic protein (ECP) in the sputum or serum and/or the specific IgE and comparing them to the initial results.

If there is little clinical improvement in the sinusitis, reconsider your diagnosis and review your treatment.

Co-morbid problems should be considered:

- adenoidal hypertrophy
- choanal atresia
- nasal foreign body
- non-allergic forms of rhinosinusitis
- local mucosal factors such as cystic fibrosis and ciliary defects, immunological deficiencies such as IgG<sub>2</sub>, IgA, lazy neutrophils and complement disorders
- systemic diseases such as diabetes.

## IMMUNOTHERAPY

The greatest triumphs of modern immunology have come from vaccination. It is the single most successful manipulation of the immune system so far, because it takes advantage of the immune system's natural specificity and inducibility.<sup>10</sup> This is the only form of treatment that offers a cure to the patient. It should be considered in every patient who does not respond to conventional treatment, adhering to specific guidelines. The most common vaccines in use are for house dust mite, Bermuda grass, Timothy grass and moulds. They are available as sublingual drops (SLIT), intranasal drops

(INIT) and subcutaneous injections (SIT). The immunological mechanism is not fully understood at present but these two treatment forms can take effect within 2 months of commencing the treatment.

Newer immunotherapies are being devised, of which the most promising is the use of antigen/IL-12 fusion proteins.<sup>11</sup>

## SURGICAL TREATMENT

Allergic rhinosinusitis is not primarily managed by surgery. However, many patients can benefit from rinsing the maxillary sinuses with a sterile saline solution, after aspirating sinus fluid for microscopy, culture and sensitivity.

Mucosal biopsies may be taken for histopathology. Electron microscopy is needed if ciliary dysfunction is seriously considered as a diagnosis. Blood is drawn for follow-up tests or for the usual allergy test battery as mentioned above. The ears are then assessed and ventilated if required.

***Some parents will only use these alternative remedies, so one must be prepared to help in a responsible manner.***

## ALTERNATIVE TREATMENT

There are many alternative treatments. One new modality strives to bring allopathic medicine and homeopathy into one discipline. This is the subject of homotoxicology. It is worth taking note that all the products listed in this form of approach are listed in MIMS and have NAPPHI codes. Some parents will only use these alternative remedies, so one must be prepared

## MAIN TOPIC

to help in a responsible manner. It uses minute dose medicines which are prepared according to the principles of the Arndt-Schulz Law and the law of Hormesis. Both terms appear in *Dorland's Medical Dictionary*. It also uses a type of immunomodulation which is similar to current immunotherapy. There is a lot of information on the Internet about this subject and it is worthwhile being informed.

Please note: The editor has substantially shortened the original article. E-mail [mikemcd@icon.co.za](mailto:mikemcd@icon.co.za) for the original if you need it.

References available on request.

### IN A NUTSHELL

Allergic rhinitis is a hypersensitivity reaction initiated by immunological mechanisms.

Sinusitis is mediated by the same mechanism or it is induced by viral inflammations.

Allergic rhinosinusitis is now classified as IgE-mediated rhinosinusitis or as non-IgE-mediated allergic rhinosinusitis.

Use the terms 'intermittent' or 'persistent' instead of 'seasonal' or 'perennial'.

The main symptoms of blocked nose and postnasal drip may be severe with sequelae. Other symptoms of allergy are milder than in the acute phase.

Phadiotop, Fx5, skin-prick test and ECP are essential.

A CT scan of the sinuses is essential for the proper management of severe cases or if medical treatment has failed.

The mainstay of medical treatment is an intranasal steroid and an oral second-generation H<sub>1</sub>-receptor blocker that has an anti-inflammatory effect at normal doses.

Diet and nutrition and the environment should be evaluated in every case.

Consider other possible causes if treatment fails.

An endoscopic evaluation of the nose, sinuses and nasopharynx is valuable in difficult or refractory cases.

Minor surgical procedures have a synergistic effect when combined with the conventional treatments in difficult cases.

## SINGLE SUTURE

### Let them eat cake

The hedonists among us will be delighted to learn that eating Scandinavian caviar paste enriched with

stable fish oil will lead to an increase in very long-chain n-3 polyunsaturated fatty acids. A study in a recent edition of the *European Journal of Clinical Nutrition* found that, although Scandinavian caviar paste is naturally enriched with these fats, it is even more effective when enriched with stable fish oils.

It is good to learn that those in the more affluent areas of the world are taking steps to ensure that their rich diet is as healthy as possible.

(Engström K, et al. *Eur J Clin Nutr* 2003; 57: 1052-1059.)