Nasal Polyps

Current Understanding and Management

by Dr Ong Yew Kwang

A group of disorders characterised by inflammation of the mucosa of the nasal cavity and sinuses, rhinosinusitis is one of the most common and prevalent illnesses throughout the world. It has a significant impact not just on patient symptoms and quality of life but also carries a huge economic burden.[1]

Depending on the duration of the symptoms, rhinosinusitis can be divided into acute rhinosinusitis (< 12 weeks) or chronic rhinosinusitis (> 3 months).[2] Chronic rhinosinusitis (CRS) on the other hand, can be divided into two types: CRS without nasal polyps (CRSsNP) and CRS with nasal polyps (CRSwNP).[2] This article will focus on CRSwNP, where advances in understanding the pathogenesis and current management strategies will be discussed.

Nasal Polyps

CRSwNP accounts for 20–33% of all cases of CRS [3] while the prevalence of nasal polyps is about 4% in the general population and men seem to outnumber women (2:1), with the overall incidence increasing with age in both sexes.[4]

Considered a heterogeneous group, CRSwNP includes nasal polyps associated with allergic fungal sinusitis, aspirin-exacerbated respiratory disease (AERD) and cystic fibrosis (CF). Asthma patients also suffer from increased rates of nasal polyposis.[5]

Pathogenesis

Currently, it is well accepted that the development of nasal polyps is a result of an active inflammatory process. What remain unclear are the etiological factors and the pathogenetic mechanisms behind it. Viruses, bacteria, fungus, allergy and environmental pollution have all been suggested as possible initial triggers. These inciting agents disrupt the epithelial lining and initiate an inflammatory cascade. Stroma edema may consolidate if inflammation fails to subside, thereby resulting in the formation of polyps.[5, 6] It is important to recognise that no single factor fully accounts for the genesis of nasal polyps. It is likely to be multi-factorial in etiology, involving several pathogenetic mechanisms.

Microorganisms have always been implicated in the pathogenesis of CRS. A varied species of organisms including staphylococcus, streptococcus species, gram-negative rods and even anaerobes have been isolated in patients with CRS.[1] This may reflect either infection or colonisation, but the clinical significance remains a subject for debate. Recent studies have

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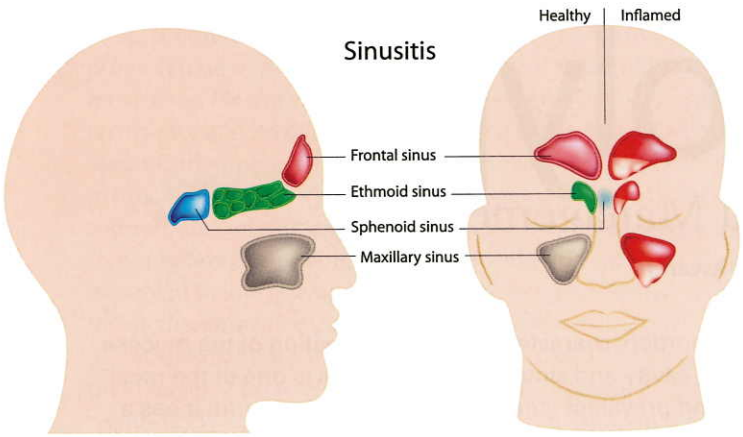

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focused on the roles of biofilms, Staphylococcus aureus superantigens and fungi in the pathogenesis of CRS.

Role of T cells in CRSwNP

The role of T cells and its cytokines (the molecular profile, in particular) have been studied in great details and much insight has been gained over the years. It has been suggested that CRS with and without polyps can be discriminated based on inflammatory profile. Classically, CRSsNP is a T helper cell (T_H) subtype 1–dominant and neutrophil-dominant process, whereas CRSwNP represents an eosinophilic TH2 process.[7,8] A key mediator in nasal polyps (NP) is eosinophils, which can be found in up to 90% of the cell populations in NPs. High levels of T_H2 cytokines such as interleukin (IL)-5 and IL-4 are also found in NP tissues. IL-5 is the most important in activation of eosinophils while IL-4 induces differentiation of naïve helper T cell (T_H0 cells) to T_H2 cells.

However, it is well accepted that not all patients with CRSwNP demonstrate this T_H2 eosinophilic dominant process.[9] A recent study comparing Caucasian and Chinese patients with nasal polyps has demonstrated a predominantly neutrophilic pattern with a T_H1/T_H17 T-cell up regulation in Chinese patients as compared to a T_H2 dominant eosinophilic inflammation in Caucasian.[10] Nasal polyps in cystic fibrosis patients also displayed a predominant neutrophilic inflammation.[11] These heterogenous T_H inflammation profiles reaffirm the notion that different pathogenetic mechanisms are involved resulting in the same clinical phenotype of CRSwNP.

Other factors such as altered innate immunity, adaptive immunity, tissue remodeling and aberrant arachidonic acid metabolism may also play a role in the development of CRSwNP. Further research will shed more light on the relative importance of each of these factors.

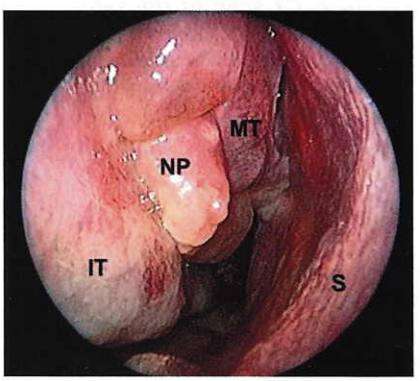

Figure 1a. ***Endoscopic view of right nasal cavity. Nasal polyp (NP) is seen arising in the osteomeatal complex. IT-inferior turbinate. MT-middle turbinate. S-septum***

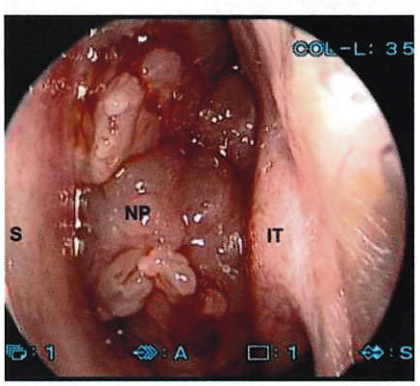

Figure 1b. ***Endoscopic view of left nasal cavity. The nasal polyp (NP) is filling up the entire left nasal cavity. S- septum. IT-inferior turbinate.***

Aspirin Exacerbated Respiratory Disease (AERD)

A subset of patients with CRSwNP has coexistent asthma and aspirin sensitivity; this condition is also known as AERD or Samter's triad. These patients develop severe nasal and respiratory symptoms after ingestion of aspirin or other nonsteroidal drug and the nasal polyps are characterised by eosinophilia. Aberrant arachidonic acid metabolism has been implicated in the pathogenesis of AERD. Ingestion of cycloxgenase (COX) 2 inhibitors results in a shift in the arachidonic acid metabolism towards the lipoxgenase pathways leading to increased leukotriene products and inflammation of the respiratory passages.

Clinical Presentation

Patients with small nasal polyps are usually asymptomatic. Those with larger polyps typically present with nasal obstruction, nasal discharge (anterior or posterior nasal drip), facial pain or pressure and reduction or loss of smell. The diagnosis of CRSwNP is made when there are 2 or more of the above symptoms for more than 12 weeks, one of which should be nasal obstruction or nasal discharge and either endoscopic signs of polyps, and/or CT changes as characteristic of the disease.

Diagnosis

Diagnosis of nasal polyps can easily be made by nasal endoscopy. Nasal polyps are bilateral and typically arise around the osteomeatal complex **[Figure 1 a,b]** – an area between the middle turbinate and the lateral

nasal wall and is the common outflow tract of the maxillary, frontal and the anterior ethmoid sinuses. Endoscopic appearance of polyps usually reveals pale and edematous swellings. Biopsies of the polyps are usually not performed. However, unilateral polyps are infrequent and they should prompt consideration of other diagnoses, such as antrochoanal polyp, inverting papilloma, other malignant tumors or even an encephalocoele.

Imaging

Computer tomographic (CT) scan of the paranasal sinuses evaluates the extent of the disease and is essential as a roadmap prior to surgery. Long standing polyps can thin out the lamina papyrecea or skull base and it is important to study the anatomy and be aware of any potential `landmines' prior to surgery. Sinus CT usually shows partial or complete opacification of the nasal cavities and paranasal sinuses **[Figure 2]**. The main limiting factor of CT scan is its inability to differentiate polyps from mucous and other soft tissue masses. In such cases, an MRI scan will be needed to resolve the issue.

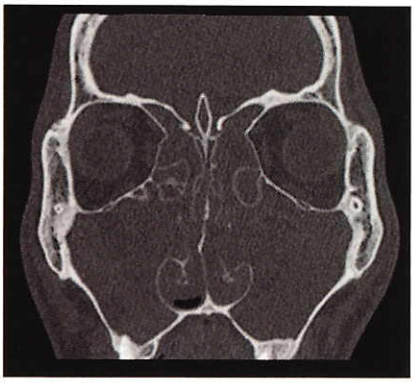

Figure 2. ***CT scan of the same patient (in fig 1b) showing complete opacification of the ethmoid and maxillary sinuses bilaterally.***

Treatment

The goals of the treatment are to eliminate the nasal polyps, alleviate symptoms and to prevent recurrences. In general, patients with mild conditions can usually be effectively controlled with medical treatment while those with severe conditions require a combination of both medical and surgical treatment.

Medical Treatment

Corticosteroid

Intranasal steroids are the first-line of medical treatment for nasal polyposis.[6] Its anti-inflammatory effect improves nasal obstruction and drainage. They have been shown to decrease polyp size and improve nasal symptoms.[12] The use of intranasal steroids postoperatively has also been shown to reduce recurrence and the need for systemic therapy.[13] These intranasal steroids have low systemic absorption and hence the systemic side effects of oral steroids are minimised. Fluticasone (Avamys®), mometasone (Nasonex®), triamcinolone (Nasacort®), budesonide (Rhinocort®) are nasal corticosteroids spray available locally and are used mainly for the treatment of allergic rhinitis. Only mometasone and budesonide are approved for the treatment of nasal polyps.

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Recently, there has been an increasing interest in the off-label use of budesonide (Pulmicort® respules) as nasal irrigation to treat recurrent nasal polyps after endoscopic sinus surgery. This allows high-dose delivery of a potent corticosteroid to nasal and sinus cavities while again minimising systemic side effects. Though there have been no long-term studies, short-term use (4-8 weeks) appears to be a safe alternative to traditional aerosolized steroid spray or systemic corticosteroids.[14] However, the U.S. Food and Drug Administration (FDA) have yet to approve this mode of treatment.

Oral steroids are generally reserved for advanced or refractory cases.

They reduce the size of the nasal polyps and improve the sense of smell. But long-term use is limited by its extensive list of side effects and should be used with caution in patients with diabetes, uncontrolled hypertension, peptic ulcers and glaucoma.

Antiluekotrienes

Cysteinyl leukotriene receptor (LTR) antagonists (such as montelukast) functions by blocking LTR sites and has been shown to be of benefit in patients with coexisting allergic rhinitis and asthma. They might improve symptoms in nasal polyposis and be an alternative to long-term oral steroid therapy. The prevention of relapse following surgery can also be enhanced by treatment with antileukotrienes.[15]

Short-term Oral Antibiotic Therapy

There is limited evidence that antimicrobials as a sole modality of therapy are effective in the management of CRS. However, short-term oral antibiotics are recommended to improve symptoms in acute exacerbation of chronic rhinosinusitis with nasal polyps.[2, 3] The choice of antibiotics should be guided by cultures of the mucopus from the middle meatus. A minimum duration of 3-4 weeks is usually needed.

Long-term Oral Macrolide Therapy

Long-term, low-dose macrolide therapy (erthyromycin 500-1000 mg/day, clarithyromycin 400 mg/day or roxithyromycin 150 mg/day for 8 to 12 weeks) may be considered for patients with nasal polyps.[16-18] Its effectiveness may be related to their anti-inflammatory properties rather than their antimicrobial characteristics. One concern regarding the long-term use of macrolide is the induction of antibiotic resistance.

Aspirin Desensitisation

Aspirin desensitisation therapy is recommended for patients with Samster's triad. It improves nasal symptoms, reduces polyp recurrence, and the need for additional surgeries.[19]

Adjunct Treatments

The evaluation of allergy is important in the management of patients with nasal polyposis. Control of allergy helps with controlling the inflammation and reduces the additive factors. Anti-histamines are not recommended unless there is concurrent allergy.

Nasal saline spray or irrigation with hypertonic or isotonic saline helps relieve symptoms by reducing the allergen load and removing nasal secretions and post-surgery debris.

Oral/topical decongestants and mucolytics have no roles in the treatment of nasal polyposis.[2]

Novel Therapy

The future for the medical management of CRS lies in the detection of specific inflammatory cytokines involved in the pathogenesis and targeting therapy against it. The recent use of anti-IL-5 in severe nasal polyps represents another milestone in the treatment milieu.[20] The classification of CRS, targeting of specific inflammatory cytokine and measurement of outcome based on cytokines may indeed become a reality in the future.

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