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Do Sinonasal Surgeries Affect Bronchial Asthma Patients?

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Abstract

Introduction: The respiratory passages are linked from anatomical, histological and immunological bases, with inflammation in one part of them influencing the other part and forming One Passage system.

The aim of the work: This work was done to evaluate the influence of sinonasal surgery on the consequences of bronchial asthma through an assessment of the intensity of asthma, the recurrence of attacks and the pulmonary function test values (One month and Three months successively after the operation concentrating on postoperative FEV1: Forced expired vital capacity in the first second and FVC: Forced vital capacity values).

Patients and Methods: Fifty asthmatic patients of different age groups of both sexes (ages ranging between 28-60 years) attending outpatient clinics of ENT and chest departments of Al-Azhar university hospitals (AL-Hussein and Bab El-Sharia) in the period between March 2016 - December 2017 and they have chronic nasal problems.

Results: Collectively, the highest positive results in pulmonary function test values occur in (group I) (asthmatic patients with nasal polyps), slight improvement in (group II) (asthmatic patients with deviated septum and hypertrophied turbinates) and (group III) (asthmatic patients with chronic sinusitis) but no improvement in (group IV) (asthmatic patients received asthma medication only).

Conclusion: It could be concluded that sinonasal surgery has the highest positive effect on asthmatic patients having nasal polyps with an intermediate effect on those with chronic rhinosinusitis and other nasal problems i.e. deviated septum and hypertrophied turbinates. Therefore, we suggest that patients with asthma (particularly resistant type) be evaluated for chronic sinusitis and nasal polyps.

Keywords: Bronchial Asthma; Sinonasal Surgery; Pulmonary Function Test; Nasal Endoscopy

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Introduction

The idea of the One Passage was elicited because of the frequency of the cases of rhinosinusitis accompanying asthma [1,2]. Consideration of the link between rhinosinusitis and asthma came to light when evidenced by imaging of the diseased paranasal sinuses in cases of bronchial asthma [3,4]. This prospective study was done to evaluate the influence of sinonasal surgery on the consequences of bronchial asthma through an assessment of:

- The intensity of asthma.
- The recurrence of attacks.
- Pulmonary function test values (One month and Three months after the operation Specifically, postoperative FEV1 and FVC values.

Patients & Methods

This study was conducted on 50 asthmatic patients of different age groups of both sexes ages were ranging from 28-60 years (mean and standard deviation are shown in Table 1) attending outpatient clinics of ENT and chest departments of Al-Azhar university hospitals (AL-Hussein and Bab El-Sharia) in the period between March 2016 - December 2017 and they have chronic nasal problems. The decision was made to proceed with a surgical intervention. A written consent was taken from all patients before the operation and they were informed about the nature of the disease, the intended approach, its complications and the anticipated results. The 50 asthmatic patients were enrolled in this study and divided randomly into 4 groups:

- Group I: 20 asthmatic patients with allergic nasal polyps (Figure 1).
- Group II: 10 asthmatic patients with nasal obstruction not due to allergy, i.e. deviated nasal septum and hypertrophied inferior turbinate's.
- Group III: 10 patients having asthma with chronic rhinosinusitis.
- Group IV: 10 asthmatic patients refusing the operation and receiving the usual medication for bronchial asthma.

Inclusion criteria:

- Asthmatic patients with allergic nasal polyps.

Figure 1: An endoscopic pre-operative view of nasal polyps of female asthmatic patient 30-years-old.

- Patients above 18 years.
- Patients who are fit for anesthesia and surgical intervention.

Exclusion criteria:

- Patients with chronic chest diseases other than bronchial asthma i.e. cystic fibrosis and COPD
- Patients changed their residence or occupation during the conduction of the study.

All patients were subjected to the following before operation:

- Personal history with special attention to smoking. Allergy and aspirin intolerance. Asthma history including duration of disease, the number of attacks, duration, and medication was taken (during attack and maintenance).
- Adequate medical history including the presence of hypertension, diabetes mellitus or other diseases, surgical and anesthetic history taking:
- General Examination.
- Chest Examination.
- ENT Examination, including sinoscopic examination using 0 & 300 lenses.
- Radiological examination: Computerized tomography of the nose and paranasal sinuses (both coronal and axial views) were done to all patients to confirm the diagnosis and to put the plan for surgery (Figure 2 & Figure 3).

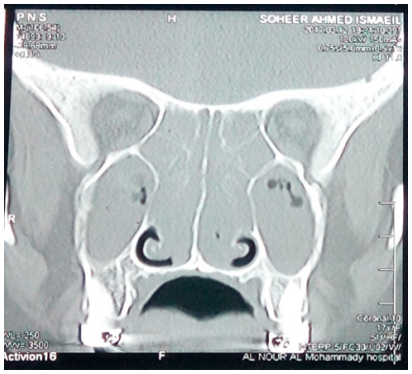

Figure 2: Preoperative CT (coronal view) of asthmatic female patient 50 years old with bilateral allergic nasal polyps.

Figure 3: Preoperative CT (coronal view) of asthmatic male patient 40 years old with a deviated septum, bilateral hypertrophied inferior turbinate's and right concha bullosa of the middle turbinate.

- Chest X-Ray to exclude other chest diseases.
- Pulmonary function test values using Spirometer were considered (Figure 4 & Figure 5).

Preparation for Surgery:

- No oral corticosteroid was given before surgery at least 2 weeks, topical steroid and broad-spectrum antibiotics were given one week before surgery. Control of asthma by the maintenance of steroid inhalers.

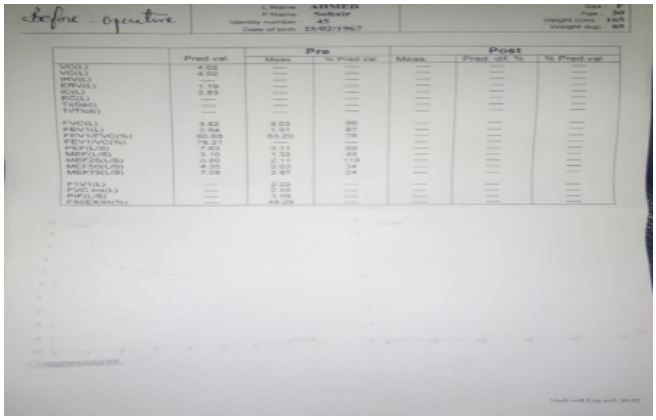

Figure 4: Pre-operative spirometry of female asthmatic patient 50 years old with bilateral allergic nasal polyps.

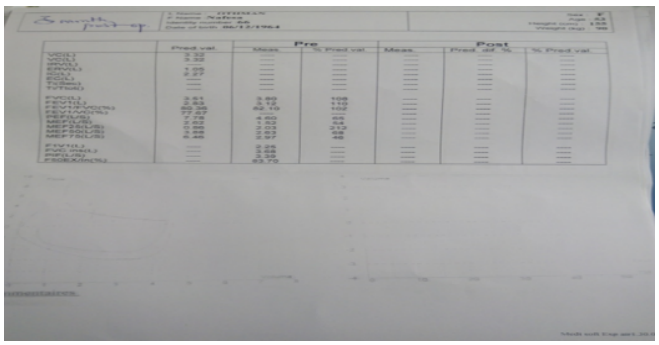

Figure 5: 3 months post-operative spirometry of female asthmatic patient 53 years old with bilateral allergic nasal polyps.

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Results

The study includes 50 asthmatic patients with ages ranging from 28-60 years the results and statistical data analysis were shown in the following tables and figures (Table 1-4) (Figure 6 & Figure 7).

Table 1: Comparison between groups according to demographic data.

Demographic Data	Group I: Nasal polyposis (N=20)	Group II: Non-allergic nasal problems (N=10)	Group III: Chronic sinusitis (N=10)	Group IV: Control (N=10)	Test	p-value
Age (years)						
Mean±SD	44.40±7.93	37.90±6.67	46.10±7.81	44.10±8.84	F=2.155	0.106
Range	30-60	28-51	31-58	30-60		
Sex						
Female	13 (65.0%)	6 (60.0%)	4 (40.0%)	7 (70.0%)	x^2=2.292	0.514
Male	7 (35.0%)	4 (40.0%)	6 (60.0%)	3 (30.0%)		

F-ANOVA test; x^2: Chi-square p-value >0.05 NS

Table 2: Comparison between groups according to pulmonary function test (post-operative after one month).

Pulmonary function test (Post-operative after one month)	Group I: Nasal polyposis (N=20)	Group II: Non-allergic nasal problems (N=10)	Group III: Chronic sinusitis (N=10)	Group IV: Control (N=10)	LSD					
					GI vs. GII	GI vs. GIII	GI vs. GIV	GII vs. GIII	GII vs. GIV	GIII vs. GIV
FVC										
Mean±SD	3.65±0.39	3.57±0.32	3.69±0.34	3.41±0.38	0.571	0.813	0.086	0.488	0.311	0.091
Range	2.75-4.35	3-4.05	2.8-3.9	2.7-4.2						
FVC%										
Mean±SD	109.45±7.30	106.70±6.46	107.90±7.26	116.20±12.87	0.410	0.641	0.047*	0.755	0.017*	0.035*
Range	90-125	100-118	90-115	95-137						
FEV1										
Mean±SD	2.95±0.37	2.78±0.40	2.94±0.39	2.22±0.33	0.249	0.953	<0.001**	0.342	<0.001**	<0.001**
Range	2.4-3.8	2.05-3.4	2.4-3.8	1.47-2.7						
FEV1%										
Mean±SD	107.80±8.96	99.00±11.90	105.60±8.64	91.20±16.54	0.049*	0.619	<0.001**	0.200	0.132	0.007*
Range	97-128	80-119	99-125	65-114						
FEV1/FVC										
Mean±SD	78.83±7.14	77.52±6.30	75.79±8.15	65.25±9.27	0.661	0.311	<0.001**	0.616	<0.001**	0.004*
Range	57.23-90.9	68.05-85.33	57.23-85.71	51.19-81.81						

F- ANOVA test; LSD: Least significant difference
*p-value <0.05 S; **p-value <0.001 HS; p-value >0.05 NS

Table 3: Comparison between groups according to pulmonary function test (post-operative after 3 months).

Pulmonary function test (Post-operative after 3 months)	Group I: Nasal polyposis (N=20)	Group II: Non-allergic nasal problems (N=10)	Group III: Chronic sinusitis (N=10)	Group IV: Control (N=10)	LSD					
					GI vs. GII	GI vs. GIII	GI vs. GIV	GII vs. GIII	GII vs. GIV	GIII vs. GIV
FVC										
Mean±SD	3.80±0.38	3.61±0.38	3.82±0.41	3.39±0.50	0.234	0.936	0.013*	0.271	0.240	0.026*
Range	2.73-4.49	3.1-4.1	2.73-4.1	2.8-4.58						
FVC%										
Mean±SD	114.45±10.84	107.70±10.57	112.30±9.04	114.80±9.95	0.097	0.592	0.930	0.322	0.129	0.589
Range	90-144	92-122	90-123	101-128						
FEV1										
Mean±SD	3.16±0.32	2.92±0.47	3.15±0.34	2.16±0.44	0.111	0.952	<0.001**	0.182	<0.001**	<0.001**
Range	2.5-3.64	2-3.5	2.5-3.59	1.42-2.75						
FEV1%										
Mean±SD	116.20±9.74	104.70±15.46	114.20±7.96	88.30±17.98	0.024*	0.686	<0.001**	0.101	0.006*	<0.001**
Range	105-143	77-125	105-130	63-109						
FEV1/FVC										
Mean±SD	83.65±5.30	80.51±7.43	83.70±7.38	63.93±12.72	0.319	0.986	<0.001**	0.380	<0.001**	<0.001**
Range	75.36-96.81	64.51-86.76	75.36-96.81	49.12-85.59						

F- ANOVA test; LSD: Least significant difference
*p-value <0.05 S; **p-value <0.001 HS; p-value >0.05 NS

Table 4: Comparison between groups according to Frequency of attacks and Number of daily uses of asthma medications.

	Group I: Nasal polyposis (N=20)	Group II: Non- allergic nasal problems (N=10)	Group III: Chronic sinusitis (N=10)	Group IV: Control (N=10)	ANOVA	p-value
Frequency of attacks (per week)						
Pre-operative	3-9 6.30±2.39	3-10 6.83±2.59	4-9 6.83±2.59	4-10 7.35±2.79	1.683	0.445
Post-operative after 3m	1-2 1.58±0.60	3-5 4.20±1.60	3-6 4.73±1.80	5-9 7.35±2.79	8.432	<0.001**
Number of times of use of asthma medications (per week)						
Pre-operative	7-14 11.03±4.19	6-12 9.45±3.59	8-14 11.55±4.39	6-13 9.98±3.79	2.015	0.174
Post-operative after 3m	3-6 4.73±1.80	4-7 5.78±2.19	4-8 6.30±2.39	7-14 11.03±4.19	9.791	<0.001**

*p-value <0.05 S; **p-value <0.001 HS; p-value >0.05 NS

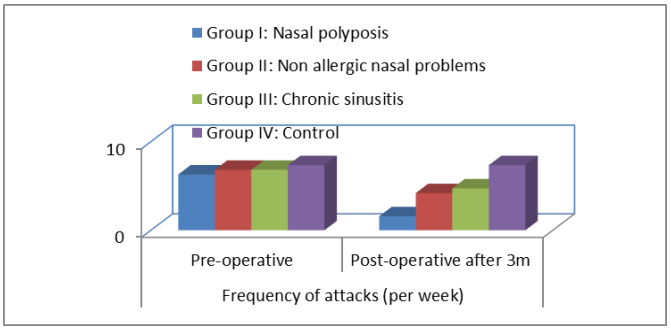

Figure 6: Bar chart between groups according to the number of attacks weekly.

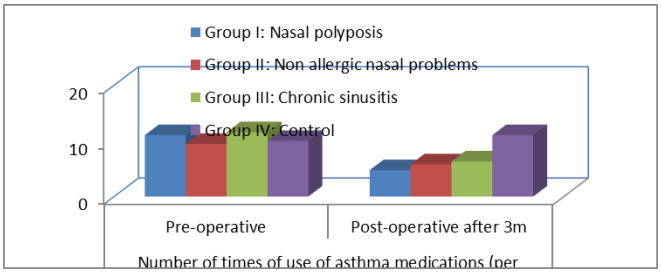

Figure 7: Bar chart between groups according to the number of daily use of asthma medications.

Discussion

The present study wasn't restricted to the study of the impact of endoscopic sinus surgery on asthmatic patients with nasal polyps only but also included the study of the impact of sinonasal surgery on other chronic nasal problems (i.e. chronic sinusitis, deviated nasal septum and hypertrophied inferior turbinates) in asthmatic patients. We used in our study the following methods for assessment of this effect on bronchial asthma outcome:

- Pulmonary function tests concentrating on (FVC, FVC%, FEV1, FEV1%, and FEV1/FVC ratio, also called Tiffeneau-Pinelli index) of the four groups of the study pre – and post-operatively.
- Questionnairing the patients about the number of asthma attacks and the number of times of using asthma medications per week pre-and post-operatively.

In the present study, by comparing the preoperative and postoperative statistical results of the pulmonary function test of (group I) we noted improvement in FVC from (4.1%) before operation and with a bronchodilator to (7.4%) 1 month after operation and (11.8%) 3 months after the operation and in FEV1 from (29%) preoperatively to (42.5%) 1 month after the operation and (52.7%) 3 months after the operation. On the other hand, no significant improvement occurs in FVC of (group II) and a slight improvement in FEV1 from (25.2%) preoperatively and with a bronchodilator to (29.8%) 1 month after the operation and (37.2%) 3 months after the operation. In (group III) we noted improvement in FVC from (2.8%) before operation and with a bronchodilator to (9.5%) 3 months after the operation and significant improvement in FEV1 from (28.8%) preoperatively and with a bronchodilator to (41.3%) 1 month after the operation and (51.4%) 3 months after the operation. In (group IV) no improvement in (FVC, FEV1, and FEV1/FVC) 1 month and 3 months after the operation. Collectively, we noted the highest positive results in pulmonary function test values occurring in (group I) (asthmatic patient with nasal polyps), slight improvement in (group II) (asthmatic patient with deviated septum and hypertrophied turbinates) and (group III) (asthmatic patient with chronic sinusitis) but no improvement in (group IV) (asthmatic patient received asthma medication only). The minimal improvement in patients with a deviated septum may be attributed to that the deviation of the septum impedes the mucociliary clearance which is essential for elimination of the irritants. Therefore, the collection of these irritants will affect adversely the lower airways both locally and systemically. So, septal surgery will cut this vicious circle and prevent the bronchoconstriction that occurs due to vagal nerve stimulation. Inversely, the 12-month study of Ragab S, et al. (2006) [5], which revealed a slight improvement in the pulmonary function test values of the patients who were subjected to surgery in comparison to those received medical treatment only. Also, an increase in FEV1 (% of predicted) is noted in all patients at 6 and 12 months. This increase was maintained in patients received medications while those subjected to surgery had no significance. Follow up in our present study was one month and three months after surgery. Follow-up was rather short in all other studies except the study of Ragab S, et al. (2006) [5], which characterized by the long duration of follow up that reached 12 months. This long duration was useful as relapsing of chronic rhinosinusitis is about 16% in 5- years follow up study [5]. Also, Lamblin C, et al. (2000) [6], revealed a reduction in FEV1/FVC at one & four years and FEV1 (% of predicted) at 4 years follow up in the patients subjected to surgery [6]. One of the important points that distinguish our study from others "the reversibility test" which was implemented to all the patients of the study in order to exclude other chronic obstructive diseases (i.e COPD) and this, in turn, clarifies its specificity and reliability. This test briefly is to do PFT for the patients

before and after bronchodilator session. Asthmatic patients showed improvement in FEV1 more than 12%. As regard the preoperative and the postoperative number of asthma attacks in comparison, we found that the number of asthma attacks weekly in (group I) decreased from (3-9) times preoperatively to (1-2) times 3 months postoperatively, while (group II),(group III) and (group IV) had achieved slight decrease in the number of asthma attacks from (3-10) to (3-5) times in (group II), from (4-9) to (3-6) times in (group III) and from (4-10) to (5-9) times in (group IV).

Regarding the number of times of using asthma medications, we noted the highest decrease in (group I) from (7-14) to (3-6) times and slight decrease in (group II) from (6-12) to (4-7) and in (group III) from (8-14) to (4-8) times while (group IV) showed no decrease in the need for asthma medications. This means that the patients of (group I) had experienced much reduction in the frequency of asthma attacks in comparison with other groups also, the need of those patients to medications had been reduced. consequently, it affects their quality of life. So, asthmatic patients with nasal polyps subjected to FESS showed postoperative maximum improvement in both spirometric measures, the frequency of asthma attacks and the need for medications compared to those with a deviated nasal septum, hypertrophied turbinates, and chronic sinusitis. As regard to patients received medical treatment and refused surgery no apparent improvement was noticed. Ehnhage A, et al. (2009) [7], reported that the patients with nasal polyps and asthma had benefited greatly from surgery in a study composed of 68 patients lacking control patients [7].

Specifically, no studies reported asthma-specific quality-of-life (QOL) before and after surgery. Furthermore, none of the previous studies utilized a control group for comparison and thus it is difficult to assess how much benefit can be attributed to the placebo effect or the natural course of asthma outcomes in patients with co-morbid CRS. Although Karuthedath S, et al. (2014) [8], had no control patients in their study, they reported that all patients subjected to surgery got better postoperative pulmonary function test values. In the study of Nishoka GJ, et al. (1994) [9], about 85% postoperative improvement in 20 asthmatic patients having chronic rhinosinusitis within a duration of 29 months follow up [9]. Senior BA, et al. (1999) [10], assessed 120 asthmatic patients with chronic rhinosinusitis and asthma postoperatively over 6.5 years and they reported 90% improvement compared with preoperative status [10]. Dhong HJ, et al. (2001) [11], observed the clinical improvement of the patients as regards the day and night symptoms. In addition, they reported a reduction in the need of antiasthma medications after surgery. This is agreed with that confirmed by Senior BA, et al. (1999) [10], and Nishoka GJ, et al. (1994) [9]. In Vashishta R, et al. (2013) [12], it was observed that endoscopic sinus surgery improved asthmatic patients clinically not their pulmonary function test values. Cho KS, et al. (2014) [13], reported the adding effect of Acetyl Salicylic Acid desensitization to surgery. They noticed a considerable improvement in the asthmatic patients subjected to surgery followed by desensitization more than surgery alone.

Conclusion

We concluded that all asthmatic patients (particularly resistant type) to be evaluated for chronic sinusitis, nasal polyps, and other nasal problems and submitted to sinonasal surgery if indicated to get benefit from the surgery. The postoperative improvement in the study groups was not in the pulmonary function only but also, in the quality of life hence, it confirms the extent of effectiveness of the sinonasal surgery on the asthma patient's control.

References

1. Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, et al. (2008) Allergic rhinitis and its impact on asthma (ARIA) update (in collaboration with the World Health Organization, GA2LEN, and Aller Gen). Allergy 86: 8-160.
2. Enriquez K, Lehrer E, Mullol J (2014) The optimal evaluation and management of patients with a gradual onset of olfactory loss. Curr Opin Otolaryngol Head Neck Surg 22: 34-41. https://doi.org/10.1097/MOO.0000000000000013
3. Matsuno O, Ono E, Takenaka R, Okubo T, Takatani K, et al. (2008) Asthma and sinusitis: association and implication. Int Arch Allergy Immunol 147: 52-58. https://doi.org/10.1159/000128659
4. Lin DC, Chandra RK, Tan BK, Zirkle W, Conley DB, et al. (2011) Association between severity of asthma and degree of chronic rhinosinusitis. Am J Rhinol Allergy 25: 205-208. https://doi.org/10.2500/ajra.2011.25.3613
5. Ragab S, Scadding GK, Lund VJ, Saleh H (2006) Treatment of chronic rhinosinusitis and its effects on asthma. Eur Respir J 28: 68-77. https://doi.org/10.1183/09031936.06.00043305
6. Lamblin C, Brichet A, Perez T, Darras J, Tonnel AB, et al. (2000) Long-term follow-up of pulmonary function in patients with nasal polyposis. Am J Respir Crit Care Med 161: 406-413. https://doi.org/10.1164/ajrccm.161.2.9905075
7. Ehnhage A, Olsson P, Kölbeck KG, Skedinger M, Dahlen B, et al. (2009) Functional endoscopic sinus surgery improved asthma symptoms as well as PEFR and olfaction in patients with nasal polyposis. Allergy 64: 762-769. https://doi.org/10.1111/j.1398-9995.2008.01870.x
8. Karuthedath S, Singh I, Chadha S (2014) Impact of functional endoscopic sinus surgery on the pulmonary function of patients with chronic rhinosinusitis: a prospective study. Indian J Otolaryngol Head Neck Surg 66: 441-448. https://doi.org/10.1007/s12070-014-0758-7
9. Nishoka GJ, Cook PR, Davis WE, McKinsey JP (1994) Functional endoscopic sinus surgery in patients with chronic sinusitis and asthma. Otolaryngol Head Neck Surg 110: 494-500. https://doi.org/10.1177/019459989411000604
10. Senior BA, Kennedy DW, Tanabodee J, Kroger H, Hassab M, et al. (1999) Long-term impact of functional endoscopic sinus surgery on asthma. Otolaryngol Head Neck Surg 121: 66-68. https://doi.org/10.1016/S0194-5998(99)70127-0
11. Dhong HJ, Jung YS, Chung SK, Choi DC (2001) Effect of endoscopic sinus surgery on asthmatic patients with chronic rhinosinusitis. Otolaryngol Head Neck Surg 124: 99-104. https://doi.org/10.1067/mhn.2001.111596
12. Vashishta R, Soler ZM, Nguyen SA, Schlosser RJ (2013) A systematic review and meta-analysis of asthma outcomes following endoscopic sinus surgery for chronic rhinosinusitis. Int Forum Allergy Rhinol 3: 788-794. https://doi.org/10.1002/alr.21182
13. Cho KS, Soudry E, Psaltis AJ, Nadeau KC, McGhee SA, et al. (2014) Long-term sinonasal outcomes of aspirin desensitization in aspirin-exacerbated respiratory disease. Otolaryngol Head Neck Surg 151: 575-581. https://doi.org/10.1177/0194599814545750