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Medical treatment of nasal polyps*†

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SUMMARY

Polyps are a multifactorial disease that affect the nasal lining and sinus mucosa, and in about one-third of the patients are associated with asthma. Polyps may occur in other respiratory diseases such as cystic fibrosis, primary ciliary dyskinesia and immune deficiencies. Allergy does not predispose to polyp formation, although mast cell reactions appear to be important. This explains why corticosteroids are effective in controlling some cases and helping to prevent recurrence in some others. Polyp formation in the sinuses is due to three factors: (1) the balance between the inflammatory response and the local homoeostatic mechanisms; (2) the relatively poor blood supply of the sinuses; and (3) the complex anatomy of the ethmoids and middle meatus which aggravates the existing oedema. Half the cases resolve on inhaled corticosteroids. Surgery should be tailored to the patient's needs, but on principle the simplest, least invasive operation should be tried first. If the patients are still symptomatic or recurrence is a problem, surgery may be followed by corticosteroids. If inhaled corticosteroids do not control the symptoms, then oral therapy may be required.

Key words: nasal polyps, surgery, corticosteroid therapy

INTRODUCTION

The term polyp was originally applied to any polypoidal lesion in the nose with no reference to any pathological classification. Histological classification improved during the nineteenth century, and neoplasms were differentiated from simple nasal polyps; the latter were considered inflammatory in nature. Today the term is most commonly used to describe simple, benign nasal polyps which are bilateral and arise from the ethmoid sinuses.

Nasal polyps are not a disease, but merely a physical finding with a number of causes. Polyps have a constant histological character and so are usually considered as a single entity; however, the nose is only capable in acting in a number of ways and, as a consequence, the same histological picture may be produced by a number of different aetiologies. Appropriate management starts with unravelling the cause and then applying structured treatment. Paradoxically, since polyps mainly consist of oedematous tissue, many cases respond to corticosteroids.

General considerations

Polyps are virtually confined to man, occurring very rarely in other primates, usually chimpanzees. The difference in development of the ethmoturbinal system in other animals may account for the interspecies differences.

Polyps may arise in children after 2 years of age, and then they may be a presenting manifestation of cystic fibrosis (Lurrie, 1957). Polyps usually arise in established cases and in some they may be particularly recurrent. They may cause expansion of the floor of the anterior cranial fossa before the fontanelles unite and result in hypertelorism as the child grows.

Benign simple polyps generally present in adulthood, and are rare before 20. Initial presentation occurs equally in each decade up to 60, after this they are encountered more rarely. They also become less troublesome as the patient ages. Approximately one per cent of the adult population have nasal polyps at some time in their lives.

Ciliary abnormalities, as seen in primary ciliary dyskinesia (Kartagener's syndrome), can result in polyps as can hyperviscous mucus as in Young's syndrome. About one-third of patients with nasal polyps have some evidence of bronchospasm (Maloney and Collins, 1977). The incidence of childhood asthma among patients with polyps is the same as in the general population, so the association is with late-onset asthma.

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Recurrence is severe in about 5% of patients: an earlier age of onset is associated with more severe recurrence as is the presence of asthma, both alone and with aspirin hypersensitivity. The latter two suggest a more aggressive respiratory mucosal disease. Allergy is not associated with more severe recurrence (Drake-Lee et al., 1984b).

There is a not only a strong male predominance in children with cystic fibrosis but also in adults. Figures vary from series to series but the ratio is between 2:1 and 4:1. This is not nearly so great in patients who have asthma in addition to polyps (Drake-Lee et al., 1984b), suggesting that this is a different group of patients.

There is a well-recognized triad of asthma, aspirin hypersensitivity and nasal polyps, occurring in up to 8% of patients (Samter and Lederer, 1958). The mechanism is uncertain, but it is not an allergic reaction and both prostaglandins (Szczeklik et al., 1975) and leukotrienes have been implicated in the production of the oedema.

Sinusitis and allergy

Despite popular beliefs, several authors have shown clinically that allergic diseases are no more common in patients with polyps than in the normal population (Settipane and Chaffee, 1977; Drake-Lee et al., 1984b; see Table 1).

Table 1. The incidence of allergic and respiratory diseases in nasal polyps. The controls are gathered from different studies and referenced in Drake-Lee et al. (1984b).

	Polyp patients	Normal population
Hay fever	10%	10%
Childhood asthma	5%	5%
Eczema	11%	3%
Penicillin allergy	7%	<15%
Positive skin tests	25%	20–25%
Non-allergic diseases		
Late-onset asthma	>25%	3%
Aspirin intolerance	8%	0.1%

Virtually every patient with nasal polyps has some degree of radiological changes in the sinuses that are not confined to the ethmoids alone. The incidence of chronic infective sinusitis has decreased dramatically over the last 50 years, whereas nasal polyps have not become less frequent. Hyperplastic sinusitis is associated with hypersecretion of mucus and when the ostium of a sinus is blocked the sinus may then become colonized with bacteria. Pus cells and bacteria are cultured together in under 15% of maxillary sinuses (Dawes et al., 1989). A further argument against a direct bacterial role is the dramatic response of about half the cases to corticosteroids. If the process were primarily infective, then an exacerbation of the condition should occur and even in those cases who do not respond there is no exacerbation of symptoms.

Ultrastructural studies have shown that mast cells in polyps are degranulated (Cauna et al., 1972; Drake-Lee et al., 1984a). The degranulation could give rise to eosinophilia and the presence of inflammatory mediators would account for the oedema.

Inflammation

Histamine, prostaglandins and leukotrienes mediate inflammation. Polyp fluid is easy to collect (Berdal, 1954). Serum may also be collected and levels of compounds compared in both samples from the same patient. Levels of histamine are far higher in polyp fluids, with values several hundreds of times higher than those of serum on average (Drake-Lee and McLaughlan, 1982). Since histamine is preformed and detoxified locally by the tissue histaminases as well as being metabolized in the lungs and the liver, these levels suggest that local mechanisms are overcome and circulation is too inadequate to transport the excess.

The results of studies that have looked at arachidonic acid metabolites, which are relatively unstable and may be generated by trauma, are difficult to interpret (Salari et al., 1986; Nigam et al., 1986; Smith et al., 1987; Jung et al., 1987). It appears that the levels of thromboxanes are elevated and that challenge will produce 5-hydroxyeicosatetraenoic acid (5-HETE), 12-HETE, and 15-HETE, the most elevated being 15-HETE. There is some suggestion that levels are higher in patients with aspirin sensitivity, but whether this is due to a more severe inflammation is not clear. Leukotrienes C4 and D4 may be demonstrated in polyp oedema fluid. Prostaglandins E_2, F_2 and 6-ketoprostaglandin $F_{1\alpha}$ are also present in the fluid.

Local inflammatory reactions occur throughout the nose, but the anatomical development of the ethmoids facilitates persistent oedema since the blood supply is far less well-developed in the sinuses. The process is dynamic, so that polyps may vary in size and medical treatment aims at aiding recovery.

CLINICAL GROUPING

In a multifactorial disease it is important to have a simple scheme to help in the management of the problem. Patients may be grouped clinically into those with pan-respiratory disease and those with nasal disease alone. Those with pan-respiratory disease, such as late-onset asthma, cystic fibrosis, immune deficiency and primary ciliary dyskinesia, are the most difficult to treat both medically and surgically. Those with nasal disease alone are difficult to evaluate since several factors may be contributing to the presence of nasal polyps and include anatomical abnormalities, particularly in the middle meatus as well as extensive mucosal diseases in the nose and the paranasal sinuses that are not associated with any such abnormality.

Patients are often poly-symptomatic and should be assessed on this basis together with the results of investigations before starting treatment, so that their progress is monitored effectively following therapy. Symptom scores and diary cards are an objective way of monitoring therapy.

TREATMENT

Treatment is a combination of medical and surgical modalities following the assessment of the patient. Medical therapy should be initiated initially, sometimes in conjunction with surgery. Very limited disease associated with an anatomical abnormality of the middle meatus may not respond to medical treatment. This article will concentrate on the medical management. Medical treatment can be conveniently divided into two areas, that directed at inducing remission, and that directed at preventing recurrence. The principles are summarized in Table 2.

Table 2. Summary of medical treatment.

PRE-OPERATIVE THERAPY WITH INTRANASAL CORTICOSTEROIDS:
Trial of therapy since one-half of patients respond.
1. Betamethasone nose drops: 2 drops each side twice a day for one month, or
2. Aqueous beclomethasone, flunisolide, budesonide or fluticasone: 2 puffs each side twice a day for one month.
POST-OPERATIVE THERAPY:
Intranasal corticosteroids
Indicated in patients with recurrence and symptoms. Intranasal corticosteroids (with e.g. beclomethasone) first.
If patients do not respond, then:
1. betamethasone nose drops, 2 drops each side twice a day, or oral corticosteroids.
2. prednisolone, between 5 and 30 mg daily, for ten days with topical treatment which should be continued.
Diets
May help those with aspirin hypersensitivity.
Allergy control
If patients have allergic rhinitis therapy may be required.

Initial medical treatment

About half of the cases respond to corticosteroids. Polyps regress when corticosteroids are given orally, and corticosteroids are as effective as surgery (Lildholt et al., 1988). Because of the risk of side effects, they are usually given intranasally. It is worth trying intranasal corticosteroids on all patients, since they will prevent surgery in up to half of the patients. Where available, two drops of betamethasone (0.1%) at each side twice a day with retention should be tried for one month. An aqueous spray, such as beclomethasone, flunisolide, budesonide or fluticasone, may be used as an alternative therapy and should also be given for one month when the response can be re-assessed (Charlton et al., 1985; Dingsor et al., 1985). Two puffs of beclomethasone diproprionate (400 μg) at each side twice a day is a typical treatment.

Medical treatment must be given in a way that will ensure contact for a reasonable length of time. Nose drops may be given in either the head-down-and-foreward position (praying to Mecca) or lying prone with the head dependent, and the patient should stay in this position for at least one minute, preferably longer. Betamethasone does have a systemic absorption and whether its effect is due to this or the position in which it is applied has yet to be evaluated. Cushing's syndrome has been described following betamethasone abuse (Stevens, 1988), so it should be given carefully if used on a continuous basis. Sprays are easier to use and probably have a better compliance. Betamethasone has yet to be produced as a spray. Although it is felt that the potion of a nasal spray is important, as long as the spray ends on the ciliary epithelium its action will transport the spray posteriorly, and the spray will cover the nasal lining.

If the polyps do not respond after a month, then they may be removed surgically. As more patients are given medical treatment before they reach the specialist, the proportion of 'steroid-resistant' polyps will rise. There are many different views on the best surgical treatment for nasal polyps, and the attitude to surgery is coloured by the patients with severe recurrences; it is not the purpose of this paper to discuss them. The majority of patients who have occasional recurrences every ten or so years, may be treated very effectively by simple polypectomy. Modern diagnostic techniques, including endoscopic nasal examination and computerized evaluation of the nose and paranasal sinuses, have shown the site of disease more accurately. The endoscope can be used to undertake a more thorough endonasal ethmoidectomy. It can also be used to monitor the post-operative course.

Post-operative therapy

A number of studies have shown that long-term post-operative treatment with corticosteroid nose sprays reduces the severity of recurrence (Mygind et al., 1975; Deuschl and Drettner, 1977). Patients who present for the first time and those with several years between recurrences do not necessarily require post-operative treatment. Both beclomethasone and flunisolide, or other fluorinated corticosteroid nasal sprays, may be used long-term in the standard doses.

Patients with nasal polyps may also have symptoms of rhinitis without obvious polyps that require treatment. Once the symptoms are under control, the dose of the spray may be titrated against the symptoms. If polyps recur, then betamethasone nose drops may be tried.

When patients have intractable disease where neither surgery nor inhaled corticosteroids prevent severe recurrences, oral corticosteroids, such as prednisolone, may be required to control nasal symptoms in those patients, if there are no medical contra-indications. Daily doses of up to 30 mg or more may be required, but as little as 5 mg will help in some patients. The minimum dose that resolves symptoms should be used and continued for 10 days while topical therapy with intranasal corticosteroids is instituted as well. Topical therapy may then hold the condition. Polyps that are controlled on steroids tend to recur when therapy is ceased.

Diets and allergy control

Allergy is rarely present concurrently with nasal polyps, but if it is then appropriate control of the environment may be required.

Since there is a link between aspirin and the natural salicylates and tartrazine dyes, it is worth trying patients on a diet free from those compounds when they have aspirin hypersensitivity together with asthma and nasal polyps. It is difficult to perform controlled trials, but about half of the patients with aspirin hypersensitivity say that they feel better with fewer nasal symptoms. Wheat-flour hypersensitivity may produce nasal symptoms and so exclusion diets may be tried. This should be undertaken with the help of a dietician.

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