

Effect of functional endoscopic sinus surgery on asthma control with nasal polyposis and chronic rhinosinusitis

Önder Akdeniz¹, Seyhan Dülger², Dilber Yılmaz Durmaz², Özlem Şengören Dikiş², Tekin Yıldız²

¹Department of Otorhinolaryngology, Esentepe Hospital, Bursa, Turkey

²Department of Department of Chest Diseases, University of Health Sciences, Bursa Yüksek İhtisas Training and Research Hospital, Bursa, Turkey

ABSTRACT

Objectives. The purpose of this study is to examine the effect of endoscopic sinus surgeons on the control of disease in asthma combined with chronic rhinosinusitis. **Methods.** Twenty-three asthma patients with chronic rhinosinusitis were evaluated retrospectively. They were assessed with asthma control test and pulmonary function tests. Subjective nasal obstruction assessment was done according to the nasal obstruction symptoms evaluation (NOSE) scale. Other subjective sinonasal complaints were classified using visual analogue scale (VAS). At postoperative third month, pulmonary function tests, asthma control test, NOSE and VAS were reevaluated. **Results.** According to asthma control test, number of patients under control, partial controlled and uncontrolled were 2/6/15 preoperatively and 14/4/5 postoperatively, respectively. There was permanent or partial improvement in fullness in the nose snuffle of 95.7% according to NOSE. The most remarkable permanent improvement in the symptoms were seen in the feeling of pressure in the face of 75%, smell disorders of 66.7% according to sinonasal visual analogue scale assessment. NOSE and VAS values were significantly improved postoperatively (<0.05). **Conclusions.** Uncontrolled asthma associated with chronic rhinosinusitis can benefit from functional endoscopic sinus surgery in asthma control level, nasal blockage symptoms and other sinonasal complaints.

Eur Res J 2018;4(2):101-105

Keywords: asthma, endoscopic sinus surgery, chronic rhinosinusitis, asthma control test

Introduction

Asthma is a chronic inflammatory disease of the airways. In most patients it affects all airways, including the upper respiratory tract and the nose [1]. Chronic rhinosinusitis is associated with more severe asthma. It is an inflammatory condition of the paranasal sinuses. It distincts two clinically entities:

Chronic rhinosinusitis without nasal polyposis and chronic rhinosinusitis with nasal polyposis [2]. Treatment of sinusitis in patients with asthma can be improved of patients' lower airway disease. Surgical approaches have yielded good results in the treatment of chronic sinusitis [3].

Address for correspondence:

Seyhan Dülger, MD., University of Health Sciences, Bursa Yüksek İhtisas Training and Research Hospital, Department of Chest Diseases, 16115 Yıldırım, Bursa, Turkey E-mail: drsdulger@gmail.com Tel: +90 2244526648

Received: May 3, 2017; Accepted: November 24, 2017; Published Online: December 4, 2017

In this study, we evaluated the subjective sinonasal complaints, changes in objective pulmonary function tests and asthma control test, following functional endoscopic sinus surgery (FESS) applied for cases with chronic rhinosinusitis and asthma components.

Methods

Patients

This study involved 23 patients admitted to our clinics with chronic rhinosinusitis resistant to retrospective medicine who had been treated for asthma and operated with functional sinus surgery. Informed consent was obtained from participants for all surgical procedures.

Exclusion criteria were being smoker, systemic diseases (cystic fibrosis, bronchiectasis, chronic obstructive pulmonary disease, diabetes, neoplasia, fungal sinusitis etc.), aspirin hypersensitivity (Samter's Syndrome), previous nasal operation and having upper respiratory infection in the last month.

Asthma Control Test

Their clinical conditions in terms of asthma were assessed preoperatively and at the 3rd month postoperatively with asthma control test [2, 4].

Spirometry

Pulmonary function tests were performed spirometrically (Spirothor Wavefront); FVC (forced vital capacity), FEV1 (forced expiratory volume in the first second) and FEV1/FVC preoperatively and at the postoperative 3rd month.

The Nasal Obstruction Symptoms Evaluation (NOSE) Scale

Subjective nasal obstruction assessment was done according to NOSE scale. The components of NOSE are nasal congestion and sniffing, nasal blockage or obstruction, trouble breathing through nose, trouble sleeping and unable to get enough air through nose during exercise or exertion, scored as, 0: not a problem, 1: very mild problem, 2: moderate problem, 3: fairly bad problem, 4: severe problem [5].

Visual Analogue Scale (VAS)

Other subjective sinonasal complaints (postnasal drip, headache, feeling of pressure in the face, epistaxis, smell disorders, taste disorders and chronic cough) were classified using VAS carts (visual

analogue scale) as 0: no symptom, 1: lightly tolerable, 2: moderate still tolerable 3: serious symptom restricting daily activity [6].

Preoperative Period

In the preoperative period, antibiotherapy (Klaritromycine 500 mg BID) for 2-4 weeks, topical intranasal steroid (budesonide 400 mcg/day for 8 weeks, antihistamine (levocetirizine 10 mg/day) and oral systemic steroid (methylprednisolone, 1 mg/kg/day) were given to the patients with nasal polyps; oral methylprednisolone treatment was discontinued gradually before the operation. Functional endoscopic sinus surgery was performed under general anesthesia.

Statistical Analysis

Statistical Package for Social Sciences (SPSS) (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.). Numerical values were expressed by the mean and the standard deviation; and their distribution was tested with the Kolmogorov-Smirnov test. Comparison of pulmonary function tests, asthma control test, NOSE and VAS were assessed preoperatively and postoperatively with Wilcoxon test and $p < 0.05$ was accepted as level of significance.

Results

This retrospective study included 23 patients (13 male, 10 female; age range: 17-63, mean age: 38.4 ± 13.4) with chronic rhinosinusitis and asthma resistant. Mean asthma duration was 5.8 ± 3.0 years. Mean FEV1, FVC and FEV1/FVC were $74.22\% \pm 11.90$; $70.78\% \pm 10.37$ and $87.17\% \pm 5.70$ preoperatively and $87.55\% \pm 9.36$; $87.81\% \pm 9.95$ and $83.02\% \pm 7.78$ postoperatively, respectively. Mean FEV1 and FVC increased significantly three months after operation ($p < 0.001$), however mean FEV1/FVC reduced significantly ($p = 0.013$) (Figure 1).

While two (8.7%) patients were clinically under control, 6 (26.1%) partial controlled and 15 (65.2%) were not under control according to the asthma control test preoperatively. After three months, 14 (60.9%) were under control, 4 (17.4%) partial controlled and 5 (21.7%) were uncontrolled (Figure 2). There was statistically significant improvement in postoperative asthma control test ($p = 0.001$).

Postnasal drip, headache, feeling pressure,

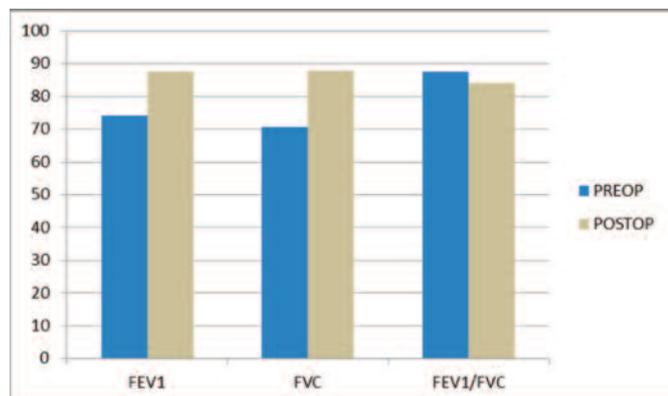


Figure 1. Preoperative and postoperative pulmonary function test results. FEV1 = forced expiratory volume in the first second, FVC = forced vital capacity

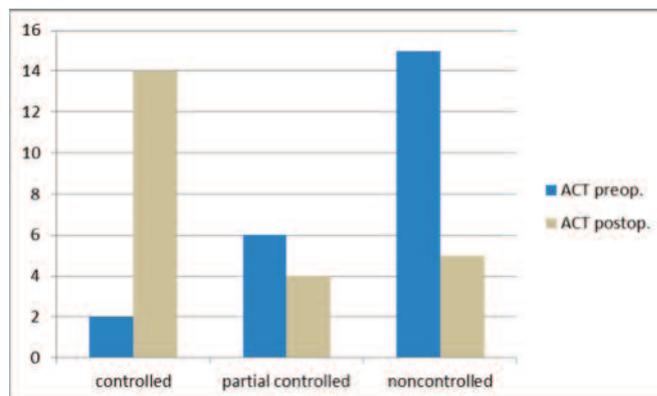


Figure 2. Preoperative and postoperative ACT values. ACT = asthma control test

epistaxis, smell disorders, taste perversion and chronic cough have improved in postoperatively in NOSE ($p<0.001$, $p=0.001$, $p<0.001$, $p=0.046$, $p<0.001$, $p=0.007$, $p=0.003$, respectively). Postnasal blockage, stuffiness, nasal discomfort during breathing, sleep difficulties, difficulty breathing after physical activity improved statistically significantly postoperatively ($p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.001$, respectively).

The most remarkable permanent or partial improvement in the symptoms were seen in the feeling of pressure in the face of 100%, smell disorders of 100% and headache of 87.5% according to NOSE teste (Figure 3). There was permanent or partial improvement in fullness in the nose sniffle (95.7%), stuffiness (86.9%), nasal discomfort while breathing (91.3%) sleep difficulties (69.6%), difficulty breathing after physical activity (56.5%) according to sinonasal VAS assessment (Figure 4).

Discussion

In the present study we investigated the possible effects of functional endoscopic sinus surgery at asthma control in patients who have uncontrolled asthma with chronic rhinosinusitis. This study showed that the number of controlled patients increased from 2 (8.7%) preoperatively to 14 (60.9%) postoperatively, and the number of uncontrolled patients reduced to 5 (21.7%) from 15 (65.2%). There was a remarkable improvement in clinical control levels of our patients in terms of asthma at the 3rd month after functional endoscopic sinus surgery.

In the study of Proimos *et al.* [7], controlled patients were 17.4% to 16.3%, partial controlled patients were 74.4% to 83.7%, and not under controlled patients were 8.1% to 0% changed postoperatively at the sixth month. The rate of not controlled asthmatic patients who were operated on in

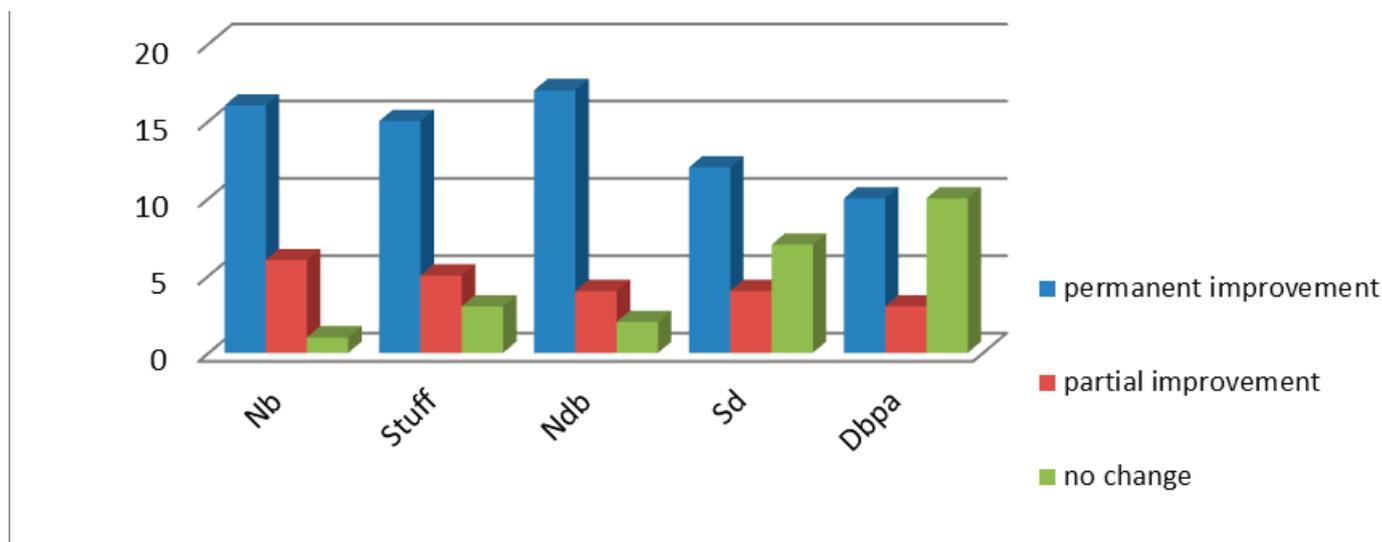


Figure 3. Postoperatively improvement according the NOSE test. NOSE = nasal obstruction symptoms evaluation, Nb = nasal blokage, Stff = stuffiness, Ndb = nasal discomfort while breathing, Sd = sleep difficulties, Dbpa = difficulty breathing after physical activity

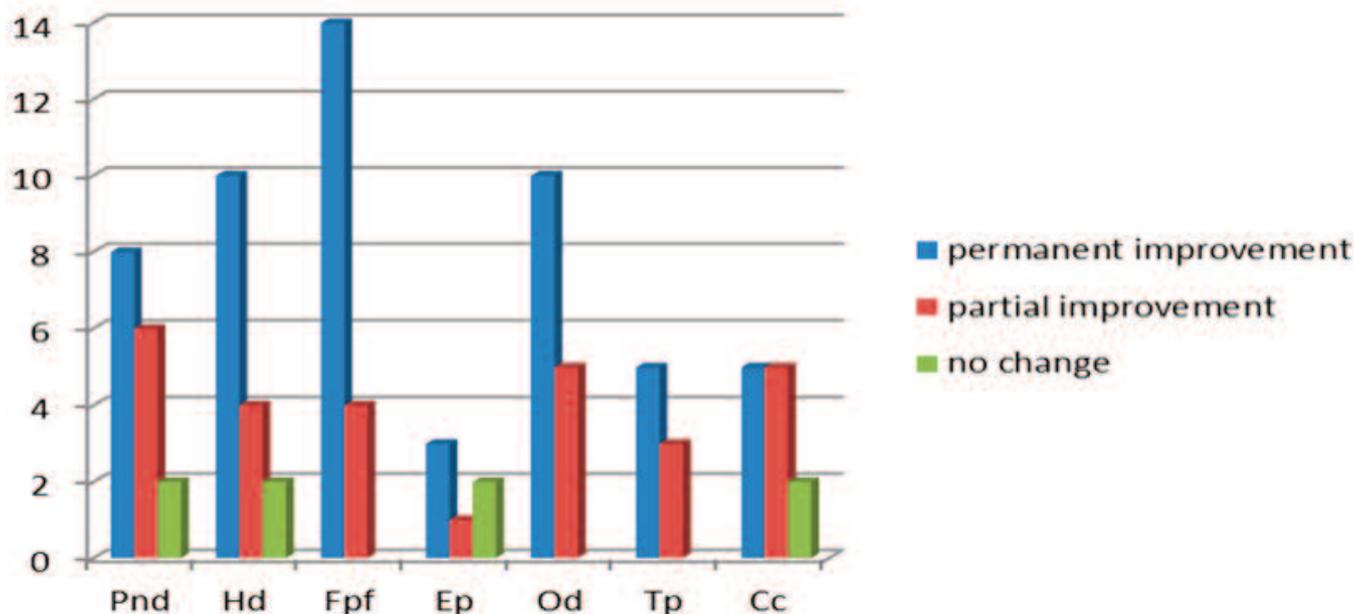


Figure 4. Sinonasal symptoms improvement according VAS. VAS = visual analogue scale, Pnd = postnasal drip, Hd = headache, Fpf = feeling of pressure in the face, Ep = epistaxis, Od = olfactory disorders, Tp = taste perversion, Cc = chronic cough

this study was much lower than our study. Dejima *et al.* [8] have found a remarkable improvement in subjective complaints, daytime and nighttime asthma symptoms in out of 75% of 19 patients with asthma. However, no change in the asthma symptom score was found in Goldstein *et al.*'s study [9]. Chen *et al.* [10] have obtained significant improvement in asthma control levels in their study of 27 cases. Ragab *et al.* [11] assessed prospectively 43 patients with asthma in a randomized study comparing the effects of sinus surgery and medical treatment for chronic rhinosinusitis with nasal polyps. Asthma control improved significantly after both treatments. Dunlop *et al.* [12] have reported that, 40% of 50 chronic rhinosinusitis patients had an improvement in their asthma after 12 weeks following endoscopic sinus surgery, while 54% had no change, and in 6% clinical control was assessed as worse.

We have determined a significant postoperative improvement in FVC and FEV1 values, compatible with Dejima *et al.*'s study [8]. But mean FEV1/FVC reduced significantly ($p = 0.013$). We have found it consistent that there was an improvement in both restrictive and obstructive types of respiratory failure after functional endoscopic sinus surgery. Gulati *et al.* [3] reported improvement in FEV1 measurements. Chen *et al.* [10] did not find any significant difference in terms of asthma drug consumption and pulmonary function tests postoperatively. However, in other study, they were found improvement in the pulmonary function and asthma control test at one year after surgery [13]. In Goldstein *et al.*'s study [9], the

results of the pulmonary function test had not changed. In our study, there was improvement in NOSE and VAS evaluations postoperatively. We had determined improvement in nasal blockage at a ratio of 69.6% according to NOSE. According to VAS, we have determined the highest permanent improvement of 75% in feeling of pressure in the face, 66.7% smell function and 62.2% in headache. Uri *et al.* [14] have not report an improvement in asthma symptoms after endoscopic sinus surgery, whereas quality of life had improved. Philips *et al.* [15] showed that the most common and also recoverable symptom after endoscopic sinus surgery is headache. Chen *et al.* [13] found significant improvement in the VAS score at one year after surgery. Proimos *et al.* [7] found statistically significant improvement after operation in nasal blockage, smell, facial pain and headache. Our findings were consistent with other studies.

We could not find any other study involving all of the findings we evaluated with NOSE and VAS.

The Limitations of the Study

The main limitations of this study have been small sample group. We can follow cases for a short period of 3 months after the operation. Further studies may be necessary to investigate the relationship of the asthma and surgical treatment of chronic rhinosinusitis as functional endoscopic sinus surgery that it can be suggested to eliminate the risk factor of asthma control.

Conclusions

Despite of low in case number, our hypothesis that asthma control can be increased, especially in cases of chronic rhinosinusitis with nasal polyps, may be defended. The improvement in sinonasal symptoms by surgical treatment of nasal blockage, may provide the clinical control of asthma.

Authorship declaration

All authors listed meet the authorship criteria according to the latest guidelines of the International Committee of Medical Journal Editors, and all authors are in agreement with the manuscript.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

Financing

The authors disclosed that they did not receive any grant during conduction or writing of this study.

Acknowledgements

The study was presented as a poster in the 26th International Congress of the European Respiratory Society, September 2-7, 2016, London, United Kingdom.

References

- [1] Rice DH. Endoscopic sinus surgery. *Otolaryngol Head Neck Surg* 1994;111:100-10.
- [2] Global Initiative for Asthma. *Global Strategy for Asthma Management and Prevention*, 2017.
- [3] Gulati SP, Chaudhry D, Kalra V, Wadhwa R, Garg A. The role of functional endoscopic sinus surgery (FESS) in patients with asthma with chronic sinusitis. *Indian J Otolaryngol Head Neck Surg* 2008;60:152-5.
- [4] Thomas M, Kay S, Pike J, Williams A, Rosenzweig JR, Hillyer EV, et al. The Asthma Control Test (ACT) as a predictor of GINA guideline-defined asthma control: analysis of a multinational cross-sectional survey. *Prim Care Respir J* 2009;18:41-9.
- [5] Stewart MG, Witsell DL, Smith TL, Weaver EM, Yueh B, Hannley MT. Development and validation of the nasal Obstruction Symptom Evaluation (NOSE) scale. *Otolaryngol Head Neck Surg* 2004;130:157-63.
- [6] Wewers ME, Lowe NK. A critical review of visual analogue scales in the measurement of clinical phenomena. *Res Nurs Health* 1990;13:227-36.
- [7] Proimos E, Papadakis CE, Chimona TS, Kiagiadaki D, Ferekidis E, Yiotakis J. The effect of functional endoscopic sinus surgery on patients with asthma and CRS with nasal polyps. *Rhinology* 2010;48:331-8.
- [8] Dejima K, Hama T, Miyazaki M, Yasuda S, Fukushima K, Oshima A, et al. A clinical study of endoscopic sinus surgery for sinusitis in patients with bronchial asthma. *Int Arch Allergy Immunol* 2005;138:97-104.
- [9] Goldstein MF, Grundfast SK, Dunsky EH, Dvorin DJ, Lesser R. Effect of functional endoscopic sinus surgery on bronchial asthma outcomes. *Arch Otolaryngol Head Neck Surg* 1999;125:314-9.
- [10] Chen FH, Zuo KJ, Guo YB, Li ZP, Xu G, Xu R, et al. Long-term results of endoscopic sinus surgery oriented treatment for chronic rhinosinusitis with asthma. *Laryngoscope* 2014;124:24-8.
- [11] Ragab S, Scadding GK, Lund VJ, Saleh H. Treatment of chronic rhinosinusitis and its effects on asthma. *Eur Respir J* 2006;28:68-74.
- [12] Dunlop G, Scadding GK, Lund VJ. The effect of endoscopic sinus surgery on asthma: management of patients with chronic rhinosinusitis, nasal polyposis, and asthma. *Am J Rhinol* 1999;13:261-5.
- [13] Chen FH, Deng J, Hong HY, Xu R, Guo JB, Hou WJ, et al. Extensive versus functional endoscopic sinus surgery for chronic rhinosinusitis with nasal polyps and asthma: A 1-year study. *Am J Rhinol Allergy* 2016;30:143-8.
- [14] Uri N, Cohen-Kerem R, Barzilai G, Greenberg E, Doweck I, Weiler-Ravell D. Functional endoscopic sinus surgery in the treatment of massive polyposis in asthmatic patients. *J Laryngol Otol* 2002;116:185-9.
- [15] Philips JS, Vowler SL, Salam MA. Endoscopic sinus surgery for 'sinus headache'. *Rhinology* 2007;45:14-9.