Effect of functional endoscopic sinus surgery in patients of chronic sinusitis with bronchial asthma

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Abstract

Rhinosinusitis and bronchial asthma have been found to be coexistent in different studies. A prospective study of 23 patients with bronchial asthma who underwent Functional endoscopic sinus surgery (F.E.S.S) for coexistent chronic sinusitis was undertaken and the effect of endoscopic sinus surgery on bronchial asthma was analyzed in these patients using both subjective and objective criteria. It is concluded in this study that Functional endoscopic sinus surgery for chronic sinusitis in cases of bronchial asthma helps in reduction of their asthma symptoms, requirement of medication and helps in improving their peak expiratory flow.

Keywords Chronic sinusitis • Bronchial asthma • Functional endoscopic sinus surgery

Introduction

Sinusitis and asthma are closely interrelated diseases and sinusitis is known to influence bronchial asthma in its severity and chronicity. However the precise nature of their relationship is poorly understood. Coexistence of rhinosinusitis with asthma on the basis of clinical findings has been found to range between 34% to 58% patients in various studies ^{[1][2]}. Radiologically the correlation between bronchial asthma and chronic rhino sinusitis has been more pronounced. Abnormal sinus X-rays have been seen in 66% cases of bronchial asthma and abnormal sinus CT scans in 78% patients of bronchial asthma ^[2]. A number of authors have investigated the effect of endoscopic sinus surgery on

bronchial asthma in patients with rhinosinusitis with some studies reporting improvement in asthma postoperatively³ and some an equivocal effect⁴. The present study is designed to elucidate the effect of functional endoscopic sinus surgery on asthma in patients of bronchial asthma with chronic sinusitis.

Materials and methods

Twenty three patients having coexistent chronic sinusitis and bronchial asthma were taken as the sample for the study. The group comprised 15 males and 8 females with an age distribution from 17 to 56 years with a mean age 34 years. A patient was included in the study only if he satisfied both clinical and radiological criteria of chronic sinusitis and criteria for bronchial asthma.

The clinical criteria for chronic sinusitis were symptoms of ⁵ nasal congestion/stuffiness, nasal discharge, history suggestive of postnasal drip, local pain and tenderness over sinus, night cough and unpleasant smell or taste (fotor oris) with symptoms lasting for more than 12 weeks.

The radiological criteria for chronic sinusitis seen on CT Scan of Paranasal sinuses were⁶

1. Mucosal thickening of >8mm in adults
2. Indistinct bony margins
3. Erosion of mucoperiosteum
4. Obstruction of osteomeatal complex

Other associated anatomical variants like concha bullosa, paradoxical middle turbinate, deviated nasal septum were noted. Patients were considered to have concomitant bronchial asthma if they followed the guidelines advocated by the American Thoracic Society in 1995⁷.

All the patients had already received medical treatment for chronic sinusitis for 12 weeks in the form of broad spectrum antibiotics, nasal decongestants, antihistaminics and nasal steroid sprays. No improvement had been noted. These patients were also on treatment for bronchial asthma.

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Written informed consent was taken from all patients. Patients were excluded from the study if

- a) they were pregnant
- b) had psychological problems
- c) had coexistent systemic disease
- d) were undergoing medical/surgical treatment for other diseases.

Patients in the study group were evaluated preoperatively under the following heads- A detailed history was taken laying stress on the symptoms of bronchial asthma and sinusitis. The presenting complaints of sinusitis were noted as per Table 1.

The severity of bronchial asthma was assessed using subjective and objective criteria.

The subjective criteria were symptoms of dyspnoea, cough and wheezing

The objective criteria taken into account were -

- Dosage of medications
- Admissions for asthma exacerbations
- Pulmonary function tests

A: Severity of asthma was graded by clinical features as per Table 2^[8] as

Grade 1: Intermittent

Grade 2: Mild persistent

Grade 3: Moderate persistent

Grade 4: Severe persistent

B: Dosage of medications for adequate control of bronchial asthma was also taken into account. This included dosage of inhalers - whether patients required steroids, β -2 agonists or both/combination and whether they required oral theophylline and oral steroids.

C: Other parameters considered were

History of asthma attacks and emergency admissions for asthma exacerbations for the preceding 1 year.

D: Pulmonary function tests.

Peak expiratory flow rate (PEFR) was assessed preoperatively using a peak flow meter at bedside. Best of 3 efforts prior to bronchodilator dose was taken as the reading.

Functional Endoscopic Sinus surgery was performed by the same surgeon following Messerklinger technique. Uncinectomy and infundibulotomy was carried out in all patients. The extent of the procedure was tailored to the extent of sinus disease as documented by nasal endoscopy and CT scan findings. The most common procedure followed was anterior ethmoidectomy followed by polypectomy. The type of surgery done is as per Table 3. Postoperative treatment protocol followed was broad spectrum antibiotics for 2 weeks with Saline nasal douche twice a day for 8 weeks and Fluticasone nasal spray 2 puffs each nostril once a day for 12 weeks.

Post surgery patients were followed up for 1 year postoperatively. At the end of one year the same subjective and objective outcomes used for the evaluation of bronchial asthma preoperatively were reassessed and any improvement in symptoms of sinusitis was noted.

Results

Twenty three patients with coexistent chronic rhinosinusitis and asthma were taken as subjects for the study. At the beginning of the study bronchial asthma was evaluated on the basis of

- Symptoms
- Hospitalisation in the past year due to bronchial asthma
- Asthma control with medications and requirement of medicine for asthma
- Pulmonary function tests

The results obtained were as follows

A: Symptoms of Chronic Sinusitis

Overall 15 out of 23 patients (65%) undergoing FESS had marked improvement in their symptoms while 3(13%) had moderate improvement and 2(9%) had slight improvement in their symptoms. 3 (13%) patients had no improvement in their symptoms.

B: Symptoms of Bronchial asthma

Majority of the patients 14 out of 23(61%) (Table 4) showed improvement in their symptomatology. Out of 14 patients having Grade 2 severity of symptoms 11 showed improvement to Grade 1 symptoms. Out of 5 patients having Grade 3 severity of symptoms 3 showed improvement to Grade 2 symptoms.

C: Hospitalization due to bronchial asthma

Preoperatively 11 patients had required repeated admission for acute exacerbation of asthma in the year preceding surgery. Postoperatively the number of patients requiring repeated admission for acute exacerbation of asthma reduced to 7. When the total number of hospitalizations for acute exacerbations of asthma was taken into account it had reduced from 19 in the year preceding surgery to 12 in the year following surgery.

D: Asthma attacks

Postoperatively 19 out of 23 patients had a decrease in number of asthma attacks in the year following surgery (83%). However 4 patients did not find any improvement in the number of asthma attacks they experienced postoperatively.

E: Requirement of medications

Nineteen out of 23 (83%) patients exhibited a reduced requirement of medication postoperatively. Eighteen patients required steroid & β -2 agonist inhalers preoperatively for asthma control. Out of them postoperatively in 2 patients there was no change in dosage of inhalers whereas the remaining 16 patients required it at a lower dosage. Three

Table 1 Presenting Complaints of Sinusitis

Presenting Complaints	Number of patients	Percentage
Nasal obstruction	17	74%
Nasal discharge	15	65%
Headache/Facial pain	12	52%
Postnasal drip	10	43%
Anosmia	6	26%

Table 2 Severity of Asthma as per clinical symptoms

	Intermittent Grade1	Mild persistent Grade2	Moderate persistent Grade3	Severe persistent Grade4
Day symptoms	<once a week	>once a week <once a day	daily	daily
Night symptoms	<twice a month	>twice a month	>once a week	Frequent with limitation of daily activities

Table 3 Type of procedure performed

Procedure	Unilateral	Bilateral	Total
Anterior ethmoidectomy	12	11	23
Total ethmoidectomy	3	4	7
Polypectomy	2	9	11
Frontal sinusotomy	1	3	4
Sphenoidotomy	2	3	5
Septoplasty			9

Table 4 Effect of FESS on Asthma symptoms

No. of patients(n=23)	Grade 1	Grade 2	Grade 3	Grade 4
Preoperatively	4	14	5	-
Postoperatively(at 1 yr)	15	6	2	-

patients required steroid & β -2 agonist inhalers and sustained release theophylline preoperatively. Of these 1 patient showed good control of asthma postoperatively with only steroid & β -2 agonist inhalers. In however in the other 2 patients there was no history of any reduction in drug dosage postoperatively. Two patients requiring steroid & β -2 agonist inhalers, sustained release theophylline and oral steroids preoperatively showed good control of asthma postoperatively with only steroid & β -2 agonist inhalers and oral theophylline without any need for oral steroids.

G: Peak expiratory flow rate

Average peak expiratory flow rates were improved in 20 out of 23 patients 1 year postoperatively ranging from 50 to 160 lit/min. Average improvement from baseline was 86lit/min.

H: Complications of Surgery

Complications of Endoscopic sinus surgery after 1 year of followup was synechia formation between middle turbinate and lateral wall seen in 2 patients and recurrence of polyposis seen in 2 patients.

Discussion

Epidemiological evidences and clinical studies have suggested a link between chronic sinusitis and bronchial asthma. Though it is believed that upper airway disease actually exacerbates lower airway disease the exact mechanism is yet to be elucidated. The possible mechanisms explaining the link between chronic sinusitis and bronchial asthma include:

A: Sino nasal bronchial reflex which asserts that stimulation of neural receptors in the nose and sinuses activates trigeminal afferent pathways and produces bronchoconstriction through a vagal efferent⁹.

B: Direct passage of mediators (postnasal drip) produced by activated inflammatory cells from the sinuses into the lungs exerts a significant effect on bronchial hyperresponsiveness¹⁰.

C: Persistent mouth breathing where air is not warmed and filtered through the nasal passages before it enters the lungs¹¹.

D: Cytokines and chemotactic factors released by inflamed sinus tissue into circulation promoting inflammation and recruiting eosinophils into upper and lower airway¹².

E: Chronic sinusitis and asthma are characterized by the same inflammatory process that is marked histologically by tissue eosinophils which contribute to inflammation and injury of epithelium of nose, sinuses and lungs. Eosinophilic inflammation, epithelial damage and basement membrane thickening which are present in chronic sinusitis are also present in asthma suggesting a common process underlying at least some types of chronic sinusitis and asthma¹³.

With such an association it is expected that the treatment of upper airway would improve the lower airway. Whether Functional endoscopic sinus surgery (F.E.S.S.) has a positive effect on the clinical course of bronchial asthma in patients with chronic sinusitis remains controversial. In this study the effect of Functional endoscopic sinus surgery in patients of chronic sinusitis with bronchial asthma in respect to their asthma was studied.

It was observed in this study as per Table 4 that majority of patients 14 out of 23 (61%) suffering from bronchial asthma and chronic sinusitis showed improvement following surgery in terms of the severity of asthma symptoms. This is similar to a study done by K. Dejima et al³ in which 28 patients with bronchial asthma and coexistent sinusitis who underwent Functional endoscopic sinus surgery reported improvement in their asthma symptoms following surgery.

In this study asthma attacks decreased in 19 out of 23 patients (83%) following surgery. Similar observations were seen in a study done by Brent A.S et al¹⁴ where 20 out of 27 patients of bronchial asthma who underwent Functional endoscopic sinus surgery for chronic sinusitis (74%) reported reduction in asthma attacks following surgery.

In this study it was found that 19 out of 23 patients had reduced requirement of medications for bronchial asthma after undergoing surgery. This correlates with findings seen in other studies done by Brent A.S et al¹⁴ and K. Ikeda et al¹⁵ where it was seen that in a majority of asthma patients undergoing Functional endoscopic sinus surgery for chronic sinusitis there was reduced requirement of asthma medications including oral steroids postoperatively.

Average peak flow rates were improved in 20 out of 23 patients 1 year postoperatively ranging from 50 to 160 lit/min. Mean improvement from baseline was 86 lit/min at the end of 1 year. This is similar to a study done by K. Ikeda et al¹⁵ where it was found that in 15 patients of bronchial asthma undergoing F.E.S.S for chronic sinusitis the average peak expiratory flow at 6 months postoperatively increased from 40 to 190 lit/min.

It was seen that 20 out of 23 patients (87%) had improvement in their symptoms of sinusitis. It was seen that out of these 20 patients 14 had a concurrent reduction in the severity of asthma whereas number of asthma attacks reduced in 19 out of 20 patients along with a reduced need of asthma medication. It was thus seen in this study that in majority of patients who had improvement in symptoms of sinusitis post F.E.S.S had improvement in their asthma symptoms along with a reduced requirement of asthma medication.

In all 4 patients did not show any improvement in their asthma though 1 patient had a slight improvement in his peak expiratory flow rate. Subjective worsening of asthma or precipitation of asthma attack after sinus surgery has been reported by Nakamura H et al in their study¹⁶. However no subjective worsening of asthma or precipitation of asthma was seen in our study. Lack of improvement in 2 patients could be due to poor compliance in taking postoperative medication leading to recurrence of nasal polyposis. Two patients having synechia formation seen during long term follow up had no improvement in symptoms of bronchial asthma though 1 showed a slight improvement in peak expiratory flow and slight improvement in symptoms of chronic sinusitis. Thus it is seen in our study that all patients with poor surgical results had no improvement in their bronchial asthma symptoms. This is similar to a study by K. Dejima et al³ in 28 patients where it was seen that patients with good F.E.S.S results had the greatest improvement in asthma.

Conclusion

This study concluded that a significant number of patients who were subjected to Functional Endoscopic Sinus Surgery

14 out of 23 (61%) showed an improvement in both their subjective and objective evaluation of bronchial asthma postoperatively. This study thus concludes that Functional Endoscopic Sinus Surgery when used to treat asthmatic patients with chronic sinusitis can play a significant role in the clinical improvement of asthma.

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