

# The Effect of Endoscopic Sinus Surgery in Chronic Rhinosinusitis Patients With Concurrent Asthma

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## Abstract

**Background:** Chronic rhinosinusitis (CRS) and asthma are among the most important health-related conditions with evident socio-economic effects. The relationship between asthma and CRS has been considered in medical references for centuries. Previous studies have shown that treatment interventions targeting disease in one part of the airway are effective for general asthma management. However, the effect of endoscopic sinus surgery (ESS) in CRS patients with concurrent asthma remains controversial. Therefore, we aimed to assess the effects of ESS on improvement of asthma in CRS patients with concurrent asthma.

**Objectives:** The aim of this study was to evaluate the impact of ESS on asthma in CRS patients.

**Methods:** Twenty-five CRS patients with asthma who met our inclusion criteria after taking a complete history underwent physical examination and diagnostic nasal endoscopy, and the asthma control test (ACT) questionnaire was administered to them. Six months after ESS, the patients' asthma was again assessed using the ACT questionnaire.

**Results:** Overall, the mean ACT score significantly increased from 12.56 at the baseline to 20.71 after a six-month follow up period (0.001).

**Conclusions:** Given the remarkable improvement in asthma control levels, ESS can be considered a useful method for treating CRS patients suffering from asthma.

**Keywords:** Chronic Rhinosinusitis, Asthma, Sinus Surgery

## 1. Background

Chronic rhinosinusitis (CRS) and asthma are among the most important health-related conditions with evident socio-economic effects (1). The relationship between asthma and CRS has been considered in medical references for centuries (2, 3). The disease processes of these two conditions are very similar, and in some cases, even the clinical manifestations and pathophysiology of these diseases are the same. Epidemiological studies have reported that 34% of asthma patients suffer from concurrent rhinitis or sinusitis and also that the prevalence of asthma may be more than 50% in patients with rhinosinusitis (4).

Epidemiological and physiological findings have shown that the airway from the middle ear mucosa to the nose, sinuses, and pulmonary tree acts as an integrated unit. This means that CRS and asthma may be separate parts of a single inflammatory mucosal disease resulting from similarities in the upper and lower airways (4).

Previous studies mention that triggering of a part of the airway by an allergen may result in a systemic in-

flammatory response, which also affects other parts of the airway (4). Recent advances in airway biology have determined that systemic inflammatory responses play key roles in these diseases (5). Another possible mechanism may be nasal secretions entering the lungs (6).

Previous studies have shown that treatment interventions targeting disease in a part of the airway are effective for management of inflammatory processes in other parts; for example, treatment of allergic rhinitis improves asthma control (7). However, the effect of endoscopic sinus surgery (ESS) on the function of the lower airway in CRS patients with concurrent asthma remains controversial (4, 6, 8).

## 2. Objectives

We aimed to assess the effects of endoscopic sinus surgery on improvement of asthma in CRS patients with concurrent asthma.

### 3. Methods

This cohort study was registered by the ethics committee of the Baqiyatallah University of Medical Sciences. Patients with chronic rhinosinusitis (CRS) and concurrent asthma presenting to the Otolaryngology clinic at the Baqiyatallah hospital in 2015 were assessed for eligibility. After taking a complete history and considering the symptoms of asthma (based on the ACT) and CRS, patients underwent physical examination and diagnostic nasal endoscopy.

Upon confirmation of the diagnosis, we explained the study process to the patients, and a written informed consent form was obtained. A sinus CT scan and pulmonary function test (PFT) were conducted for all patients prior to intervention, and an ACT questionnaire was administered to them. Patients with concurrent asthma and CRS who were more than 15 years old and candidates for sinus surgery based on physical examination and CT scan were included in the study. Patients who were pregnant, immuno-compromised, or suffering from cystic fibrosis, fungal rhinosinusitis, paranasal neoplasia, or upper airway infection symptoms two weeks prior to the intervention as well as those less than 15 years old or at high risk for sinus surgery were excluded from the study.

All patients underwent endoscopic sinus surgery (ESS) by a single surgeon. Uncinectomy and antrostomy were performed for all patients, and surgical extent was considered based on CT scan and endoscopic exam findings. After intervention, patients underwent conservative medical therapy by saline irrigation and corticosteroid nasal spray (Fluticasone). During the first, third, and sixth months after surgery, patients were evaluated for symptoms. At the end of the sixth month, an ACT questionnaire was administered to patients. Changes in ACT were evaluated before and after intervention.

Data were analyzed using the statistical package for social sciences (SPSS Inc., Chicago, IL) software version 16. Normal distributed variables (approved by the Kolmogorov-Smirnov test) were compared using a paired sample t-test. The Wilcoxon test was run within the groups in variables without normal distribution.

### 4. Results

Twelve men and 13 women aged 22 to 75 years underwent endoscopic sinus surgery. The mean age was 51 years. The ACT was administered to patients before and six months after surgery. Results demonstrate that the mean ACT score before surgery was 12.56, and after the follow-up period, it increased significantly to 20.71 ( $P = 0.001$ ) in all

patients. Overall, ESS remarkably increased ACT score in these measures.

Based on CT scan interpretation and diagnostic nasal endoscopy, our patients were divided into two groups: 13 patients had nasal polyps, and 12 patients had no polyps in their imaging studies. There was not a significant difference between these two groups in terms of mean ACT score before ESS and after the six-month follow-up. The mean ACT score in patients with polyps was 11.4 at the baseline, and after the follow-up period, it increased to 20.1. This improvement in ACT score was statistically significant ( $P = 0.018$ ) (Table 1).

The mean ACT scores in patients without polyps before ESS and after six months were 13.85 and 21.28, respectively. The mean score for ACT was significantly increased in these patients ( $P = 0.018$ ).

### 5. Discussion

Prior studies have noted the importance of chronic rhinosinusitis and asthma as two major health issues with great social and economic effects (1, 8, 9). As mentioned in the literature review, the prevalence of CRS accompanied by asthma in epidemiological studies was reported between 30% to 80% (4, 10, 11). Although the positive effects of medications in the treatment of both CRD and asthma have been proven, there is some controversy about the effects of surgical therapy in the concurrent treatment of these two disorders (10-13). The present study was designed to determine the effects of endoscopic sinus surgery on the improvement of asthma in CRS patients with concurrent asthma.

The current study found that the mean ACT score significantly increased in patients after a six-month follow-up period. The findings of the current study are consistent with those of Chen et al. (10). In a meta-analysis, Vashishta et al. demonstrated that ESS in patients suffering from both CRS and asthma improves clinical asthma outcome measures, but not lung function test results (14).

Another important finding was that nasal polyps were not significantly reduced by surgery. The results of this study indicate that ESS can significantly increase ACT scores in patients with and without polyps.

#### 5.1. Conclusion

This study has shown that endoscopic sinus surgery has a positive effect on asthma control in patients suffering from CRS. Therefore, we suggest that patients with asthma (particularly resistant type) be evaluated for chronic sinusitis.

What is now needed is a large, randomized clinical trial with a long-term follow-up period to evaluate the efficacy

**Table 1.** Comparison of Mean ACT Score in Patients With and Without Polyps

	Mean ACT Score at the Baseline	Mean ACT Score After Six Months	P-Value Within Groups
Patients With Polyps	11.42	20.14	0.018
Patients Without Polyps	13.85	21.28	0.018
P-Value Between Groups	0.38	0.16	

and long-term outcome of the endoscopic sinus surgery on improvement of asthma in CRS patients. Spirometry parameters and surgery complications are two important points that can be considered in further studies.

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