

Histopathological Variants of Chronic Polypoid Rhinosinusitis and Clinical Outcomes

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ABSTRACT

Chronic rhinosinusitis with polyposis is a clinical condition that has been poorly understood and difficult to treat. Its features are the inflammation of nasal and paranasal mucosa with polyp. The aim of this study was to determine variant histopathology in these patients and its outcome based on postoperative symptoms and endoscopic findings. Ninety three patients with chronic polypoid sinusitis with no previous history of sinus surgery and any other diseases underwent endoscopic surgery. Histological samples of polyp were analyzed. The samples were classified into 4 groups based on the Hellquist classification: Allergic (A), chronic inflammatory (B), seromucinous (C), and polyp with atypical stroma (D). Patients were followed by clinical symptoms and endoscopic assessments for 12 months. Age, smoking behavior, family history, allergy, asthma, and sensitivity to Aspirin were assessed. In addition, histological types of polyps were investigated and recurrent polyps were determined. The group A had highest frequency 71% (66 cases), followed by the group B 20.4% (19 cases) and C 8.4% (8 cases). Twenty percent of patients (27 cases from the group A) had recurrent polyp. Recurrence had a significant relation with type of pathology and history of asthma and allergy. Recurrence in the group A was statistically significant (P -value=0.0036) compared with the two other groups. This study showed that allergic polyp was the most frequent polyp and recurrent in patients with chronic polypoid rhinosinusitis. In addition, there is a relation between type of pathology and history of asthma and allergy with recurrence after surgery.

Key words: Chronic polypoid rhinosinusitis, Histopathology, Clinical outcome

INTRODUCTION

Nasal polyposis is a common disease that generally affects about 2-4% of the world population¹. However, its prevalence is different in various groups; for example its prevalence has been cited as: 36% in patients allergic to aspirin, 7% in asthma patients, 0.1%, in children, and 20% in

cystic fibrosis patients. The other common conditions, accompanied with the disease, are Churg-Strauss syndrome, allergic fungal sinusitis, and Kartagener syndrome².

This disease is referred to a group of dysfunctions characterized by the inflammation of nasal mucous membrane and paranasal sinuses

persisting for at least 12 weeks³. Based on the criteria of ear, nose and throat surgery of America the major defining factors of it include facial pain or feeling of pressure, nasal discharge or postnasal drip, reduction or loss of sense of smell, and fever. In 2003, it declared that this definition needs radiological or endoscopic confirmation and clinical examination findings in addition to the patient's history. The most frequent complaint of nasal polyposis patients is nasal obstruction and the age group of 40 years has the highest involvement without sexual preference [4, 5]. The more common risk factors of the nasal polyposis are smoking, exposure to pollutants and dust, eczema, allergy to aspirin, alcohol consumption, asthma, and atopy. It should be noted that polyp is a mass of tissue that projects from a mucosal surface and is supported by a stalk-like connection, and nasal polyposis is a clinical condition characterized by the accumulation of polyps, especially in the middle meatus and ethmoid, which is usually two-sided and tends to be recurrent. Polyps are usually numerous, non-neoplastic, soft, luminous, not bleeding, and translucent⁴.

The pathogenesis of nasal polyposis has not yet been properly identified. Recently some differences in the demonstration of inflammatory mediators and cellular features have been observed in chronic sinusitis with nasal polyposis. The majority of sources confirm that eosinophil and its resulting inflammatory products are the main characteristics of nasal polyposis⁵.

Recent studies have shown that nasal polyposis, contrary to what previously thought, is not an allergic condition and the majority of articles divide polyps into two categories of eosinophil and neutrophil. While others, in categorizing polyps mention eosinophilic-polypoid and glandular hyperplasia groups⁶, but according to the study of Hellquist (1993) on 95 patients, he considered a more complete classification, which based on it four types of polyps are defined.

Allergic type that 86% of nasal polyps belong to this category. Specifications of this type of polyps include: normal epithelium with somewhat goblet cells activity, thickened basement membrane, high number of eosinophils that are mostly populated next to vessels together with

plasmocytes and histiocytes, and presence of mast cells scattered in the stroma.

The second form is inflammatory or fibroinflammatory (3.7%) that epithelium mostly shows changes like becoming stratified cuboidal or squamous, pseudo-thickening of membrane is irregular or is not seen at all, infiltration of inflammatory cells includes a collection of neutrophils, lymphocytes, and plasma cells. And the number of eosinophils is not more than other types of cells and probably neutrophil is the dominant cell type. The third form is glandular hyperplasia (5.3%): In some cases, seromucinous glands increase and are hyperplastic, which is sometimes known as tubo-cystadenoma.

Finally, polyps with atypical stroma with the prevalence of about 1.1% are not common. Generally, an edematous stroma and active fibroblasts are located in parts of the polyp.

These fibroblasts exhibit unusual characteristics. They are star-shaped, large, irregular, and hyperchromic, which are usually without mitosis. This classification is confirmed by pathological assessments⁷.

Nasal polyposis imposes many direct and indirect social and economic costs to the society and also significantly affects the quality of life of patients and is associated with occupational and social limitations, which this problem is more influential on mental health of people than their physical health⁸. Determining the exact histopathological characteristics and variants of chronic polypoid rhinosinusitis can help selecting efficient medications for the management of this disease. In addition it facilitates determining the effective parameters of alternative treatment options for this disease such as non-drug treatments⁹⁻¹¹.

It is notable that this disease has adverse effects on the life of individuals compared to other diseases such as rheumatoid arthritis, insulin-resistant diabetes, and COPD. Rhinosinusitis with nasal polyposis is associated with high risk of complications such as orbital and cerebral complications¹².

There are different treatments for chronic rhinosinusitis with polyposis including the use of decongestants, antibiotics, antihistamines, topical and systemic corticosteroids, and surgery as well. In some cases, treatment of the individual will continue for their whole life. Therefore, with regard to the reduced quality of life and treatment costs as well as long term of treatment process, conducting further studies on this area is necessary. Few studies have been conducted on identification of polyps in patients with chronic rhinosinusitis with polyposis and the assessment of prognosis based on the type of histology.

This study aimed to assess histopathological polyps in patients with chronic rhinosinusitis, and their one-year treatment prognosis based on clinical and endoscopic findings was performed.

METHODS

The study was performed on patients with chronic rhinosinusitis with polyposis referred to the Ahvaz Golestan Hospital (Iran) during the second half 2013, who were candidates for endoscopic surgery.

The criteria for entry into the study were no prior history of endoscopic sinus surgery and not having rhinosinusitis with fungal polyposis and hereditary diseases such as Kartagener syndrome and cystic fibrosis.

The collected data were age, sex, family history of rhinosinusitis with polyposis, history of asthma and allergies, allergy to aspirin, and smoking behaviors.

After performing endoscopic surgery, biopsy specimens were sent to the pathology lab. The samples were assigned into four groups based on Hellquist classification. The assignment was performed independently by two pathologists.

After surgery, patients received the treatment protocol consisting of short term systemic corticosteroid, long term topical corticosteroid, washing with normal saline and antibiotics for two to four weeks. Patients were followed for one year

and based on the clinical symptoms and endoscopic finding, recurrence rate among them was evaluated.

RESULTS

Ninety three samples (from 93patients) were obtained and evaluated and classified into four groups: allergic group, chronic inflammatory group, seromucinous (glandular hyperplasia) group, and the polyps with atypia group. Which allergic group with 71% (66 people) had the highest frequency and after that were chronic inflammatory group with 20.4% (19 people) and seromucinous group with 8.6% (8 people). In none of the studied samples polyps with stromal atypia were found. Twenty nine patients (20.4%) had positive family history regarding polyposis. Twenty eight patients (30.1%) gave a description of asthma and allergies. None of the cases had allergy to aspirin (ASA) and 17 patients (18.3%) were smokers.

In the follow-up assessment of the patients after one year in 29 of cases (2.31%) recurrence was observed that included the allergic group 27 individuals (40.9%), chronic inflammatory one individual (5.3 %) and seromucinous one individual (12.5%). According to statistical analysis age, family history, allergy to aspirin, and smoking variables did not affect recurrence rate and only the type of pathology and a history of asthma and allergy contributed significantly to the recurrence (Table 1).

Table 1: Relation among different variables and recurrence; univariate analysis

	Recurrence Frequency (%)	p-value
Family history	neg 23 (31.1%) pos 6 (31.1)	0 .967
Allergy & Asthma	neg 14 (21.5%) pos 15 (53.6%)	0.002
Smoking	neg 25 (32.5%) pos 4 (23.5%)	0.569
Diagnosis	Allergic 27 (40.9%) Inflammatory 1 (12.5%) Seromucinous (5.3%)	0.0006

The relationship between the type of pathology, asthma, and allergy with recurrence rate in allergic and chronic inflammatory group showed that the recurrence in the allergic group was significantly positive (P-value <0.05). However, compared to the seromucinous group it was not significant (P-value <0.05).

In addition, no significant relationship between chronic inflammatory group and seromucinous group regarding recurrence rate was found.

DISCUSSION

Chronic rhinosinusitis affects approximately 4% of the world population and significantly affects the quality of life of people. It is still unclear whether chronic sinusitis with polyposis and without polyposis are different stages of the same disease or not³. Histologically polyposis is known by a proliferation of the epithelium, glandular hyperplasia, and thickening of the basement membrane, edema, fibrosis, and infiltration of inflammatory cells, especially neutrophils, eosinophils, mast cells, and macrophages. Chronic infection and allergy are the two major underlying causes of nasal polyp¹³.

The turbulence of airflow in the nasal side walls or bacterial-viral infections leads to inflammatory changes in the nasal mucosa. Following the lesion and protrusion of the submucosa, epithelial regeneration and new glands are formed. Polyp structural cells including epithelial and fibroblast have the ability to generate m-RNA for the production of GM-CSF and other cytokines, which this causes an inflammatory response in the polyps. It seems that a specific pattern of cytokine is contributed to various forms of polyps. For example, IL-5 is the most important cytokine responsible for the eosinophils tissue in the nasal polyposis. The value of identifying the type of polyp is of significance important in the treatment. For example, systemic steroids are used for advanced types, especially the type associated with allergy. According to the study that Hellquist *et al.* conducted in 1993 by examining 95 samples, four categories were defined, which our findings are consistent with the results of this study in terms of the prevalence, with the exception that

none of our samples had atypia. The highest frequency belonged to allergic group and then chronic inflammatory and seromucinous groups. Unlike the majority of studies reporting that allergic type has higher prevalence, Tikaram in a study on Asian individuals reported that neutrophilic polyps had a higher prevalence¹⁴.

Samter triad is a combination of nasal polyp, asthma, and aspirin allergy. Kim *et al.* (2007) evaluated 208 patients with sinusitis with polyp and reported the prevalence of 4.8% for patients with allergic origins¹⁵. Contrary, we observed the disease in none of our patients. The reason for this difference is that none of them mentioned a history of allergy to aspirin.

Pawliczak reported the prevalence of 14% for the positive family history among patients¹⁶, whereas our findings showed 20.4% of our patients had positive family history, which did not have a significant impact on recurrence rate. The number of individuals with positive family history among the people who had recurrence was close to the ones that had negative history (31.1% and 31.6%).

Larsen in a meta-analysis study showed polyposis has higher recurrence among asthma patients (7-15%) and in average 29.9% of patients suffering polyps have asthma¹⁷ which is consistent with our findings indicating about 30.1% of the patients had positive asthma and allergy records. The overall recurrence rate in all three groups under study was 31.2%, which in detail the highest rate belonged to allergic group and after that to seromucinous and chronic inflammatory groups. Recurrence was only significant in allergic group compared to chronic inflammatory group. While compared to the seromucinous group, unlike the condition of chronic inflammatory group to seromucinous, it was not significant. This is while the recurrence rate in allergic group is about three times as many as seromucinous group. Albu carried out a study on 227 patients suffering nasal polyposis and underwent endoscopy in a two-year follow-up and reported that 24% of patients showed the recurrence of polyps. Among the factors studied, the role of asthma and allergy to aspirin were significant, and smoking and age were insignificant, which is similar to our results¹⁸.

As expected, allergy group showed the highest recurrence rate in our study, because according to studies performed to identify possible mechanisms, allergies can be a contributing factor in the recurrence of polyps that lead to the onset of the inflammatory cascade and therefore early recurrence after surgery.

Although Batra *et al.* in their one-year study on patients with nasal polyps with concomitant asthma, showed that endoscopy surgery has benefits on the symptoms of patients¹⁹, the best decision for the selective treatment of patients depends on the opinion of the physician.

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