The role of functional endoscopic sinus surgery (FESS) in patients with asthma with chronic sinusitis

S. P. Gulati · Dhruva Chaudhry · Vijay Kalra · Raman Wadhera · Ajay Garg

Abstract 25 patients of bronchial asthma with chronic sinusitis were operated with the aim to evaluate the efficacy of functional endoscopic sinus surgery (FESS) on asthma symptoms. The mean postoperative daytime asthma symptom scores, nocturnal asthma symptom scores, mean postoperative nocturnal awakening scores and number of asthma attacks reduced significantly ($p < 0.001$). The mean FEV_1 observed postoperatively showed significant increase ($p < 0.001$). 21 patients reported overall significant improvement in the asthma. 6 patients were completely taken off from all sort of anti-asthmatic drugs [inhaled corticosteroids (ICS) + long acting β_2 agonist (LABA)]. In 3 patients there was significant / substantial decrease in the dosage of anti-asthma drugs. It is concluded that FESS is a viable option for improving the control of asthma.

Keywords Functional endoscopic sinus surgery · Sinusitis and asthma

Introduction

Sinusitis and asthma are both significant health problems. Sinusitis afflicts 14.7% of the population [1]. The point prevalence of asthma is 6.6%. New asthma developed in 1.4% of the subjects who were followed over a period of approximately 4 years [2].

The frequent association of paranasal sinus disease and bronchial asthma has been noted for many years [3]. Eighty percent of patients with asthma have rhinitis, while 5–15% with perennial rhinitis have asthma [4]. There is high incidence of radiographic evidence of sinusitis, of the order of forty to sixty percent in asthmatic patients [5]. Although a number of asymptomatic normal individuals may have radiographic evidence of maxillary sinus abnormality, the incidence is reported to be significantly higher in asthmatic [6]. A study from Los Angeles Children's Hospital indicated that 75% of patients admitted to that institution with status asthmaticus had abnormal sinus X-ray films [7].

The pathological picture of the sinus lesions in asthma is characteristic and is similar to that of the lungs in asthma [8]. Is this relationship between two diseases causal or merely an epiphenomenon of the same infectious or immune mediated disease affecting the entire respiratory tract? The question has interested physicians for centuries [1]. One thing appears consistently throughout the literature, treatment of sinusitis in most patients can result in improvement or stabilization of a patient's lower airway disease. The present study has been undertaken to evaluate the improvement in asthma after treatment of chronic sinusitis with functional endoscopic sinus surgery.

Material and methods

The present study was conducted in the Department of Otorhinolaryngology, Pt. B.D. Sharma PGIMS, Rohtak. Functional endoscopic sinus surgery was done in twenty

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five patients in the age group of 15–60 years after obtaining their consent.

Study protocol algorithm

Patient with sinus symptoms (nasal obstruction, nasal discharge, post-nasal drip) with asthma symptoms inspite of being on therapy [long acting beta-2 agonists, formeterol 12 µg BD + inhalational steroids (budesonide / beclomethasone 800 µg/day)]

CT scan PNS shows:

1. Hypertrophy of mucosa
2. Polyp
3. Fluid level
4. Non homogenous opacities

FESS

↓

1. Nasal polyps if present were removed.
2. Middle meatal antrostomy + anterior ethmoidectomy were done in patients having CT scan abnormalities of maxillary sinus or anterior ethmoidal cells.
3. Posterior ethmoidal cells opened and diseased mucosa removed if posterior ethmoidal cells were involved.
4. Sphenoidotomy performed if sphenoid sinus found involved.

Preoperative/Postoperative FESS:

Clinical assessment

- * Daily symptoms
- * Nocturnal symptoms
- * Breathlessness

* Exacerbation

* Dose of medications

Objective assessment

* Spirometry

FEV₁

Observations and results

There were 10 males and 15 females in our study. The age ranged from 15 to 60 years. The mean age of patients was 37.28 ± 11.35 years. The maximum numbers of patients (36%) were between 25 to 35 years. The range of asthma duration varied from 3 months to 20 years. 68% patients had asthma for less than 6 years. Uncinectomy and middle meatal antrostomy were done in all the 25 patients, anterior ethmoidectomy in 19, posterior ethmoidectomy in 6, frontal recess clearance in 5, sphenoidotomy in 4 and nasal polyp-ectomy was done in 3 patients.

All the patients were assessed at the end of 3 months to know the efficacy of the FESS viz-a-viz asthma control.

Assessment was done by:

(a) Effect of FESS on asthma symptoms (Table 1):

The asthma symptom score is a simple and effective tool that uses some basic but important criteria to rate the level of asthma control and track it overtime. Patients are asked to fill a proforma containing questions regarding various symptoms of asthma, number of attacks, interference with activities, nocturnal awakenings and unscheduled visits to asthma clinic. Scores ranging from 0 to 4 are given for each question. Significant ($p < 0.001$) improvement occurred in asthma symptom scores.

(b) Effect of FESS on FEV₁ (Table 2): Significant ($p < 0.001$) improvement occurred in FEV₁.

(c) Effect of FESS on drug requirement (Table 3): 6 patients were completely taken off from all sort of anti-asthmatic drugs [inhalational corticosteroids (ICS) + long acting β_2 agonist (LABA)]. In 3 pa-

Table 1 Effect of FESS on asthma symptoms

Sr no	Asthma symptoms	Preoperative (mean±SD)	Postoperative (mean±SD)	p value
1	Day time asthma symptoms score	10±1.41	5.52±1.75	<0.001
2	Nocturnal asthma symptoms score	1.48±0.5	0.4±0.5	<0.001
3	Nocturnal awakenings	1.2±0.40	0.4±0.5	<0.001
4	Asthma attacks	0.8±0.7	0.08±0.27	<0.001

Table 2 Effect of FESS on FEV₁

	Preoperative (mean±SD)	Postoperative (mean±SD)	p value
FEV ₁	1.92±0.73	2.7±0.87	<0.001

tients there was significant / substantial decrease in the dosage of anti-asthmatic drugs.

(d) Effect of FESS on overall response of patients: 21 patients reported overall significant improvement in

Table 3 Effect of FESS on drug requirement [Inhalational corticosteroids (ICS) and long acting β_2 Agonist (LABA)]

Sr no.	Effect on drug requirement		Number of patients (%)
1	Antiasthmatic drugs completely taken off		6(24%)
2	Significant decrease in dosage of antiasthmatic drugs		3(12%)
3	No change in dosage of antiasthmatic drugs	Symptomatically better	12(48%)
		No improvement in asthma symptoms	4(16%)

the asthma. Overall response of patients means improvement in symptoms of sinusitis and asthma with decreased number of unscheduled visits to doctor's clinic, emergency room or hospital.

Discussion

Traditional and more radical, surgical approaches have shown good results in the treatment of chronic sinusitis with asthma. Because of our improved understanding of the pathogenesis of sinusitis, FESS has emerged as the surgical procedure of choice for chronic sinusitis.

FESS has been carried out in chronic sinusitis in asthma by a large number of workers. Stammberger [9] in a study on 54 patients with asthma and sinusitis who underwent functional endoscopic sinus surgery reported slight to marked subjective as well objective improvement in 83% of patients. Mean FEV₁ showed significant improvement after FESS. Nishioka et al [10] studied 20 asthma patients who underwent functional endoscopic sinus surgery for chronic sinusitis. Patients who required preoperative hospital admissions (4 patients) and emergency room or urgent physician office visit (18 patients) had a 75% and 81.3% reduction in visits, respectively, after surgery. Park et al [11] in a study on seventy nine patients with asthma and chronic sinusitis noted improvement in asthma in 80% of patients following FESS.

Our aim of the study was to determine whether or not FESS improves asthma symptoms in patients with moderately persistent asthma, still symptomatic on moderate doses of ICS + LABA. In conformity with the literature, in the present study significant improvement occurred in all the parameters noted.

The forced expiratory volume in one second (FEV₁), forced vital capacity (FVC) and vital capacity (VC) are helpful in the diagnosis of asthma. These are obtained from maximal forced and relaxed expirations into a recording spirometer. Typical patterns detected in obstructive ventilatory defects like asthma are FEV₁ ↓↓, VC normal or ↓ and FEV₁ / VC ↓. If an obstructive ventilatory defect is found, the response to bronchodilator in standard doses can be measured. Reversibility of air flow obstruction is found in asthma.

Possible mechanisms explaining the improvement in asthma after treatment of sinusitis (FESS) are:

- i) Decrease in production of inflammatory mediators that could either be aspirated into the lower airways or locally stimulate irritant receptors in the sinuses with resultant reflex bronchospasm (nasal – sinus-bronchial reflex) [12].
- ii) Decrease in β -adrenergic blockade – infections of the respiratory tract (sinusitis) is known to enhance the β -adrenergic blockade, resulting in an increase in the hyperirritability of the bronchial tree [13].

Conclusion

Present study clearly demonstrates the efficacy of FESS in the management of chronic allergic rhinosinusitis with significant improvement in all parameters of asthma control. Therefore, in patients of moderate to severe persistent asthma, not responding to maximal medical treatment, chronic sinusitis should be looked into and if needed FESS should be advised. The choice of procedure to be done during FESS shall be dictated by CT scan PNS and peroperative findings.

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