

The Effects of Endoscopic Sinus Surgery on the Postoperative Outcomes of Open Rhinoplasty

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Abstract

Objective: Several studies have advocated concurrent endoscopic sinus surgery and rhinoplasty. However, concerns about increased surgical risk, complications, and unsuccessful cosmetic outcomes following the concurrent procedures have been reported. The aim of this study was to investigate the overall safety of concurrent endoscopic sinus surgery and rhinoplasty and to specifically examine the effect of endoscopic sinus surgery on cosmetic outcomes.

Methods: We retrospectively reviewed 57 patients who underwent concurrent open rhinoplasty and endoscopic sinus surgery (ESS). We then selected a control group of patients, who underwent rhinoplasty only and were matched with a study group for age, sex, external nose deformity, and implant graft material. The postoperative outcomes of the 2 groups were compared.

Results: Fifty-seven patients underwent concurrent open rhinoplasty and ESS. Postoperative assessment showed that a successful outcome was achieved in 82.5% of the patients who underwent concurrent procedures and in 87.7% of the patients who underwent rhinoplasty only ($P = .56$). The rate of revision due to a dissatisfied outcome was 5 patients (8.7%) in the concurrent surgery group and 3 patients (5.3%) in the rhinoplasty-only group ($P = .36$). Minor complications occurred in 6 patients (10.5%) from the group who underwent the concurrent procedures and 5 patients (8.8%) from the rhinoplasty-only group ($P = .76$).

Conclusion: Combined rhinoplasty and endoscopic sinus surgery achieves a similar aesthetic outcome to rhinoplasty only, with no significant increase in rates of revision or complication.

Keywords

chronic rhinosinusitis, endoscopic sinus surgery, outcome, rhinoplasty, treatment

Introduction

Traditionally, performing rhinoplasty in conjunction with sinus surgery to treat chronic rhinosinusitis has been avoided because it may expose patients to an increased risk of bleeding, infection, and edema, all of which may potentially jeopardize the aesthetic outcome.¹ However, with advances in surgical techniques, perioperative care, and endoscopic instrumentation, concurrent rhinoplasty and endoscopic sinus surgery (ESS) have been advocated and frequently performed recently for patients who needed both operations.² Combining the 2 procedures makes sense, as most patients prefer single general anesthetic and recovery periods, not to mention the savings related to reduced time off work and reduced financial costs.

Since the time when Shemen and Matarasso reported the first case series of concurrent ESS and rhinoplasty,³ several reports have described the outcome of combining these 2 procedures. Initial concern about the safety of concurrent

surgery was revealed to be unfounded, as these studies collectively demonstrated that rates of complications associated with the concurrent procedures are as low as performing either procedure alone.^{1,3-5} However, the outcomes reported by these and subsequent studies were mainly focused on airway improvement and general outcomes of concurrent surgery.⁶⁻⁹ Scalfani and Schaefer reported on the course of recovery by comparing concurrent ESS and rhinoplasty with rhinoplasty alone.¹⁰ No studies to date have specifically investigated the cosmetic outcomes of concurrent ESS and rhinoplasty.

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The aim of this study is to report on the cosmetic outcomes of rhinoplasty in patients who had undergone concurrent ESS and rhinoplasty procedures and to compare these with those of rhinoplasty alone. The rates of complication and revision are also reported.

Materials and Methods

Study Design and Patients

The medical records of 943 patients who underwent open rhinoplasty (OR) by the senior author (Y.J.J.) in the Asan Medical Center between July 2003 and May 2011 were reviewed. Fifty-seven patients were found to have undergone concurrent open rhinoplasty and ESS (OR/ESS). We then selected a control group of 57 patients who had open rhinoplasty only (OR) during the same period of time, and these were matched for age, sex, surgical techniques, external nasal deformity, and implant material (if any). The purposes of all rhinoplasty were cosmetic and functional. We simulated postoperative aesthetic outcomes using Syncromax simulation (version 3.0, Dreamwizard, Seoul, Korea) before surgery. The surgeon made efforts to achieve aesthetic goals that the patient agreed with. The demographics, external nose deformity, surgical techniques, surgical extent of sinus disease, and perioperative outcomes were all recorded and analyzed for both groups.

Surgical Principle of Concurrent Surgery

For those undergoing ESS, preoperative computed tomography (CT) scans of their paranasal sinuses were obtained. Patients who underwent ESS had typically received more than 1 month of medical therapy, including oral antibiotics, topical and systemic steroids, and nasal saline irrigation, to which they had failed to respond. The degree of sinus inflammation evident from CT was graded using the Lund-Mackay scoring system.¹¹

All patients were operated on by the same surgeon (Y.J.J.), and in the concurrent OR/ESS group, ESS always preceded OR. The ESS procedure was performed according to the extent of diseased sinuses, as confirmed by CT scanning. Involvement of the frontal and sphenoid sinuses was not regarded as a contraindication of concurrent OR/ESS. At the end of ESS, a Merocel (Medtronic Xomed, Minneapolis, Minnesota, USA) that had been soaked with antibiotics diluted in saline was packed tightly into the middle meatus. The patients were then reprepared and redraped, and fresh instruments were used for the subsequent rhinoplasty.

All rhinoplasty was performed using an open approach, as is the preference of the senior author. This signified the operation as a separate procedure with a different access. As is typical of Asian rhinoplasties, many patients required grafting material. Where possible, grafting material was harvested from the septum or concha. If it was anticipated

that a large quantity of grafts was needed, autologous costal cartilage was then harvested instead of conchal cartilage. Some patients also received homologous or alloplastic material such as Tutoplast-processed fascia lata (TPFL) and/or expanded polytetrafluoroethylene (e-PTFE) for dorsal augmentation. In general, however, these were avoided if possible.

Assessment of Surgical Outcomes

We assessed 3 surgical outcomes: aesthetic outcome, the number of patients requiring revision surgery, and postoperative complications. Surgical outcomes were compared between the group of patients who underwent concurrent surgery (OR/ESS) and those in a similar group of patients who underwent rhinoplasty only (OR). Aesthetic outcomes were assessed by 2 board-certified, rhinoplasty-trained otolaryngologists (B.J.M. and S.M.H.), who were not involved in any aspects of the surgery or the study, such as specific information about rhinoplasty technique and whether or not the patient underwent combined ESS. Assessment was based on reviews of pre- and postoperative photographs taken during the last follow-up visit. Based on the consensus opinion of the 2 otolaryngologists, the postoperative outcome (defined in terms of correction of nasal deformity) was classified as excellent, good, fair, or no change. Excellent was defined as 90% to 100% correction of deformity, good as 70% to 89%, fair as 50% to 69%, or no change as < 50%.^{12,13} Examples of each case are shown in Figures 1 to 3. The outcomes "fair" and "no change" were regarded as unsuccessful. Anthropometric measurements were also made using pre- and postoperative photographs. Deviation, nasofrontal, and nasolabial angles were determined.^{14,15}

Ethical Considerations

This is a retrospective case-control study approved by the institutional review board of the Asan Medical Center in Seoul, South Korea.

Statistical Analysis

Statistical analyses were performed using SPSS software version 12.0 (SPSS Inc, Chicago, Illinois, USA). McNemar's test was used to compare the proportion of patients who had a successful outcome, the revision rates, and the complication rates in the 2 groups. A value of $P < .05$ was regarded as statistically significant.

Results

We enrolled 57 patients in our concurrent OR/ESS group and selected 57 patients for our OR-only control group, who were matched for age, sex, external nasal deformity, and surgical techniques for OR. The mean age for all

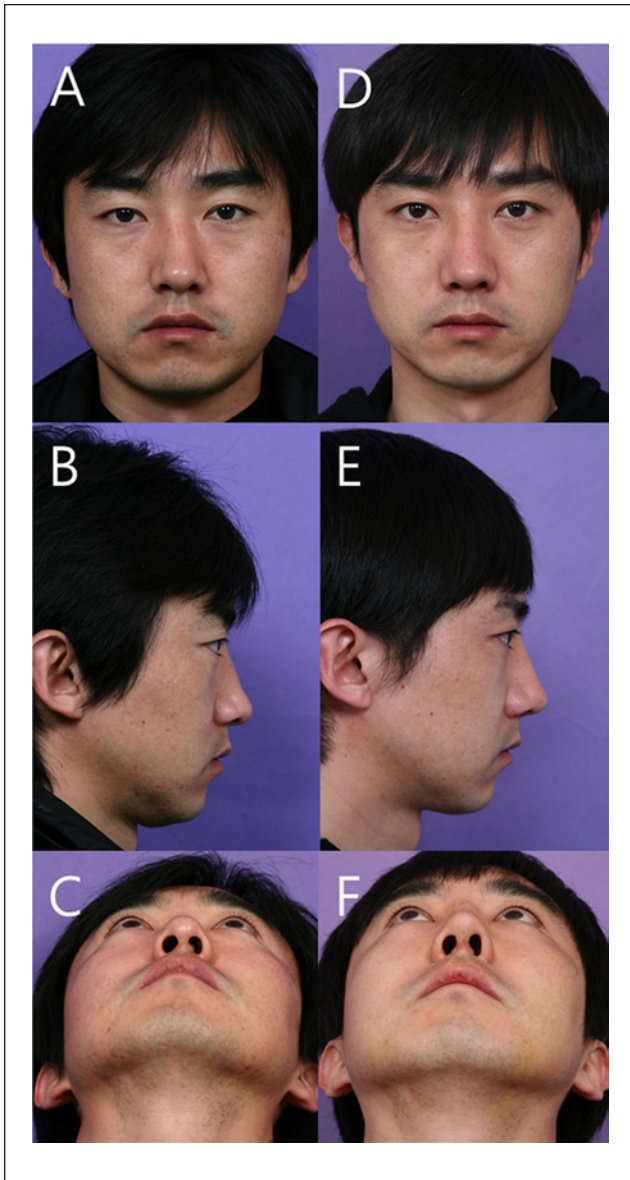


Figure 1. Example of an excellent surgical outcome. (A-C) Preoperative view of a 33-year-old man with a deviated nose. (D-F) Three-month postoperative views after surgical treatment with a medial and lateral osteotomy and bilateral spreader graft.

included patients was 38.4 years. For each group, 47 members (82.5%) were male and 10 members (17.5%) were female. The demographics, nasal history, external nasal deformities, and details of rhinoplasty surgical techniques for both groups are listed in Table 1. Of the 114 patients in both groups, a deviated nose was the most common deformity ($n = 78$), followed by saddle nose ($n = 19$), hump nose ($n = 15$), and short nose ($n = 2$) (Table 1). Septal cartilage ($n = 105$) and Tutoplast-processed fascia lata (TPFL, $n = 81$) were the most commonly used graft and implant materials (Table 1). During the review of the severity of sinusitis and details of the patients undergoing combined ESS, the

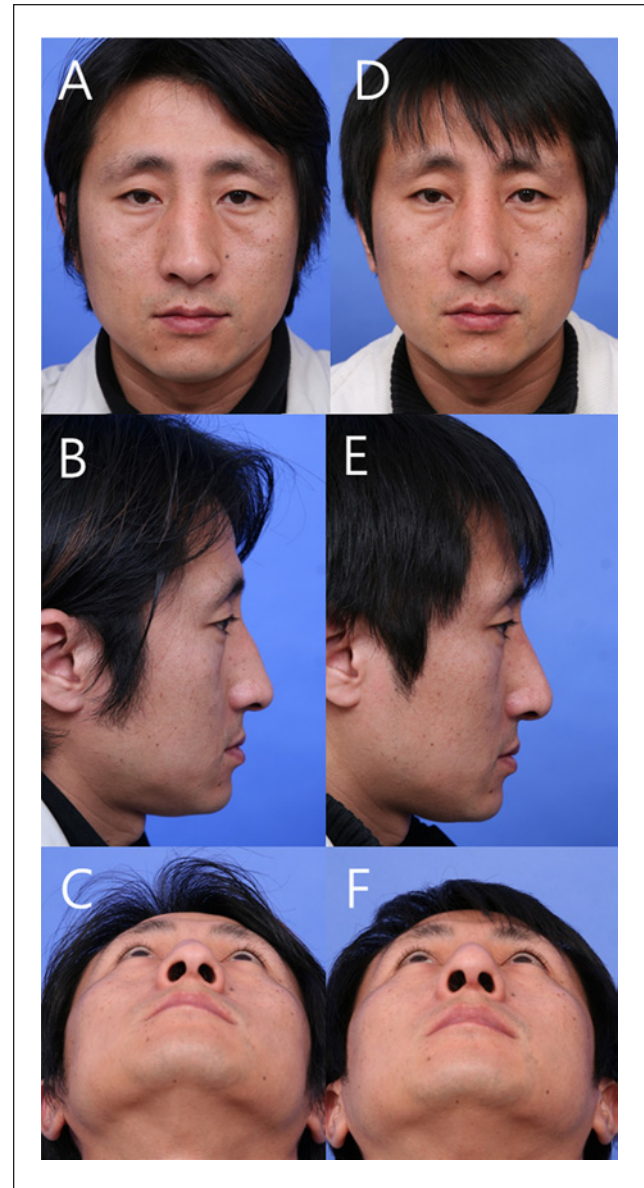


Figure 2. Example of a good surgical outcome. (A-C) Preoperative view of a 37-year-old man with a hump nose. (D-F) Three-month postoperative views after surgical treatment with a dorsal augmentation using septal cartilage and Tutoplast-processed fascia lata after a humpectomy.

average Lund-Mackay CT score of our patients was 9.0, with a range from 4 to 24 (Table 2). Table 2 also details the types of sinus surgery performed. The most common element was middle meatal antrostomy ($n = 55$), which in general was performed in conjunction with an anterior ethmoidectomy ($n = 50$).

The aesthetic outcomes of both groups of patients, as judged independently by 2 otolaryngologists, are shown in Table 3. The proportion of patients judged to have a successful aesthetic outcome (excellent or good) was 82.5% in the concurrent OR/ESS group and 87.7% in the OR-only

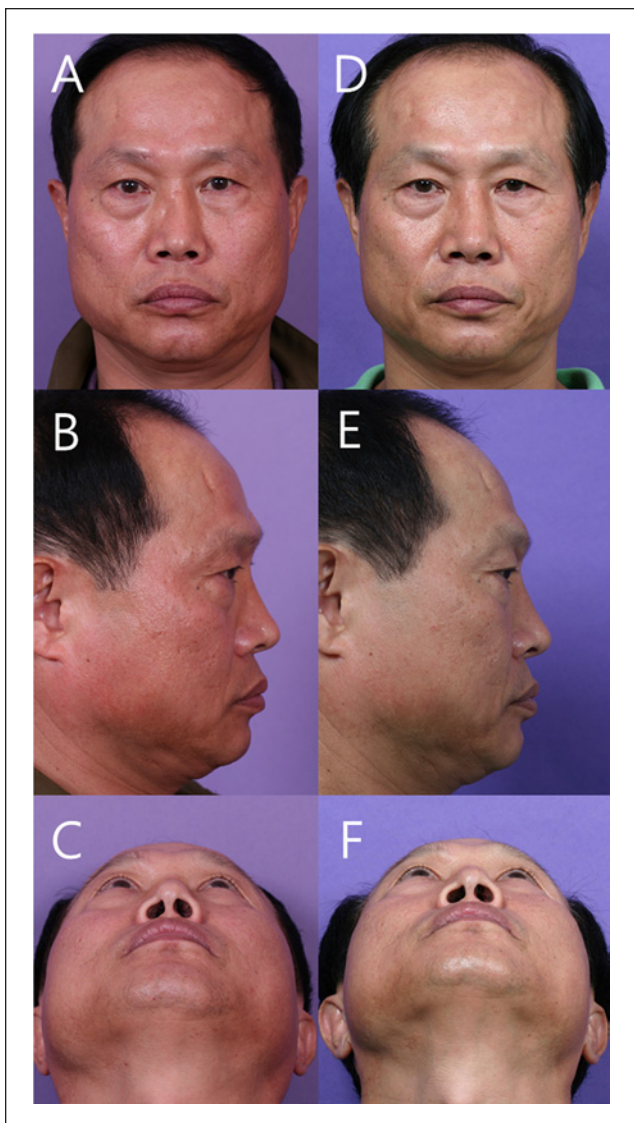


Figure 3. Example of no-change outcome. (A-C) Preoperative view of a 58-year-old man with a deviated nose. (D-F) Twelve-month postoperative views after surgical treatment with a medial and lateral osteotomy.

group. This difference was not statistically significant ($P = .61$). Unsuccessful outcomes (fair and no change) were 17.5% and 12.3%, respectively. Among all of the patients in both groups, 8 patients required revision rhinoplasty to further correct appearance, 4 patients (50%) had a suboptimal correction of a deviated dorsum, 3 patients (37.5%) had a saddle deformity, and 1 patient (12.5%) had a short-nose deformity (Table 4).

Pre- and postoperative anthropometric measurements showed overall reduced deviation angle and increased nasofrontal and nasolabial angles after surgery in both groups ($P < .05$ for each; Table 5). However, there were no differences in each parameter between the 2 groups ($P > .05$ for each).

Table 1. Demographics, Nasal History, Nasal Deformities, and Details of Surgical Techniques in the OR/ESS and OR-Only Groups (n = 57, Both Groups).

	OR/ESS	OR Only
Demographics		
Age, y	38.2	38.6
Sex, male/female	47/10	47/10
Previous rhinoplasty	2	2
Previous septoplasty	5	3
Previous ESS	5	0
History of nasal trauma	8	11
Follow-up period, mo	14.1	12.6
External nose deformities		
Deviated nose	39	39
Saddle nose	9	10
Hump nose	8	7
Short nose	1	1
Surgical techniques & graft materials		
Open approach	57	57
Osteotomies		
Medial	39	41
Lateral	40	42
Harvested cartilage		
Septal	52	53
Conchal	19	18
Costal	13	13
Implant		
TPFL	40	41
Others (e-PTFE, silicone)	2	6

Abbreviations: e-PTFE, expanded polytetrafluoroethylene; ESS, endoscopic sinus surgery; OR, open rhinoplasty; TPFL, Tutoplast-processed fascia lata.

Table 2. Severity of Sinusitis and Details of Patients Undergoing ESS (n = 57).

	No. of Patients
Range of Lund-Mackay CT score	
4 to 8	37
9 to 16	16
17 to 24	4
Details of ESS	
Middle meatal antrostomy	55
Anterior ethmoidectomy	50
Posterior ethmoidectomy	25
Frontal sinusotomy	21
Sphenoidotomy	6

Abbreviations: CT, computed tomography; ESS, endoscopic sinus surgery.

Revision rhinoplasty was performed on 5 patients (8.8%) in the OR/ESS group and 3 patients (5.3%) in the OR-only group. The proportion of patients who needed subsequent revision was not significantly different between the 2 groups ($P = .73$; Table 4). Postoperative complication rates are listed in Table 6. Formation of synechiae was the most

Table 3. Cosmetic Outcomes in OR/ESS and OR-Only Patients (n = 57, Both Groups), as Judged by 2 Independent Otolaryngologists.

	OR/ESS	OR Only	P Value
Successful	47 (82.5%)	50 (87.7%)	.61
Excellent	26	30	
Good	21	20	
Unsuccessful			
Fair/no change	10 (17.5%)	7 (12.3%)	

Abbreviations: ESS, endoscopic sinus surgery; OR, open rhinoplasty.

Table 4. Cases of Revision Rhinoplasty and Its Causes in OR/ESS and OR-Only Patients (n = 57, Both Groups).

Revision Required	OR/ESS	OR Only	P Value
Suboptimal correction of deviated dorsum	2	2	
Saddle deformity	2	1	
Short nose	1	0	
Total	5 (8.8%)	3 (5.3%)	.73

Abbreviations: ESS, endoscopic sinus surgery; OR, open rhinoplasty.

common complication (n = 5), followed by tip graft infections (n = 4), and small septal perforations (n = 2). Complication rates were 10.5% in the OR/ESS group and 8.8% in the OR-only group; the difference in the frequencies of complications was not significant ($P = 1.00$; Table 6).

Discussion

Our study shows that there is no significant difference in terms of aesthetic outcome, rates of revision surgery, and postoperative complications between patients who undergo concurrent OR/ESS and those who undergo OR only. There have been numerous reports of the outcomes of concurrent ESS and rhinoplasty. The earlier studies concentrated on the complication rates of combined surgery^{4,6-9} and did not include formal aesthetic outcome reports. Two studies, by Inanli et al¹⁴ and Murrell,¹⁵ noted that all of their patients were satisfied with the rhinoplasty outcome but did not elaborate on the method used for measuring this. All of these studies^{4,6-9,14,15} were retrospective reviews of case series.

Our current study is the first to do so by comparing concurrent rhinoplasty/ESS surgery to rhinoplasty only. In our study, all of the rhinoplasties were performed using an open approach. The average postoperative follow-up period was 14.1 months for the OR/ESS group (range, 6.1-51.1 months) and 12.6 months for the OR-only group (range, 4.8-49.4 months). This allowed the edema to settle and any postoperative imperfections to be revealed. There was no significant difference in the proportion of patients who attained a successful outcome (82.5% in the concurrent OR/ESS group, and 87.7% in the OR-only group) and improvement

of deviation, nasofrontal, and nasolabial angles in terms of rhinoplasty in the 2 groups. The result provided evidence that 1 of the aims in the concurrent surgery (improvement of aesthetic nasal appearance and anthropometric measurements) has not been affected by the other (clearance of sinus disease). Specifically, we did not experience any collapse of the lateral nasal wall, as reported by Friedman.¹⁶ This phenomenon was potentially explained by loss of support of the frontal process of maxilla, when both exenteration of the agger nasi cells and medial and lateral osteotomies were performed.

Higher complication rates have always been a principle concern with concurrent surgery. There is the theoretical risk of contamination of the cosmetic surgical field or spreading infection from diseased sinus cavities. It has also been argued that postoperative endoscopic care is essentially impossible after concurrent surgery as a result of the pain and discomfort that results from osteotomy and intranasal inflammation leading to increased scarring and the formation of synechiae.¹⁷ Two reviews of published studies on concurrent surgery have reported that there is no additive risk of minor complications when ESS and rhinoplasty are performed concomitantly.^{2,10} Minor complications, such as epistaxis and formation of synechiae, were found to be in the range of 0% to 22% collectively, and no major complications were reported. Our present study supports these findings. Overall, complications were 10.5% in the OR/ESS group and 8.8% in the OR-only group ($P = .76$). The complications involved the formation of synechiae, tip graft infection, and small septal perforation. We did not find an increased incidence of soft tissue infection, septal perforation, or postoperative epistaxis in the OR/ESS group relative to the OR-only group, as suggested by Fakhri and Citardi.¹⁷

As is common in Asian rhinoplasty procedures, the requirement for graft and/or implant material was high in our current cohort. Even though we did try to avoid the use of nonautologous material, it was still necessary for TPFL to be used in 70.5% of the patients in the OR/ESS group and 72% of cases in the OR-only group. Our previous study demonstrated that TPFL was useful when correcting dorsal irregularities or when used in combination with other implant material for dorsal augmentation.¹⁸ Overall, the number of patients in our current analysis who received alloplastic material was low. Two patients (3.5%) in the OR/ESS group and 6 patients (10.5%) in the OR-only group had e-PTFE implants. Comparatively, the number of cases that instead used autologous cartilage harvested from septum, concha, and/or rib was much higher. Fifty-two (91.2%) and 53 (92.9%) patients had autologous cartilage grafts in the OR/ESS and OR-only groups, respectively. We have not found it necessary to avoid all grafts and implants, as suggested by Rizk et al⁴ and Inanli et al,¹⁴ where none of their patients had any autologous or alloplastic implants.

Table 5. Comparison of Deviation, Nasofrontal, and Nasolabial Angles in Patients Who Underwent the Lower Vault Technique.

Measurement	OR/ESS	P Value	OR	P Value
Deviation angle				
Preoperative	167.18 ± 10.56	< .001	168.97 ± 6.78	< .001
Postoperative	176.34 ± 8.12		177.02 ± 3.52	
Nasofrontal angle				
Preoperative	143.23 ± 10.44	.001	140.83 ± 10.11	.011
Postoperative	139.34 ± 11.44		137.85 ± 10.70	
Nasolabial angle				
Preoperative	91.03 ± 11.44	.003	89.32 ± 12.69	.021
Postoperative	94.43 ± 11.92		92.14 ± 8.12	

Abbreviations: ESS, endoscopic sinus surgery; OR, open rhinoplasty.

Table 6. Rates and Type of Postoperative Complications in OR/ESS and OR-Only Patients (n = 57, Both Groups).

Postoperative Complication	OR/ESS	OR Only	P Value
Synechiae	3	2	
Tip graft infection	2	2	
Septal perforation	1	1	
Total	6 (10.5%)	5 (8.8%)	1.00

Abbreviations: ESS, endoscopic sinus surgery; OR, open rhinoplasty.

With regard to the order of surgery, we adhered to the principle that ESS should be performed before OR, as rhinoplasty could cause significant intranasal edema and bleeding, thus rendering ESS more difficult and risky.² It was mandatory that the patient was repped and redraped before OR and that fresh sterile instruments were then used. We did not find it necessary to perform septoplasty before ESS as long as access for endoscopy was not hindered. In all cases, the septum was explored as part of the OR procedure, as we view the correction of septal pathology as an integral part of the operation. This is in contrast to some reports in the literature that have recommended the sequential performance of septal and sinus surgery followed by rhinoplasty.^{4,5} It is important to stress that the 2 operations should be viewed as isolated and independent procedures. In our routine, irrigation of the nasal cavities and packing of the middle meatus signified the end of ESS. The open approach is then viewed as a fresh entry to gain access to the subsequent rhinoplasty procedure.

The severity of existing sinus disease has also been a concern when carrying out concurrent surgery. Most clinicians have advocated that only patients with mild or moderate sinus disease are suitable and that concurrent surgery should be avoided when there is significant inflammation, frontal sinus opacification, or grossly purulent disease.^{4,5,16} Rizk et al demonstrated that postoperative edema was greater when frontal and sphenoid diseases were present, and the authors advocated that the presence of the former is

a contraindication for concurrent surgery.⁴ However, some authors have challenged that view. Mazzola and Felisati did not agree that sphenoid or frontal sinusitis represents an inflammatory disorder more severe than maxilloethmoidal sinusitis.⁸ The finding by Lee et al that 4 patients in their study who developed cellulitis did not have gross intraoperative sinus purulence led them to conclude that postoperative complications were not related to intraoperative findings or the order of surgery.⁶ They concurred with Mazzola and Felisati that frontal and sphenoid sinusitis should not be a contraindication for concurrent ESS/rhinoplasty.⁸

The average Lund-Mackay CT score of our patients is 9 (range, 4-23). This puts our patient population in the higher end of the scores reported among previously published studies.¹⁰ The ESS procedures performed in our concurrent group of patients comprised the full range of sinus surgeries, including middle meatal antrostomy, anterior and posterior ethmoidectomy, frontal sinusotomy, and sphenoidotomy. As shown above, the higher Lund-Mackay scores of our patient population and the extent of our ESS have not resulted in a significant difference in the aesthetic outcome and complication rates of concurrent surgery, compared with OR alone.

In conclusion, the advantages of concurrent ESS and rhinoplasty have always been obvious for both patients and surgeon: the septum is manipulated only once, overlapping symptomatology can be corrected in 1 setting, and there is a reduced hospital stay and reduced costs for the patient. Previously published reports agree that concurrent surgery does not increase postoperative complications. Our present study has further confirmed that the aesthetic outcome of OR can also be maintained following concurrent OR/ESS.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

1. Millman B, Smith R. The potential pitfalls of concurrent rhinoplasty and endoscopic sinus surgery. *Laryngoscope*. 2002;112:1193-1196.
2. Reh DD, Chan JY, Byrne PJ. Concurrent rhinoplasty and endoscopic sinus surgery: a review of the pros and cons and a template for success. *Facial Plast Surg Clin North Am*. 2012;20:43-54.
3. Shemen L, Matarasso A. Combined endoscopic sinus surgery and aesthetic rhinoplasty: a pilot study. *Am J Rhinol*. 1991;5:131-136.
4. Rizk S, Edelstein D, Matarasso A. Concurrent functional endoscopic sinus surgery and rhinoplasty. *Ann Plast Surg*. 1997;38:323-329.
5. Toffel P. Simultaneous secure endoscopic sinus surgery and rhinoplasty. *Ear Nose Throat J*. 1994;73:556-573.
6. Lee JH, Sherris DA, Moore EJ. Combined open septorhinoplasty and functional endoscopic sinus surgery. *Otolaryngol Head Neck Surg*. 2005;133:436-440.
7. Marcus B, Patel Z, Busquets J, Hwang PH, Cook TA. The utility of concurrent rhinoplasty and sinus surgery: a 2-team approach. *Arch Facial Plast Surg*. 2006;8:260-262.
8. Mazzola R, Felisati G. Rhinoplasty and endoscopic surgery for functional and inflammatory nasal/sinus disorders. *Plast Reconstr Surg*. 2005;115:705-710.
9. Kircher M, Dutton JM. Concurrent endoscopic sinus surgery and rhinoplasty. *Am J Rhinol*. 2006;20:485-488.
10. Sclafani A, Schaefer S. Triological thesis: concurrent endoscopic sinus surgery and cosmetic rhinoplasty: rationale, risks, rewards and reality. *Laryngoscope*. 2009;119:778-791.
11. Lund VJ, Mackay IS. Staging in rhinosinusitis. *Rhinology*. 1993;31:183-184.
12. Cho GS, Jang YJ. Deviated nose correction: different outcomes according to the deviation type. *Laryngoscope*. 2013;123:1136-1142.
13. Jang YJ, Kim JH. Classification of convex nasal dorsum deformities in Asian patients and treatment outcomes. *J Plast Reconstr Aesthet Surg*. 2011;64:301-306.
14. Inanli S, Sari M, Yazici M. The results of concurrent functional endoscopic sinus surgery and rhinoplasty. *J Craniofac Surg*. 2008;19:701-704.
15. Murrell G. Rhinoplasty and functional endoscopic sinus surgery. *Plast Surg Int*. 2011;2011:473481.
16. Friedman WH. Endorhinoplasty: simultaneous rhinoplasty and endoscopic ethmoidectomy. *Facial Plast Surg Clin North Am*. 1999;7:357-371.
17. Fakhri S, Citardi MJ. Considerations against concurrent functional endoscopic sinus surgery and rhinoplasty. *Facial Plast Surg Clin North Am*. 2004;12:431-434.
18. Jang YJ, Wang JH, Sinha V, Song HM, Lee BJ. Tutoplast-processed fascia lata for dorsal augmentation in rhinoplasty. *Otolaryngol Head Neck Surg*. 2007;137:88-92.