Outcomes of Concurrent Endoscopic Sinus Surgery and Rhinoplasty: A Case Control Study

Mohammad Sadeghi[1], Babak Saedi[1], Aydin Mahdkhah[2], and Azin Tabaree[2]

[1] *Department of Otolaryngology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

[2] *Cheif Resident of Otolaryngology, School of medicine, Tehran University of Medical Sciences, Tehran, Iran*

Received: 19 Nov. 2012; Accepted: 26 Feb. 2013

Address- To evaluate results of concurrent functional endoscopic sinus surgery (FESS) and nasal plastic surgery in terms of safety, efficacy and patient satisfaction, and compare them with the results of single procedures. We conducted a prospective case control study in three groups of patients with chronic sinusitis and nasal deformity; 25 cases had concurrent FESS and rhinoplasty, 25 controls had FESS, and 25 controls had rhinoplasty alone. The patients preoperative and postoperative sino-nasal outcome test (SNOT22) and also patients' satisfaction using the visual analogue scale were evaluated after one year. There were no significant differences between aesthetic indexes of concurrent surgery and control groups. Also, we found no significant inter-group difference between SNOT22 scores. There was no major complication in the studied patients. Conducting nasal plastic surgery and FESS concurrently can be a feasible surgery with functional and aesthetic results comparable to those with individual FESS or rhinoplasty.

Acta Medica Iranica, 2013; 51(11): 765-770.

Keywords: FESS; Nasal Plastic Surgery; Outcome; Rhinoplasty, Sinusitis; Sinus Surgery

Introduction

Over the past decades, there has been a huge rise in demand for cosmetic surgeries. Among different cosmetic procedures, nasal plastic surgery is considered one of the most challenging ones. A special aspect of this surgery is that a large proportion who seek this type of cosmetic procedure have associated nasal disease, such as nasal obstruction due to septal deviation or allergic rhinitis and sinusitis (1). Therefore, it is clear that concurrent nasal plastic surgery and functional endoscopic sinus surgery (FESS) may have benefits for patients and can be a considerable task for the surgeons.

Conventionally, most physicians avoid combining these two procedures because of possible risks (1). But for the first time, Shemen and Matarasso (2) claimed the safety of the combination of these two surgeries. Since then, there have been many reports about the outcomes of concurrent FESS and rhinoplasty (1,3-9). This combination suggests that treatment of many intra-nasal problems such as septal deviation or large concha bullosa should definitely be treated concomitantly with deviated nose surgery; this should reduce work day loss and probably the costs compared to separate surgeries (3).

On the other hand, there are disadvantages such as risk of spreading infection from the sinuses to adjacent parts of the nose, or increased risk of complications during osteotomy, postoperative hemorrhage, edema or hematoma (3,7,10). Furthermore, the other concern is the functional or aesthetic outcome of concurrent vs. individual surgery. Therefore, we were prompted to study the outcomes of combined FESS and rhinoplasty and compare them with those of separate surgeries in two control groups.

Materials and Methods

In this study, which was conducted between May 2009 and January 2012 in the otolaryngology department of a tertiary academic referral center (Imam Khomeini Hospital), we enrolled twenty five patients with a deformed nose associated with chronic rhinosinusitis (CRS) not responding to maximal medical treatment who underwent concurrent rhinoplasty and FESS, 25 consecutive patients who were candidates for septorhinoplasty and were well matched with our cases in the first group, and twenty five other consecutive

Corresponding Author: Babak Saedi
Otolaryngology Research Center, Imam Khomeini Medical Center, Bagherkhan Street, Chamran Highway, Tehran, Iran, Postal Code: 141973141
Tel: +98 21 66581628, Fax: +98 21 66581628, E-mail: saedi@tums.ac.ir

patients with a history of chronic sinusitis resistant to maximal medical treatment (at least 4 weeks of widespread antibiotic therapy in addition to nasal corticosteroid, guaifenesin, and nasal saline douche) who were candidates for FESS.

All procedures were performed using the same techniques by one of the senior authors. Also, a one team approach was used for both rhinoplasty and FESS. All patients completed the follow-up period and no patient was lost to follow-up in this research.

Ethical approval

The protocol of this study was approved by the Institutional Review Board of the Tehran University of Medical Sciences. Detailed information about the study was given to the participants and a written informed consent was obtained from each one. All aspects of the study were conducted according to the Declaration of Helsinki.

Sinusitis evaluation

Inclusion and exclusion criteria

Diagnosis of chronic sinusitis was based on history, imaging, and endoscopic findings and selection of chronic sinusitis patients was conducted after at least 6 weeks of maximal medical treatment. None of our patients suffered from systemic diseases, such as sarcoidosis, Wegener's granulomatosis, or psychological problems. None of them was on medications which interfered with postoperative treatment of chronic sinusitis. Pregnant patients, patients younger than 18 years, immunodeficient patients, and individuals with neoplasia or fungal rhinosinusitis were excluded from this study.

Variable measurement

Subjective variables

Patients were asked about their demographics and symptoms associated with sinusitis using the sino-nasal outcome test (SNOT22) preoperatively and 12 months after surgery with the same method under the supervision of one of the authors.

Objective variables

Nasal endoscopy

For all patients, a complete nasal examination including nasal endoscopy was performed preoperatively to determine the presence of polyps, septal deviation, and other anatomical variations. In order to classify the extent of polyposis, Stumberger's classification was used (1= polyp limited to middle meatus, 2=polyps have partially occupied the nasal space, but have not reached the inferior meatus, 3=polyps have reached inferior meatus) (11).

Radiography

All patients underwent complete computerized tomography (CT). The images were evaluated according to Lund-Mackay scoring before surgery. All images were assessed and reported by the same radiologist.

Type of treatment

To reduce inflammation and mucosal swelling to make surgery easier, all patients had oral prednisolone 3 days before surgery.

All operations were performed under general anesthesia with the same method by one of the authors. The Messerklinger's method of endoscopic surgery was used as well as the same pre- and postoperative protocol including endoscopic debridement under the supervision of one of the senior authors. Author tried to completely open all involved cells, especially in the base of skull, and to preserve the mucosa of the unaffected areas. The middle turbinate was partially resected if there were extensive polypoid changes. Septoplasty was performed when indicated. In all cases, anterior and posterior ethmoidectomy and maxillary antrostomy were performed and also, if indicated, frontal and sphenoid sinusotomy were done.

All patients were treated with broad-spectrum antibiotics for two weeks after surgery. In addition, all patients continued treatment with the same medical regimen for nasal polyposis after surgery; inhaled nasal corticosteroid two times daily (fluticasone propionate) with dosage adjustment depending on endoscopic findings, and nasal saline douche three times daily for at least six months. A short course of oral corticosteroid (prednisolone 20 mg for an average adult for one week) was administered to all patients after surgery.

Then, all subjects underwent endoscopic follow-up and any recurrence was documented. Subsequently, maximal medical treatment was allowed for any recurrence, and in case of failure, revision surgery was performed.

Rhinoplasty evaluation

Study subjects

Inclusion and exclusion criteria

The study subjects were selected from among consecutive candidates of septorhinoplasty who referred to our center. None of our patients were cases of revision rhinoplasty. They had no congenital

malformation or severe weakness of tip recoil.

Type of procedures and medical treatment

We used the open rhinoplasty approach in all cases and controls. All procedures were performed under general anesthesia by one of the senior authors. Internal lateral osteotomy was performed in all procedures, and no packing was used. Antibiotic prophylaxis (Cephalexin 500 mg/QID for five days) was prescribed to all patients and the only prescribed analgesic was acetaminophen. Subsequently, their nasal splints were removed after 7 days but taping was continued for 4 weeks thereafter.

Tests and outcome evaluation

Demographic data of all patients were documented. Preoperative and postoperative (12 months) digital photographs were taken in a standardized way and the nasal tip projection (NTP) and rotation (NTR) were re-evaluated and compared with the preoperative values and views. Photographs were taken with a Canon power shot S5 digital camera with a Canon X12 Zoom lens to ensure proper and uniform photographic size. We used the same position of patients and photographer, according to the Frankfort horizontal line, stood at a fixed distance of 1 m.

For analysis, the facial section between the horizontal planes running above the eyebrows and below the mentum was copied from the postoperative photograph. NTP and NTR were measured using Adobe Photoshop 7 software which provided an accurate analysis of the same facial sections in the preoperative and postoperative photographs.

The starting point of the nose, the most projected point on the tip, tip break point, the nasal spine (the most projected point on the convex margin of the alar crease), and the blue reflection point of the angular vein at the medial canthal area were marked on these images, and then, nasal tip rotation and projection were measured by a physician blinded to strut usage using these six points. The ratios of tip projection and columellar length to dorsal length were calculated for each preoperative and postoperative image.

Nasal TIP projection

We used Byrd's methods for evaluating tip projection. The first one was by drawing a line from the alar-cheek junction to the tip of the nose. If the upper lip projection was normal, a vertical line was drawn adjacent to the most projecting part of the upper lip. To achieve adequate tip projection, at least 50% of the horizontal line had to lie anterior to the vertical line. If greater than 60% of the line lay anterior to it, the tip was considered over projected and needed to be reduced. If less than 50% of the tip was anterior to the vertical line, it indicated a short nose with inadequate projection that needed augmentation. In this method (Byrd's method), we considered normal projection in the range of 55±5 percent.

Nasal TIP rotation

Adobe Photoshop was used to measure the nasolabial angle between 2 lines drawn parallel to the upper lip and columella. Rotation in the range of 90-95° for males and 95-110° for females was considered normal.

The measurements of angles and ratios were carried out by an independent researcher who was not aware of the preoperative and postoperative situation or procedures (concurrent FESS and rhinoplasty or rhinoplasty alone).

At least one year after surgery, the patients' satisfaction of the surgery was evaluated through a self report Visual Analogue Scale (VAS) between 0 (least satisfaction) and 10 (highest satisfaction).

Statistical method

Data were analyzed using SPSS version 15.0 for Windows (SPSS Inc., Chicago, IL); paired t-test was used to evaluate preoperative and postoperative data in each group and Chi-square test was also used. The sample size was calculated with α=0.05, β=0.2, $p1$=80 and $p2$=40 (6). The values were evaluated using descriptive statistical methods (mean±SD) and $P<0.05$ was significant.

Results

Cases

Concurrent FESS and rhinoplasty

Of the 25 patients who were entered in this study for concurrent surgery, 15 (60%) were female, and the remaining 10 (40%) were male. Their mean age was 26.6±9.14 years (Min=18 and Max=53).

The mean preoperative SNOT22 score was 40.28±13.21 (Min=15 and Max=59). In the endoscopic evaluation and Stumberger classification, the mean score was 2.72±0.84 (Min=2 and Max=4). According to the Lund-Mackay scale, preoperative CTs showed a mean score of 10.16±4.74 (Min=2 and Max=18).

Other evaluated variables were aesthetic indexes. The first one was the nasolabial angle; the mean

preoperative angle was 93.17°±7.9° (Min=80 and Max=115). The preoperative nasal tip projection was 61%±7.71% (Min=49% and Max=79%), preoperative nasofrontal angle was 133.92°±14.27° (Min=100° and 169°), and the dorsum status was 2.64±1.15 mm (Min=0 and Max=4mm).

One year after surgery the abovementioned variables were evaluated again. Mean postoperative SNOT22 was 13.36±7.35 (Min=5 and Max=30). As for postoperative aesthetic indexes mean nasolabial angle was 101.72°±10.83° (Min=92° and Max=127°), and mean projection, according to Byrd's method, was 63.36%±4.04% (Min=52% and Max=67%). Postoperative dorsum status was 0.12±0.88 mm (Min=0 and Max=2mm), and postoperative nasofrontal angle was 119.48°±7.08° (Min=102 and Max=132).

Accordingly, patients' postoperative satisfaction was 8.02±0.94 on average (Min=6 and Max=9) based on visual analogue scale (VAS). (0=the worst results and 10=the best results); the patients' average reported pain during postoperative endoscopic debridement was 3.3±1.2 (VAS) in sinusitis alone surgeries and 3.83±1.37 in concurrent surgeries; the inter-group difference was not statistically significant (P=0.78).

There were no reports of any major complication like hemorrhage, synechia, or cerebrospinal fluid leakage in this series of concurrent FESS and rhinoplasty. But there were small evidences of recurrence in three patients, which showed secretion and partial obstruction of osteomeatal complex.

There was a significant difference between pre and postoperative SNOT22 (P<0.01, t-test). The comparison between pre and postoperative aesthetic indexes are summarized in table 1.

Cases vs. controls in FESS groups

Characteristics and outcomes in the FESS group and their differences with cases are compared in table 1.

Also, the extension of endoscopic sinus surgery in cases and the FESS group is illustrated in table 2.

Characteristics and outcomes in the rhinoplasty group and their differences with cases are compared in table 3.

Table 1. Characteristics and outcomes in the FESS group and their comparison with cases.

Results / Variables	Mean±SD		*P*-value
	Control	Cases	
Age	29.1±10.73	26.6±9.14	0.184
Sex (male/female)	10/15 (40%/60%)	10/15 (40%/60%)	1
Preoperative SNOT22	44.7±11	40.28±13.21	0.17
Postoperative SNOT22	11.7±6.2	13.21±7.35	0.27
Lund-Mackay	12.0±3.5	10.16±4.74	0.07
Stümberger Classification	4.2±1.5	2.72±84.26	0.8
Postoperative VAS score	14.84±2.35	16.04±1.88	0.11
Recurrence	5 (20%)	3 (12%)	0.32

Table 2. The extension of endoscopic sinus surgery in cases and the FESS group.

	Case (%)	Control (%)
Antrostomy	25 (100%)	25 (100%)
Ant. ethmoidectomy	25 (100%)	25 (100%)
Post. ethmoidectomy	25 (100%)	25 (100%)
Sphenoidotomy	4 (16%)	7 (28%)
Frontal recess opening	2 (8%)	6 (24%)

Cases vs. Controls in rhinoplasty groups

Table 3. Characteristics and outcomes in the rhinoplasty group and their comparison with cases.

Results / Variables		Mean±SD		*P-value*
		Control	Cases	
Age		24.46±9.00	26.6±9.14	0.24
Sex (male/female)		10/15	10/15	1
Nasofrontal angle	Preoperative	131.76±12.38°	133.92±14.27°	0.46
	Postoperative	120.33±7.43°	119.48±7.08°	0.63
Nasolabial angle	Preoperative	92.24±8.6°	93.17±7.9°	0.58
	Postoperative	102.65±11.12°	101.72±10.83°	0.67
Nasal tip projection	Preoperative	71±7.21%	61.8±7.72%	0.82
	Postoperative	62.15±4.08%	63.3±4.04%	0.79
Dorsum status	Preoperative	3.50±1.13 mm	2.64±1.15 mm	0.74
	Postoperative	0.15±0.47mm	0.12±0.88mm	0.87
VAS (visual analogue scale)		15.08 ±1.97	16.04±1.88	0.76

Discussion

Over the recent years, there have been several reports of concurrent FESS and rhinoplasty in patients who suffered from sinusitis and were candidates for nasal plastic surgery. Many authors have proposed the feasibility of this combination with acceptable results. In this study we compared the results of concurrent FESS and rhinoplasty with selected well matched control groups who had either FESS or rhinoplasty.

Our major concern in designing this study was whether combining these two surgeries would have any effects on final aesthetic and functional outcomes compared to single procedures.

Final results showed no significant differences among different groups, and there were no major complications in any group. Moreover, the postoperative endoscopic debridement in the FESS group was not significantly less painful compared to cases of concurrent surgery. Since most patients asked for decreasing the size of their nose in nasal plastic surgery, one of main concerns of surgeons is feasibility of postoperative care in rhinoplasty group and how painful it would be; our results suggested acceptable levels of discomfort for them.

Since the introduction of concurrent surgery by Shemen and Matarasso (2), there have been many reports of successful treatment of sinusitis in nasal plastic surgery using this technique. However, most surgeons have reported their work as case series, and the major concern about final results, as compared with simple surgeries were still not addressed. We propose other researchers to evaluate different aspects of this type of surgery with separate elective surgeries.

Currently, most plastic surgeons agree that a successful nasal plastic surgery cannot be done without meticulous management of rhinologic problems of the internal nose. Some others, like Moses *et al.,* (12), have proposed that these types of problems may be aggravated by some types of plastic surgery. Therefore, apart from potential benefits of one stage surgeries in terms of expense and time, treatment of the rhinological problems such as sinusitis, allergy, or septal deviation can increase patient satisfaction after surgery (3).

McGraw-Wall and MacGregor (3) proposed that the major concern of some surgeons who still worry about potential complications of concurrent FESS and rhinoplasty include spreading of infection, potential prolonged edema, hematoma or deleterious effects on functional and aesthetic outcomes of treatment. Results of their study, as well as another similar one, helped to eliminate such fears.

Gliklich *et al.* assessed potential risks of lateral osteotomy after ethmoidectomy (especially Agger nasi resection) and concluded that lateral osteotomy can be performed without great risk of uncontrolled extension to skull base or comminution of nasal bone. In agreement with their results, there were no osteotomy-related complications in our series, either (3,10).

Kircher *et al*. conducted a retrospective study on 48 patients and encountered minor complications after concurrent surgeries. They recommended that it is better to screen patients with poor wound healing factors in addition to those with acute exacerbations of chronic rhinosinusitis or severe chronic rhinosinusitis to prevent possible complications (8).

Primary concerns of most researches were reduced after primary studies. Now there is general agreement about relative counter indication in advanced sinus diseases. Moreover, systemic diseases like cystic fibrosis and ciliary dyskinesia are considered counter indication to simultaneous surgery (3).

Previous studies confirmed the feasibility of this type of surgery but there were some shortcomings in them. Initially, no control groups in both rhinoplasty and FESS groups were assigned in any of the preceding studies such as the one by Marcus *et al*., and additionally, most of them were retrospective (1,4-9,13,14). Results of the current research, as a prospective case control study, are suggestive of acceptable outcomes with minimum complications. Among this type of researches, Sclafani and Schaefer (6) reported 13 cases of concurrent surgeries and compared them with rhinoplasty control subjects. Their results showed acceptable outcome without any major complications. They concluded that swelling after concurrent surgery is more predominant than separated surgery. Accordingly, they evaluated the short term problem and outcome of rhinoplasty but did not study final results with sinusitis or probably final aesthetic results of nasal plastic surgeries.

In another research, Marcus *et al.* (1) conducted a retrospective review and presented safety and efficacy of combined surgery using a two team approach. There were variations between surgical methods; some of them had the open approach, and for others, the closed approach was used. But finally more than 90% of their patients stated they would recommend concurrent procedures.

One major difference between the current study and aforementioned ones was that all of our patients underwent open approach nasal plastic surgery, and therefore the results refer to a more uniform population.

In our study, the final outcome surgeries in both functional and aesthetic parts were evaluated. Also, one team approaches for both rhinoplasty and FESS were selected. In most previous studies, two separate teams did surgeries, but this study can suggest the feasibility of a one team approach, if the surgeons have a good command on techniques of both surgeries, especially in less advanced cases.

In conclusion, concomitant surgeries can minimize patient discomfort, reduce hospital stay, shorten the recovery period, and can treat common problems of the septum or turbinates simultaneously. Advantages and long term results of concurrent surgeries should be evaluated in future studies.

References

1. Marcus B, Patel Z, Busquets J, Hwang PH Cook TK. The Utility of Concurrent Rhinoplasty and Sinus Surgery. Arch Facial Plast Surg 2006;8(4): 260-2.
2. Murrell GL.Rhinoplasty and Functional Endoscopic Sinus Surgery. Plast Surg Int 2011; 473-81.
3. McGraw-Wall B, MacGregor AR.Concurrent functional endoscopic sinus surgery and rhinoplasty: pros. Facial Plast Surg Clin North Am 2004;12(4):425-9.
4. Ricardo MF, Giovanni F. Rhinoplasty and Endoscopic Surgery for Functional and Inflammatory Nasal/Sinus Disorders. Plast Reconstr Surg 2005;115(3):705-10.
5. Costa F Robiony M, Salvo I, Toro C, Sembronio S, Politi M. Simultaneous Functional Endoscopic Sinus Surgery and Esthetic Rhinoplasty in Orthognathic Patients. J Oral Maxilofac Surg 2008;66(7):1370-7.
6. Sclafani AP, Schaefer SD. Triological thesis: concurrent endoscopic sinus surgery and cosmetic rhinoplasty: rationale, risks, rewards, and reality. Laryngoscope 2009;119(4):778-91.
7. Inanli S, Sari M, Yazici MZ. The Results of Concurrent Functional Endoscopic Sinus Surgery and Rhinoplasty. J Craniofacial Surg 2008; 19(3): 701-4.
8. Kircher ML , Dutton JM. Concurrent endoscopic sinus surgery and rhinoplasty. Am J Rhinol 2006. 20(5): 485-488.
9. Lee JH, Sherris DA, Moore EJ. Combined Open Septorhinoplasty and Functional Endoscopic Sinus Surgery. Otolaryngol Head Neck Surg 2005;133(3):436-40.
10. Gliklich RE, Lauretano AM. The Risk of Nasal Osteotomies After Ethmoid Sinus Surgery. Arch Otolaryngol Head Neck Surg 1995;121(11):1315-8.
11. Dufour X, BedierA, Ferrie J, Gohler C , Klossek J. Diffuse Nasal Polyposis and Endonasal Endoscopic Surgery: Long-Term Results, a 65-Case Study. Laryngoscope 2004;114(11):1982-7.
12. Moses JJ, Lange CR, Arredondo A. Endoscopic treatment of sinonasal disease in patients who have had orthognathic surgery. Br J Oral Maxillofac Surg 2000;38(3):177-84.
13. Millman B ,Smith R. The Potential Pitfalls of Concurrent Rhinoplasty and Endoscopic Sinus Surgery. Laryngoscope 2002;112(7 Pt 1):1193-6.
14. Rizk SS,Edelstein DR, Matarasso A. Concurrent functional endoscopic sinus surgery and rhinoplasty. Ann Plast Surg 1997;38(4):323.