Nasal polyps

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Nasal polyps are as common as adult onset asthma and unilateral polyps require histological examination. Medical therapy with corticosteroids should be tried before surgery. The anatomy should be demonstrated with computed tomography before endoscopic surgery.

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Polyp comes from the Greek and means many footed (poly-pous). There is debate as to what a nasal polyp is exactly and to what extent ethmoid disease is a pre-polypoidal condition. The oedematous lining of the ethmoid sinuses prolapses into the nose and blocks it to a variable degree depending on the size of the polyps. The variable changes extend throughout the sinuses and are easily seen on imaging with computed tomography (CT) or magnetic resonance imaging (MRI) (*Figure 1*). The mucosal changes may not be limited to the upper respiratory tract since patients may have co-existing asthma or other respiratory diseases. The condition is prone to recurrence.

Clinically, polyps are pale bags of oedematous tissue, which arise most commonly from the middle meatus and are relatively insensitive to touch (*Figure 2*). The pale colour is the result of the poor blood supply but in the presence of repeated trauma and inflammation polyps may become reddened and the surface becomes squamous rather than respiratory in type. The underlying tissue is grossly oedematous and all inflammatory cells may be found but a tissue eosinophilia is the most marked change: the degree reflects the degree of inflammation. They are commonly bilateral and, when unilateral, require histological examination to exclude the

Figure 1. Computed tomography of mucosal disease associated with nasal polyps. The disease in the ethmoid sinuses is seen and there is evidence of previous surgery including inferior meatal antrostomies.

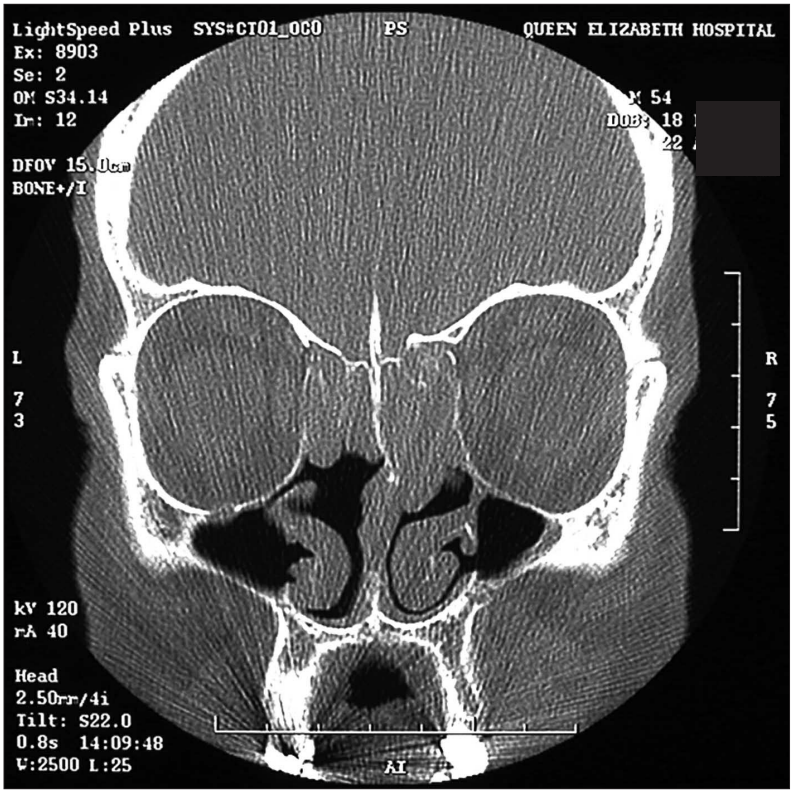


Figure 2. Endoscopic examination of the nose showing nasal polyps. The pale appearance may be contrasted to the normal mucosa. The blood vessels stand out on the surface.

transitional cell papilloma (otherwise known as Ringert's tumour or inverted papilloma) or malignancy. Most malignancies are squamous epithelial growths but adenocarcinoma is found in hard wood workers.

Simple polyps may arise at any age after 2 years. If seen before this, MRI should exclude a meningocele or encephalocele. It is unusual for simple nasal polyps to arise before 10 years of age and so may be the presenting complaint of cystic fibrosis. They occur more commonly in men and are found in all racial groups. The incidence is equal in all decades after 30 years and then declines after 60 years. Chimpanzees are the only animals to have nasal polyps. Nasal polyp patients are no more allergic than the general population (Drake-Lee et al, 1984).

ASTHMA, NASAL POLYPS AND ASPIRIN HYPERSENSITIVITY

Several studies have shown that between 20 and 40% of patients with polyps have coexisting late onset asthma (Settipane, 1996). Patients with asthma may be a distinct subgroup within the disease because proportionately a greater number of patients are women whereas polyps usually occur more frequently in males. Patients with aspirin hypersensitivity, asthma and nasal polyps are a well-recognized subgroup, which occurs in 5–10% of patients with nasal polyps. Prostaglandin metabolism may be altered in these patients and the eosinophils are more activated.

MUCOSAL REACTIONS

Nasal polyp tissue continues to behave like normal respiratory mucosa in some respects and it is able to produce immunoglobulins from the plasma cells present. Various inflammatory mediators have been measured in the oedema and tissue.

Inflammatory mediators

Histamine levels are between 100 and 7000 times the serum level (Drake-Lee and McLaughlan, 1982). Arachidonic acid metabolites are not easy to quantify since they are relatively unstable and may be generated by trauma. Leukotrienes C_4 and D_4 and the prostaglandins E_2, $F_{2\alpha}$ and 6 keto have been demonstrated in polyp oedema. Levels of thromboxanes are elevated and immunological challenge will produce 5, 12 and 15 hydroxyeicosatetraenoic acid (HETE), the latter being the highest within the oedema. There is some suggestion that levels are higher in patients with aspirin sensitivity. Various Th_1 and Th_2 cytokines and other inflammatory products have been found and include interleukin-3, 4, 5, 6 and 8. RANTES, granulocyte colony-stimulating factor, eicosanoids, veg E and F, eotaxin, intracellular and vascular cell adhesion molecule (ICAM and VCAM) among others. Their presence reflects the underlying inflammation rather than giving insight into the pathogenesis of the oedema.

Inflammatory cells

Mast cells are degranulated, a feature which is seen by ultrastructural examination but the changes may not be consistent with those described in the allergic nose (*Figure 3* and *4*). Degranulation attracts eosinophils. The eosinophil granules contain mediators that produce intense inflammation when released. More activated eosinophils were found in the polyps of patients who suffer from both asthma and aspirin hypersensitivity.

Lymphocytes and macrophages may easily be demonstrated in the stroma of nasal polyps. Frozen sections have been used to look at the distribution of T- and B-lymphocytes, human

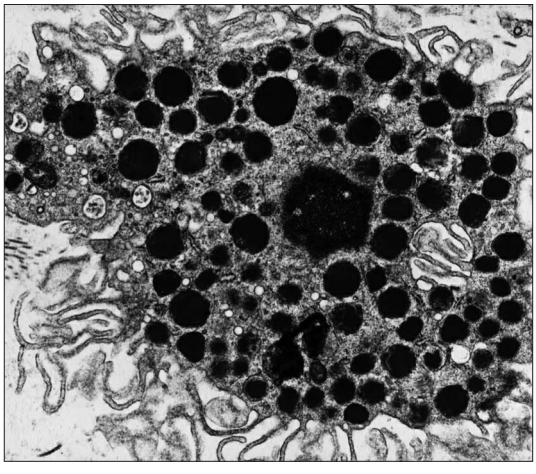


Figure 3. Normal nasal mast cell x 3000. The nucleus and the electron dense granules are easily seen. These contain the preformed mediators.

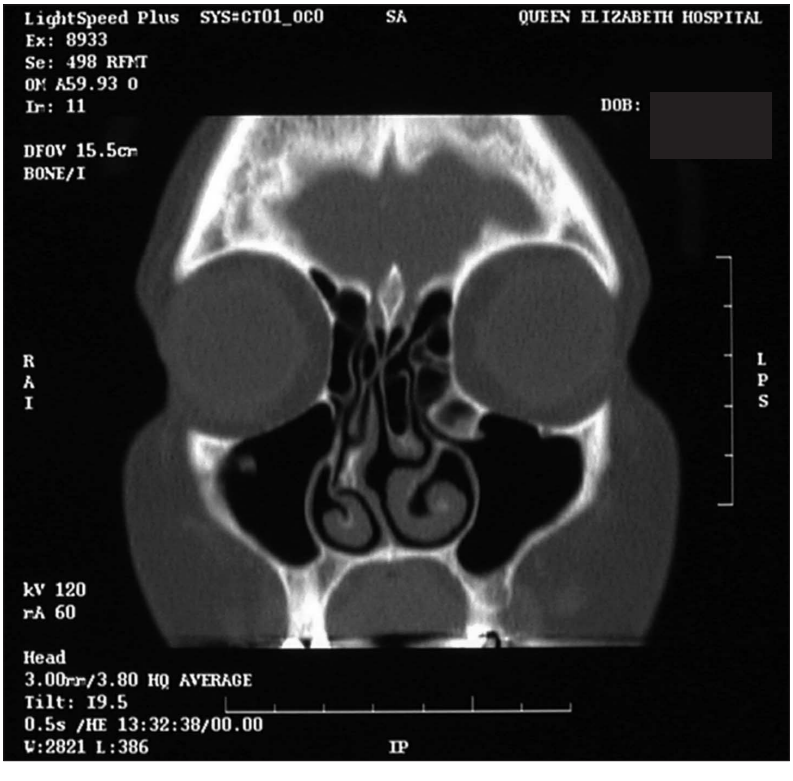
Figure 4. Degranulated mast cell from a patient with nasal polyps x 3000. Compare with Figure 3 *to see changes that occur in the granules during activation.*

lymphocyte antigen (HLA)-DR expressing cells and macrophages. Monoclonal and immunohistological staining demonstrated that T-helper cells were present in greater numbers than T-suppressor lymphocytes and that clumping occurred in the former around the glands and sub-epithelially. This was different from chronic infection where the pattern is reversed. B cells were present but in lesser numbers and macrophages could also be demonstrated. Lymphocyte subpopulations and the levels of antigen-specific immunoglobulin E in nasal polyps were not different between the allergic and non-allergic subjects which supports a non-allergic hypothesis in the pathogenesis of polyps.

INFECTION

Purulent sinusitis results from infection, usually with bacteria following a viral upper respiratory infection. The ethmoid mucosa may become polypoidal secondarily. The roles of infection and organisms are controversial in polyposis. Secondary bacterial infection may occur when polyps block the sinus ostia. Polyps do not resolve when patients are treated with antibiotic chemotherapy. Allergy to infective organisms has been postulated as the causative reaction. The two current theories are that staphylococcal super antigens initiate inflammation or that fungi set up a local hypersensitivity (Ponikau et al, 1999; Bachert et al, 2001). Both these theories do not stand up to close scrutiny. The diseased mucosa facilitates the growth of microorganisms, then a normal reaction may be present within diseased mucosa. Controlling this may reduce the inflammation and improve symptoms.

Figure 5. Anatomical variation in the nasal sinuses. This normal computed tomography scan shows pneumatization of the left middle turbinate. The nasal septum is deviated to the opposite side.



ANATOMICAL VARIATIONS

Considerable attention has been paid in the past few years to the middle meatus of the nose (osteomeatal complex) and its impact on the presentation of nasal disease (*Figure 5*). The frequency of these variations appears similar in patients with and without nasal polyps. Surgical treatment is aimed at correcting the anatomical variations and opening out the ethmoid cells into a large unit, an ethmoidectomy, often aided by the endoscope. Correct radiographical imaging with CT is essential before surgery and shows the anatomical variations and the extent of the disease. The orbital contents and the anterior cranial fossa are at risk from polyp surgery as the disease may obscure the anatomy, which in turn may be altered by previous surgery (*Figure 1*). Complications occur in less than 1% of patients following endoscopic polypectomy and the commonest are periorbital bruising, herniation of orbital fat and CSF leakage.

RECURRENCE

Recurrence is common and between 5 and 10% have severe recurrent disease, which may be very difficult to control. About 60% of patients will require a further polypectomy in a 5-year period; the rest will have less frequent recurrence (Larsen and Tos, 1997). Asthma increases the chance of recurrence.

TREATMENT

Surgery has long been the main treatment for nasal polyps but the advent of corticosteroids has changed therapy. The roles of both are still debated but the following account presents a consensus. There are a number of trials which look at the place of corticosteroids before surgical treatment, as an adjunct to surgery and after surgery to prevent recurrence and control symptoms (Holmberg and Karlsson, 1996; Mygind and Lildholdt, 1996; Mygind, 1999; Scadding, 2002).

Medical treatment before surgery

All patients should have a trial of medical treatment before surgery, either in primary care

or prescribed by the surgeon. Many patients have had medical treatment with corticosteroids sprays and drops for their rhinitis in primary care. As simple polyps may resolve when treated this way in primary care, it is difficult to assess efficacy overall. If the patient has not had a corticosteroid a trial should be undertaken before surgery. The majority of patients are sensitive to corticosteroids but high doses may be required in some and should be given orally if necessary, particularly if radical surgery is advocated. It is usual to try a corticosteroid spray for up to 6 months and this may be supplemented with corticosteroid nose drops. A number of other therapies have been tried and include the anti-leukotriene antagonists, topical antifungal medication and the macrolides but none have been found to be particularly useful. They have also been used after surgery to prevent recurrence but again are unproven.

Surgery

Surgery will remove the obstructing tissue but does not control the symptoms of rhinitis in all patients. There are between 30 and 50 operations per annum per 100 000 adults in England and Wales. The surgical method of choice has changed over the years with many polyps now being removed with the microdebrider, using a rigid endoscope for visualization (Stammberger, 1999). Some surgeons advocate radical removal of the tissue and will open all the sinuses into a single cavity. This is more popular in parts of Europe and North America.

There is no evidence that any one technique is better and the surgeon should use the methods with which he or she is comfortable. Evidence will come from the recent national audit of surgery conducted by the Royal College of Surgeons of England, which looked at over 2000 patients. Poor olfactory function may not be reversed by surgery. Simple surgical procedures may be undertaken as a day-case procedure as patients do not require nasal packing postoperatively.

Medical treatment after surgery

Evidence suggests that this works but compliance is problematic if there are no or few symptoms. Betamethasone nose drops or similar may be used if the problem is more refractory. Oral corticosteroids may be required in reducing doses starting at 30 mg for a period of 2 weeks in severe cases. There is debate about how often and to which patients this should be given.

CONCLUSIONS

Polyps are not a disease and therefore do not have a pathogenesis in the true sense of the word. They are found in adults but require investigation in children to exclude anterior cranial fossa deficits and cystic fibrosis. About one third of adults will have late onset asthma and a small group will be sensitive to salicylates. The eosinophilic tissue is grossly oedematous respiratory mucosa, which may improve with corticosteroids. Surgery can be undertaken by a variety of techniques but evidence that any particular protocol is superior is lacking. Postoperative corticosteroid therapy helps symptomatic patients and the underlying severity dictates the dose and mode. The majority of patients does not have a troublesome recurrence but between 5 and 10% may be problematic. HM

Conflict of interest: none.

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KEY POINTS

- Nasal polyps are the prolapsed oedematous lining of the ethmoid sinuses.
- Nasal polyps are a physical finding and not a disease.
- Unilateral polyps require histological examination to exclude malignancy.
- Polyps in young children may be caused by anterior cranial abnormalities or cystic fibrosis.
- Asthma coexists in 20–40% and a subgroup has salicylate hypersensitivity.
- Histology shows an inflammatory infiltrate with an eosinophilia.
- Medical treatment with topical corticosteroids may prevent surgery.
- No surgical technique has been shown to be any better.
- Corticosteroids may be required afterwards to control symptoms.
- Severe recurrence may be a problem in 5–10% of cases.