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Does Asthma and Aspirin Hypersensitivity Affect the Outcome of Endoscopic Sinus Surgery for Chronic Rhinosinusitis with Nasal Polyps

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Abstract

Introduction: Nasal polyposis is the most common mass lesions in the nose. It has been shown that it reduces quality of life, it has characteristically frequent recurrences.

Objectives: of this study is to evaluate the outcome of chronic sinusitis with nasal polyposis (CRS with nasal polyposis) with medium term follow up (mean of 42 months) after functional endoscopic sinus surgery.

Materials and methods: (prospective study) This study included 216 adult patients with nasal polyps treated with endoscopic sinus surgery in the period from June -2003 to June 2008. Patients were grouped into nasal polyposis, nasal polyposis with asthmas, and nasal polyposis with aspirin intolerance. Outcome measures include symptomatic improvement, residual and recurrent diseases. CT score, endoscopic score and complications.

Results: Patients symptom score and CT scores improved significantly after surgery. Recurrence rate was 19.9% (16%, 34%, and 38%) for the three groups, respectively. Better control of asthma with less dependency on medication was not achieved in patients with asthma as well as patients with aspirin intolerance.

Conclusion: Endoscopic sinus surgery is effective in treating patients with chronic rhinosinusitis with nasal polyps. Patients with asthma and aspirin intolerance have worse outcome than patients with polyps with no asthma.

Keywords: Endoscopic sinus surgery; Nasal polyposis; Outcome; Asthma; Aspirin intolerance

Introduction

Nasal polyposis is a chronic inflammatory disease of the paranasal sinuses with a prevalence of 1-4% of general population. In subgroups of patients having specific airway disease, aspirin hypersensitivity and asthma, much higher frequencies are found [1]. Most patients complain of nasal obstruction, loss of smell, headache, and reduced general well-being. Reduction of quality of life was associated with polyposis particularly when associated with asthma [2]. CRS with nasal polyps treatment usually starts with drugs, which can make even large polyps shrink or disappear (medical polypectomy). Drug treatments may include Nasal corticosteroids, Oral and injectable corticosteroids, If drug treatment doesn't shrink or eliminate nasal polyps surgery will be needed. Endoscopic sinus surgery (ESS) has been shown to be precise, permitting view with fewer complications and fewer re-currence rates [3]. The effect of ESS on asthma control was controversial, however most studies showed better control of asthma with endoscopic sinus surgery [4].

Management of patients with severe nasal polyposis is still unsatisfactory and recurrences remain a problem. Outcome assessment is met with some difficulties, the symptomatic evaluation being subjective and has a potential bias. The objective of this study is to assess the outcome of ESS in treatment of chronic rhinosinusitis with nasal polyps (CRS with nasal polyps), CRS with nasal polyps with asthma and CRS with nasal polyps with aspirin hypersensitivity. Also to evaluate the effect of treatment on asthma control, and the prognosis of polyps in patients of asthma and aspirin hypersensitivity.

Patients and Methods

This prospective study includes 216 adult patients with nasal polyposis treated with endoscopic sinus surgery in the period from June 2003 to June 2008. Diagnosis of CRS with nasal polyposis was based on clinical picture, nasal endoscopic assessment, CT scan coronal and axial cuts.

Patients with allergic fungal rhinosinusitis were not included in this study. Patients whose follow up shorter than six months were not included. Complete evaluation with detailed history, endoscopic examination, CT scan was carried out. Symptomatic assessment was done using a scale of 0 to 10 (Visual analog scale) which is a validated scale with 0 indicating that the symptom is not present and 10 indicating that the symptom is extremely severe. Lund Mackay staging system was used (CT score, endoscopy score and surgery score) were used [5]. Previous treatment with steroids (local and systemic) together with macrolides antibiotics was given preoperatively for at least one month.

Surgical techniques

Surgery was done as described by Stammberger, 1986 and Kennedy, 1985 [6,7]. Surgery was tailored according to the extent of polyps; polyps in the nasal cavity and or the nasopharynx were removed first. Then ethmoidectomy, wide middle meatal antrostomy, and sphenoidotomy are next performed. The maxillary sinus was cleared of polyps and diseased mucosa. Lastly, frontal recess clearance was done. Middle turbinate was removed when it is grossly polypoid. Healthy mucosa was preserved to reduce the extent of postoperative crusting and infection.

Patients were asked about their symptoms and examined endoscopically in the follow up visits, CT scan were done when possible

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when the mucosa is grossly polypoidal and in recurrent polyps (43 patients). Outcome assessment was measured with last follow up.

Statistical analysis

Statistical analysis were done using SPSS 10.0 program for windows. Patients were divided into three groups; CRS with nasal polyps, CRS with nasal polyps with asthma and CRS with nasal polyps with aspirin hypersensitivity. (Mann-Whitney U testing) was used

Preoperative and postoperative symptom score, CT score, endoscopic appearance were compared. The effects of possible factors such as age, preoperative CT score, and previous surgery on outcome were evaluated. For patients with asthma and aspirin hypersensitivity, the diagnosis of asthma and aspirin hypersensitivity was self reported or by the treating chest physician. Patients were asked about the clinical course of their asthma. A scoring similar to that used for polyp symptom score was used for evaluation of asthma symptoms (Dyspnea, cough, wheezing). Also the change in asthma medications used in the preoperative period and in the last three months of follow up was recorded. A score of medication was used (adopted from NIH) [7].

0. No medication

1- Inhaled steroid (low dose) or, theophylline + B-agonist as required

2- Inhaled steroid + long acting B-agonist

3-High dose inhalation steroids+ theophylline or long acting B-agonist

4. All + oral steroids.

The number of asthmatic attacks in the last sixth months and the frequency of acute nasal polypoid reaction with asthma in the periods of follow up were recorded.

Postoperative treatment with steroids, saline nasal wash, macrolides antibiotics for at least 3 months. Aspirin desensitization was not carried for our patients.

Results

CRS with Nasal polyps

This group included 174 patients, 84 males (48.2%) and 90 females (51.8%), with average age 36.5 years (range from 15-72 years). Duration of symptoms ranges from 3 months to 12 years with an average of 38 months. Average follow up period was 42.4 months

Previous surgery was done for 46 patients (27%) and it ranges from one (15%) to 8 surgeries (2.3%). In 31 patients previous surgery was non endoscopic polypectomy, in 3 patients, Caldwell Luck's and external frontoethmoidectomy. In the other 12 patients endoscopic surgery were done.

Symptom score: The most common presenting symptom was nasal obstruction which was the presenting symptom in 100% of patients. Other symptoms, nasal discharge in 91% of patients, smell affection in 85% and headache in 75%. The mean preoperative and postoperative symptom scores are shown in (Figure 1).

The frequency of symptom score for nasal polyposis (pre and postoperatively) is shown in (Figure 2)

Radiological score: The majority of sinus involvement was bilateral. The mean total preoperative CT score was 18.27±5.07 (range from 4 to 24). The mean total postoperative CT score was 6.6333 (range 2-22). Statistical analysis (Mann-Whitney U testing) showed significant reduction of CT score ($P = .000$). The least affected sinuses were the frontal and sphenoid sinuses.

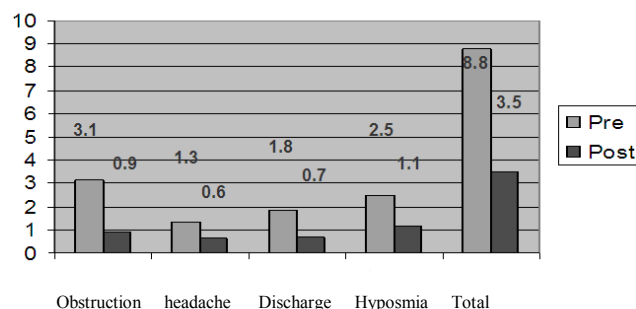


Figure 1: Mean symptom score for nasal polyposis group.

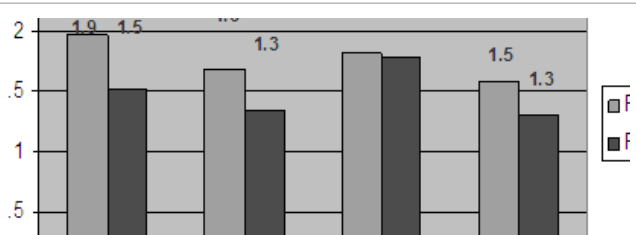


Figure 2 : Percentage of improvement of nasal polyposis group.

Surgical score: The mean surgical score was 9.0 (range from 3 to 13). There was no significant difference in average number of surgical procedures between the right and left sides (4.6 for right and 4.4 for left side). The most frequent surgical step was anterior ethmoidectomy which was performed bilaterally in 93% and unilaterally in 7% of patients. The frequency of surgical steps for different sinus areas in 3 groups is shown in (Figure 3).

Endoscopic appearance: The mean preoperative endoscopic score was 2.8 (range from 2 to 7) and the postoperative endoscopic score was 1.4 (range from 0 to 5). The improvement in the endoscopic score was statistically significant ($P = .000$).

Normal cavities was observed in 82 (46.5%), of patients, the most important findings are nasal pol-yps. Other findings include thickened mucosa, adhesion, and meatal stenosis.

Recurrent polyposis: Recurrent polyps were found in 28 patients (16%) within 12-26 months. The mean CT score for the recurrent polyps were 14 (range from 8 to 20).

Complications: Complications occur in nine patients (5.1%). Those include intraoperative and postoperative bleeding (3 patients), ecchymosis of the eye (1 patient), adhesions (4 patients), and middle meatal stenosis (1 patient).

CRS with Nasal polyps with asthma

This group included 29 patients, 18 males (62%) and 11 females (37%) with average age of 34 years (range from 29 to 55). Duration of symptoms ranges from 12 months to 10 years with an average of 60 months. Average follow up was 42.3 months. Previous surgery was done for 12 patients (41%) and it ranges from one (7%) to 4 surgeries (7%). In 7 patients previous surgery was non-endoscopic polypectomy, in 2 patients, Caldwell Luc's and external frontoethmoidectomy in 2 patients. In the other 3 patients endoscopic surgery were done.

Symptom score: The most common presenting symptom was nasal obstruction which was the presenting symptom in 100% of

patients. Other symptoms, nasal discharge, smell affection both in 93% of patients and headache in 90%. The mean preoperative and postoperative symptom scores are shown in (Figure 4). Postoperative results showed significant reduction of the symptom score for all symptoms. Improvement of nasal obstruction occurred in 89%, compared to 75% for discharge, 68% for headache and 75% for smell dysfunction. No change of the symptoms reported in 6.8%, 20%, 21%, and 17% of patients, respectively. Worsening of symptoms was reported in 3.4%, 3.4%, 3.4% and 6.8% respectively.

Radiological Score: The majority of sinus involvement was bilateral. Total mean preoperative CT score was 20 (range from 14 to 24). Total mean postoperative CT score was 8.1 (range from 2 to 20) Statistical analysis (Mann-Whitney U testing) showed significant reduction of CT score ($P = .000$).

Surgical Score: The mean surgical score was 9.4 (range from 6 to 12). There was no significant difference in average number of surgical procedures between the right and left sides (4.8 for right and 4.6 for left side).

Endoscopic appearance: The mean preoperative endoscopic score was 3.4 (range from 2 to 6) and the postoperative endoscopic score was 1.2 (range from 0 to 4). The improvement in the endoscopic score was statistically significant ($P = .000$). Normal cavities were observed in 12 patients (41.3%). Polyps were the most common finding. Other findings include scarring, adhesion and thickened mucosa.

Recurrent polyposis: Recurrent polyps were found in 10 patients (34%) within 6-12 months. The mean CT score for the recurrent polyps were 15.5 (range from 8 to 20).

Complications: Complications occur in 5 patients (17%). Those include intraoperative and postop-erative bleeding (3 patients), post operative asthma (2 patients). Number of visits to the emergency department showed no change after ESS. Acute polypoid reaction, in which the patient reported rapid onset of nasal obstruction with aggravation of their asthma symptoms, was reported in 7 (24.1%) patients. Examination reveals polyps that respond rapidly to systemic steroids. The mean symptoms and medications score shown in (Figure 5).

CRS with Nasal polyps with aspirin hypersensitivity

This group included 13 patients, 8 males (61.5%) and 5 females (38.5%) with average age of 44 years (range from 20 to 58). Duration of symptoms ranges from 12 months to 7 years with an average of 40 months. Average follow up was 38 months Previous surgery was done for 5 patients (38%) and it ranges from one (7%) to 3 surgeries (15%). In 4 patients previous surgery was non-endoscopic polypectomy, in one patient endoscopic surgery was done. The mean preoperative and postoperative symptom scores are shown in (Figure 6).

Symptom score: The most common presenting symptom was nasal obstruction which was the presenting symptom in 100% of patients. Other symptoms, nasal discharge, smell affection both in 93% of patients and headache in 90%. Postoperative results showed significant reduction of the symptom score for all symptoms ($P = .000$). Eleven patients (84%) reported improvement of their nasal obstruction and smell dysfunction while only 2 (15%) reported no improvement. Nine patients reported improvement of their headache and 8 patients reported improvement of their discharge. Two patients reported no improvement of their nasal obstruction and smell dysfunction while three patients reported that their headache and nasal discharge remain the same. Two patients reported worsening of their discharge and one patient reported worsening of his headache.

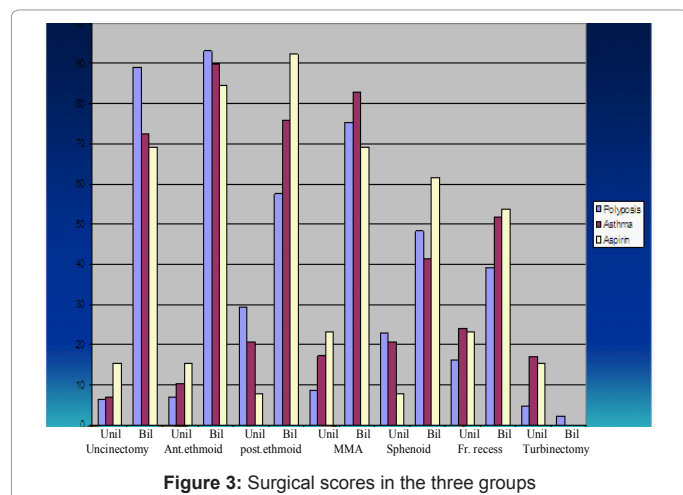


Figure 3: Surgical scores in the three groups

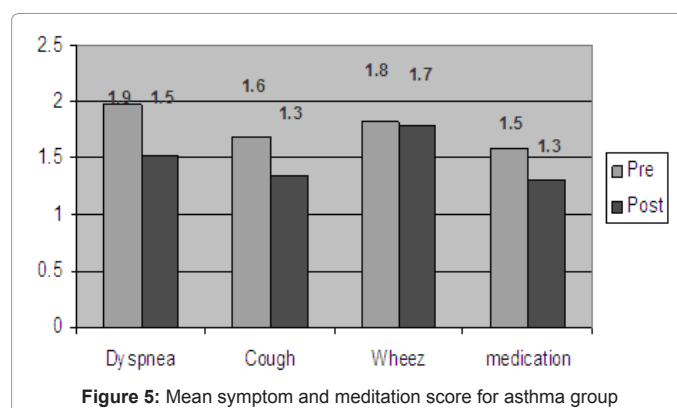


Figure 5: Mean symptom and meditation score for asthma group

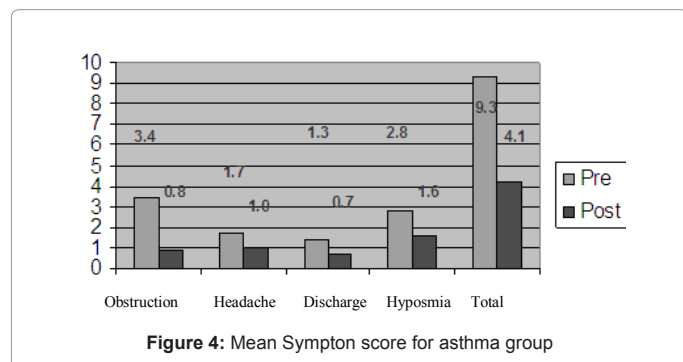


Figure 4: Mean Symptom score for asthma group

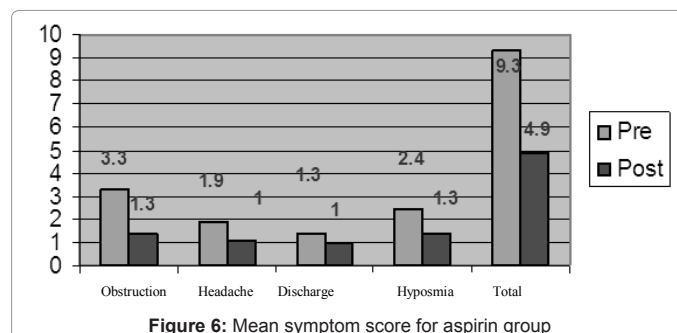


Figure 6: Mean symptom score for aspirin group

Radiological Score: The majority of sinus involvement was bilateral. Total mean preoperative CT score was 21 (range from 14 to 24). Total mean postoperative CT score was 9.0 (range from 2 to 20). Statistical analysis (Mann-Whitney U testing) showed significant reduction of CT score. The least affected sinuses were the frontal and sphenoid sinuses.

Surgical score: The mean surgical score was 9.7 (range 6 to 13). There was no significant difference in average number of surgical procedures between the right and left sides (4.9 for right and 4.7 for left side).

Endoscopic appearance: The mean preoperative endoscopic score was 3.1 (range from 2 to 5) and the postoperative endoscopic score was 1.0 (range from 0 to 3). The improvement in the endoscopic score was statistically significant (P .000). Normal cavities were observed in 5 patients (38%), polyps were mostly encountered. Other findings include persistent mucoid discharge, abnormal mucosa and scarring.

Recurrent polyposis: Recurrent polyps were found in 5 patients (38%) within 3-10 months. The mean CT score for the recurrent polyps were 17 (range from 8 to 20).

Complications: Complications occur in 3 patients (23%). Those include nasal adhesion (1 patient), post operative asthma (2 patients). Acute polypoid reaction was observed in 4 (30.7%) of patients. The mean symptoms and medication score is shown in (Figure 7).

Discussion

Evidence based medicine principles applied to otolaryngology and endoscopic sinus surgery provide the surgeon and patients with all of the necessary requirements to evaluate effect of surgery [9]. CRS with Nasal polyps is a chronic inflammatory condition that is mostly characterized by an infiltration of eosinophils. No medical or surgical treatment that guarantees cure. Management of patients with severe nasal polyposis is still unsatisfactory and recurrences remain a problem. Outcome assessment is met with some difficulties, the symptomatic evaluation being subjective and has a potential bias. Rhinosinusitis outcome measure (RSOM:31) and sinonasal outcome test 20 (SNOT-20) are valid and easy to use but they are subjective measures. Endoscopic sinus surgery as a difficult procedure to standardize as the extent of the surgery performed is influenced by the extent of underlying disease and the surgical strategy of surgeon philosophy or attitude (conservative or radical).

Based on combinations of clinical, radiological and endoscopic information, several scoring systems have been suggested for the staging and outcome assessment of nasal polyposis. Lund and Mackay

scoring system has been claimed to be suitable for every day practice as it is easily applicable and simple [10]. In all groups of patients, there was significant improvement of patients' sinus symptoms as well as the CT and endoscopic scores.

Many studies reported significant postoperative improvement in quality of life [11]. Although the overall patient satisfaction was not included in this study; the significant improvement of all patient symptoms reflects the patient impression about the procedures. The objective improvement of patients CT score and endoscopic scores implies the effectiveness of endoscopic sinus surgery for treatment of sinonasal polyposis.

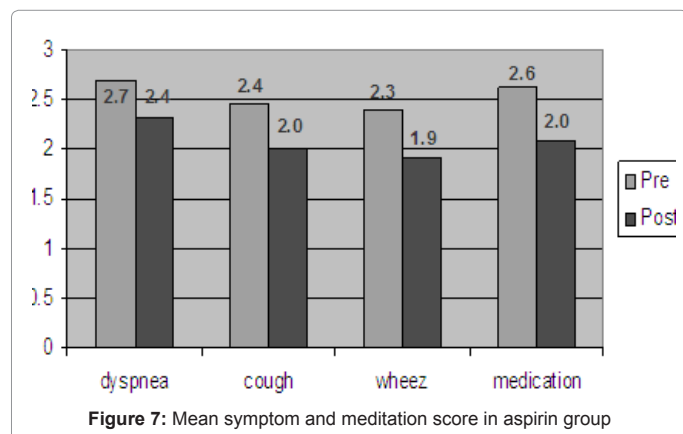
Following ESS, postoperative symptom improvement does not agree with the local signs at the operation site and as seen on CT scan. Persistent and recurrent disease manifest either endoscopically or radiologically may not be symptomatic in the early postoperative period. This is the same with patients with early nasal polyps who may not complain of significant nasal obstruction. The same applies to manifestation of sinus disease (edema, crusting, and discharge). On the other hand, patients may have various sinus symptoms without significant findings. This advocates the importance of lengthy follow up. Symptoms may not recur for years [12]. This study has the advantage of relatively long follow up, although the excluded patients (who has short follow up or lost for follow up; 76 patients) may represent a selective bias.

Prognostic factors: No agreement on the factors which can predict the outcome of ESS for nasal polyposis. Many factors have been described to have an adverse effect on outcome of sinus surgery. These include previous surgery, extent of disease, CT score, systemic disease, smoking and reflux. Some of these factors may be interrelated (Systemic disease and CT score). Preoperative CT score has a significant prognostic effect on both subjective and objective improvement of nasal polyposis. Patients with low score CT (<10) preoperatively has 75% normal cavities post operatively; while patients with high CT score (20-24) has only 11% normal cavities. Intraoperative extent of the disease as known from number of surgical steps have a significant effect on outcome measures.

Polyps, asthma, and aspirin intolerance

The associations of CRS with nasal polyps with asthma have been noted for long time. It has been estimated that 7% of patients with asthma and 36% of aspirin intolerance patients has nasal polyposis [13]. Although patients with asthma and aspirin intolerance have significant improvement of their nasal condition; they do less favorably than patients without asthma [14]. Aspirin intolerant patients do worse than aspirin tolerant patients. This may be related to the extent of nasal polyps. The mean score for nasal obstruction and also the total CT score were higher in asthma and aspirin patients than in the polyposis patients. The rate of recurrent polyposis in patients with asthma and patients with aspirin hypersensitivity is significantly higher than those without asthma.

The effect of ESS (for nasal polyposis) on prognosis of asthma is controversial. Many studies showed improvement of asthma after ESS for nasal polyposis [15]. On the other hand, few studies including the present study showed no significant improvement of asthma symptoms medications after ESS [16,17]. What is common in these studies is the high percentage of massive nasal polyposis (with high CT score). Many studies included patients of chronic sinusitis with and without polyps. Factors that could aggravate asthma as bacterial toxins and



descending infection may be not applied in most patients in this study. The inflammatory process responsible for asthma provocation and the metabolic defect in aspirin intolerance patients persist after ESS. The trend of the surgeon in performing ESS for nasal polyposis has been claimed to affect the outcome of surgery and asthma. Bonfils and Avan [18] stated that Bronchial hyperresponsiveness did not influence the outcome of surgery in nasal polyposis. Comorbidities with allergy and asthma do not influence objective and subjective recovery rates of nasal polyposis [19].

Jankowski et al. [20] showed that nasalization (radical ethmoidectomy) had resulted in improvement of asthma in 2/3 of their patients. This study provides some evidence that extensive sinus surgery performed by an experienced rhinologist can lead to a lower revision rate without compromising patient safety. The conservative attitude of the surgeon (by preserving uninvolved nasal mucosa), the severity of asthma, method of treatment are other factors that could affect the outcome of asthma after ESS.

The major limitations of this study is the small numbers of patients in asthma and aspirin hypersensitivity group, short time of follow up and aspirin desensitization was not done.

Conclusion

Endoscopic sinus surgery is effective in treating patients with nasal polyposis. Patients with asthma and aspirin intolerance have worse outcome than patients with polyps with no asthma. ESS for patients with nasal polyposis and asthma and aspirin hypersensitivity does not reduce postoperative asthma symptoms or medications with medium term follow up.

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