

Functional and cosmetic outcomes of external approach septoplasty

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ABSTRACT

Background: The external approach for septoplasty is an important surgical technique to manage severe septal deviations, caudal deformities, and mid-dorsal abnormalities when a simple endonasal approach may not suffice. The procedure is longer in duration and draws on more resources than endonasal septoplasty. The outcome reporting of the external approach for septoplasty is important to provide evidence of benefit for both patients and health care providers. This study was designed to describe functional and cosmetic outcomes of the external approach for septoplasty.

Methods: A prospective assessment of consecutive patients undergoing the external approach for septoplasty at a tertiary center was performed. Pre- and postoperative nasal peak inspiratory flow (NPIF), symptom scores, 22-Item Sinonasal Outcome Test (SNOT-22), Nasal Obstruction Score, and Short Form 36 (SF-36) quality-of-life scores were assessed. A global Likert change scale was also used for both function and cosmesis.

Results: Thirty patients (mean age, 40 ± 15.9 years; 40% women) were assessed with a mean follow-up of 12.2 ± 9.5 months. Mean NPIF improved significantly from 93.3 ± 34.7 to 143.0 ± 44.3 ($p < 0.001$). Nasal obstruction score improved significantly from 3.6 ± 1.3 to 0.69 ± 1.2 ($p < 0.001$). SNOT-22 improved significantly from 34.1 ± 17.2 to 12.7 ± 14.9 ($p < 0.001$). Ninety-six percent had subjective improvement in nasal function, and 96% had no change or improvement in cosmesis. Seventy percent improved by the minimal clinically important difference for NPIF.

Conclusion: The external approach for septoplasty is an operation that produces significant improvements in subjective and objective nasal health measures. Although requiring greater training and operative time, it is an appropriate approach for the severely deviated nasal septum.

(Am J Rhinol Allergy 25, 351–357, 2011; doi: 10.2500/ajra.2011.25.3650)

Nasal obstruction is a common presenting complaint to the rhinologist. It has been estimated that as many as one-quarter of those with nasal obstruction seek surgical treatment for their problem,¹ which often involves a septoplasty. The majority of septoplasty operations are performed through endonasal techniques. However, in the case of severe deviations, full and undistorted access to the cartilaginous and bony septum is often necessary to adequately correct the septal deformities and retain tip support. An external approach provides this surgical exposure and, in particular, has the following access advantages²:

Dorsal cartilaginous septal deviations are fully exposed and corrected by scoring, suturing, or placing unilateral or bilateral spreader grafts.

Exposure of caudal septal deviations is excellent, enabling scoring of deviations and adjustment of the caudal strut to achieve midline positioning.

This exposure is particularly helpful in revision cases where a previous endonasal approach has not adequately addressed deformities in these areas. This external approach has long been used in functional rhinoplasty surgery, where it is used along with the placement of spreader and strut grafts as a reliable way to comprehensively assess and address nasal obstruction problems.³

The transcolumellar incision involved has been cited as a disadvantage of the approach.⁴ However, when correctly performed, the

incision should cause minimal problems to the patient or the surgeon.⁵ The external approach for septoplasty therefore has the potential to successfully and reliably treat the severely deviated nasal septum. It provides a reliable way to address internal nasal valve obstruction.

However, it is a procedure associated with increased costs when compared with an endonasal septoplasty. Health care providers may therefore require evidence that this is a procedure with proven successful outcomes. Likewise, clinicians may wish to provide information to their patients that the procedure they are recommending has obvious benefits when clinically indicated.

The study of surgical outcomes has developed rapidly in the past decades. This is partly because the measurement of surgical outcomes has potential to increase quality of patient care, as well as efficiency of and accountability for resource usage.⁶ For both the individual clinician and the patient, increased information on surgical outcomes facilitates decision making where options exist.⁷ Use of objective, clinical data to assess outcomes of surgery is increasingly being supplemented by patient-reported measures. It is important to include the patient's viewpoint in any assessment, because medical problems always exist within the context of the subject's perception.⁸ This is reflected in the fact that patients who clearly have significant health problems may not necessarily perceive their quality of life to be lower than average.⁹ The concept of "quality of life" measures patients' perceptions of general health parameters at a particular point in time or defined preceding period and compares them with expectations.^{10,11} It can be assessed by standardized, validated questionnaires.¹² An advantage of using general health status questionnaires for monitoring health is that comparisons can be made with other unrelated interventions. However, these instruments may lack the sensitivity to pick up small changes in health caused by a specific intervention. To ensure sensitivity, an assessment of outcome after intervention should also have elements specific to the disease or problem being treated.^{8,13} For rhinological conditions and interventions a number of patient-reported instruments exist.^{13–15}

There is still a very important role for objective clinical measurement in assessing outcomes. Any measure should be relevant to the intervention concerned and should be simple to perform, reproducible, and validated against other measures. In general, a range of

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Presented as an oral presentation at the Australasian Rhinologic Society Meeting, Sydney, New South Wales, Australia, August 28, 2010

R. Harvey has served on an advisory board for Schering-Plough and serves on the speaker's bureau for GlaxoSmithKline; R. Sacks has been a consultant to Medtronic and an advisor to Schering-Plough. The remaining authors have no conflicts to declare pertaining to this article

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outcome measures, objective and patient-reported, general and disease-specific, provide complementary information on the effects of surgery.¹⁶ Establishing outcomes after septoplasty is not new; a number of previous studies have prospectively analyzed subjective results of closed procedures using a variety of instruments.^{17–20} However, there has been little work documenting outcomes after the external approach for septoplasty, and no study has conducted a prospective outcome assessment of the external approach using validated tools, combining patient-reported and objective measures. This study therefore assesses functional and quality-of-life measures for the external approach for septoplasty, with the aim of validating the procedure.

MATERIALS AND METHODS

Analysis of a prospective cohort of patients undergoing the external approach for septoplasty from January 2007 until December 2009 in a tertiary rhinological practice was performed. Local Institutional Review Board approval was obtained. Informed consent was obtained from all patients. Demographic data were collected. The patients were assessed preoperatively and selected for the external approach for septoplasty because of one of the following clinical criteria:

1. Presence of a severe caudal septal deformity or columella dislocation affecting the internal nasal valve.
2. Presence of a severe dorsal septal deformity affecting the internal nasal valve.
3. Revision after previous septoplasty/rhinoseptoplasty.

As noted previously, a severe deviation was one that in the opinion of the assessing surgeon significantly narrowed the nasal valve, requiring correction to optimize this valve. Patients requiring nasal bone straightening *via* osteotomies or any corrective work to the nasal tip were excluded. Patients requiring correction of alar collapse contributing to nasal obstruction or placement of batten grafts or other lateral support grafts were also excluded.

OPERATIVE PROCEDURE

All patients underwent the same procedure. The standard external approach/open structure rhinoplasty approach was used.²¹ After injection of the septum, nasal tip, and nasal bridge with local anesthetic, a hemitransfixion incision was used to raise a unilateral submucosal septal flap over the entire bony and cartilaginous septum where possible; the use of this incision to access the septum was the preference of the operating surgeon, although when flaps could not be easily raised, the septum was approached from above after the soft tissue envelope was raised.

An inverted V-shaped incision was then made in the narrowest part of the midcolumella and was continued laterally as a columella to marginal incision. The skin was dissected off the medial and lateral crura of the lower lateral nasal cartilage. The dissection proceeded superiorly to expose the upper lateral cartilages, the dorsum of the cartilaginous septum, and, eventually, the bony dorsum (Fig. 1). The septum was freed from its surrounding mucoperichondrium on both sides, and the upper lateral cartilages were freed from the nasal septum. The septal deformity was excised and cartilage was kept aside for grafting. A minimum 1-cm-wide caudal and dorsal cartilage strip was preserved if possible; the caudal end could be repositioned and resutured on the nasal spine if necessary. An endoscopic turbinate reduction was then performed.²²

Spreader grafts and a columellar strut were placed in all patients. Placement of bilateral cartilage spreader grafts coupled with scoring of the cartilage was used to correct midthird abnormalities of the dorsal cartilage. Spreader grafts were placed and were extended to the caudal edge of the septum to fully correct anterior deviations (Fig. 2).

The remaining septal cartilage was then placed back in the space from which it was excised, and the septum was sutured with incision and quilting sutures. A pocket was created between the medial crura,

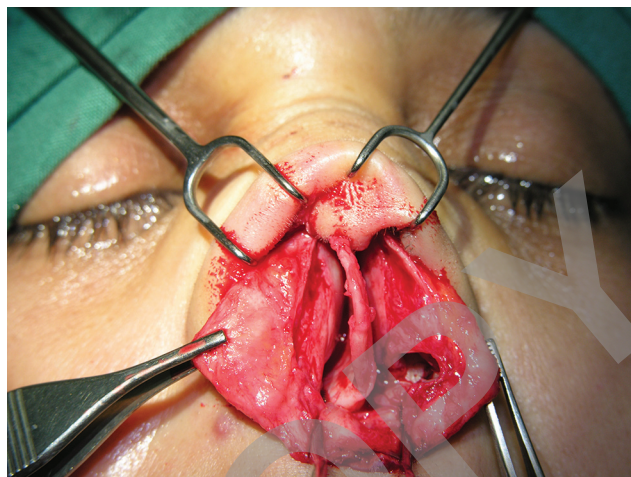


Figure 1. View showing full exposure of a deviated septum via an external approach.

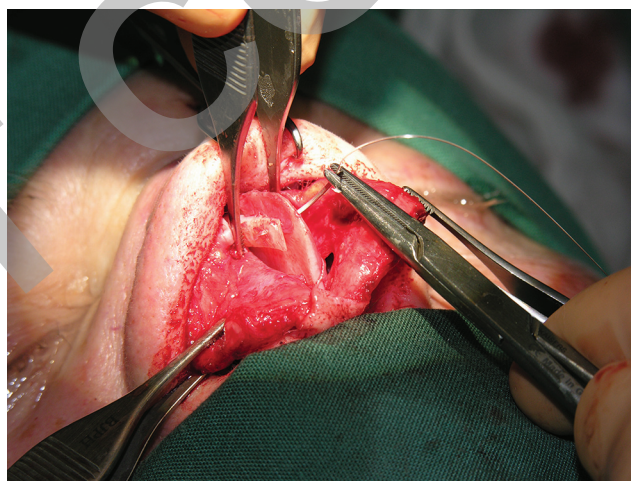


Figure 2. View showing placement of spreader grafts to correct anterior septal deviation.

and a columella strut graft was placed. The previous hemitransfixion incision was connected through to the other side to form a transfixion incision, fully separating the columella strut complex from the septum (Fig. 3). The strut complex was “set” with sutures posteriorly to the septum.

The skin was redraped over the cartilage and sutured. Doyle’s splints were inserted and a thermoplastic nasal cast was applied. The patient has a 5-day course of oral antibiotics, and splints and cast are removed after 7 days.

OUTCOMES ASSESSMENT

Preoperative, a baseline nasal peak inspiratory flow (NPIF) measurement,²³ 22-Item Sino-Nasal Outcome Test (SNOT-22) questionnaire,^{24,25} and Short Form 36v2 (SF-36v2) quality-of-life questionnaire²⁶ were recorded. A 6-point Likert nasal obstruction score was also collected—this was a grading of nasal obstruction according to the problem it causes to the patient, from “no problem” (0) to “problem as bad as it can be” (5). The number resulting was noted and analyzed for the whole group.

Nasal obstruction, SNOT-22, and SF-36 questionnaires were completed by the patient and took ~10 minutes to complete—the questionnaires were in English, which was spoken by all patients. The NPIF was measured in a seated position using a mini-Wright peak

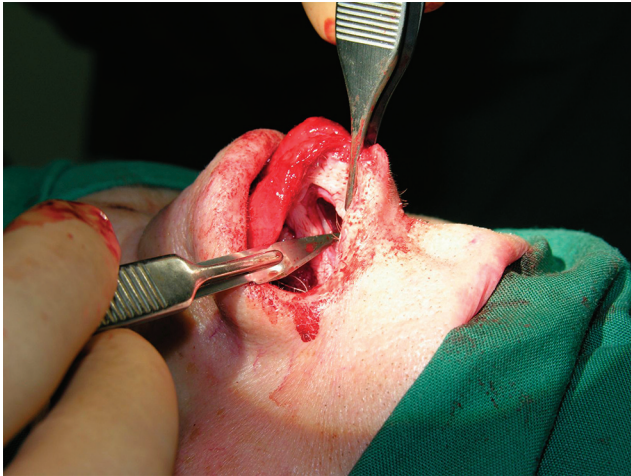


Figure 3. View showing completion of the transfixion incision to permit correction of anterior septal and columella asymmetries.

flowmeter with an anesthetic mask. A good seal was ensured and the patient was instructed to make a maximal inspiratory effort with the mouth closed. The best result of three attempts was used.²⁷

The patients were reviewed clinically at 1, 2, 8, 26, and 52 weeks and then at yearly intervals. The NPIF was performed at every visit from 8 weeks onward—the nasal obstruction score, SNOT-22, and SF-36v2 questionnaire was performed at week 26 onward, along with separate 7-point Likert anchor scores for both functional and cosmesis change. These Likert anchor scores asked the patient to rate their postoperative change in nasal breathing and nasal appearance on a scale of -3 to $+3$, where -3 was a significant deterioration, and $+3$ was a significant improvement—the numerical values were used to calculate results for the group. The last follow-up assessment was used for the purpose of final outcome.

STATISTICAL ASSESSMENT

SPSS Version 17 (SPSS, Inc., Chicago, IL) was used for data analysis. A two-tailed paired sample *t*-test was used to analyze pre- and postsurgical values for nasal obstruction scores, NPIF values, SNOT-22 scores, and SF-36v2 scores. A Wilcoxon signed-rank test was used to analyze nasal obstruction scores. Descriptive data only were used for the anchor scores.

RESULTS

Results are expressed in terms of mean $\pm$ SD. There were 30 patients (mean age, 40 ± 15.9 years) assessed. The age range was 15 to 80 years and 12 were female patients (40%). Twenty-seven percent ($n = 8$) patients were revision after prior septoplasty or rhinoseptoplasty—all were at least 1 year postoriginal procedure. All subjects underwent the external approach for septoplasty with placement of spreader and strut grafts, with no other grafts placed. The mean follow-up was 12.2 ± 9.5 months (range, 0.5–40 months). There were 90% of patients with a minimum follow-up to 8 weeks.

Nasal Peak Inspiratory Flow

Twenty-six patients had NPIF measured preoperatively and at every postoperative visit from 2 months onward—the last postoperative result was used. Mean preoperative and postoperative NPIF was 93.3 ± 34.7 L/min and 143.0 ± 44.3 L/min (Fig. 4). The mean of paired differences in NPIF was 46.6 L/min, with an SD of 42.8 L/min. There was a significant difference between pre- and postoperative measures ($p < 0.001$). This mean difference in NPIF is clinically significant, as it is greater than the calculated minimal clinically

important difference (MCID) for this measure (20 L/min).²⁵ Seventy percent of patients showed an improvement in NPIF that was greater than the MCID. Thirteen patients (50%) had more than one measurement; for these patients, NPIF improved at the first postoperative visit and remained high.

SNOT-22 Questionnaire

Twenty-six patients had SNOT-22 measured preoperatively and at every postoperative visit after 6 months—the last postoperative visit was used. The mean preoperative and postoperative SNOT-22 values were 34.1 ± 17.2 and 12.7 ± 14.9 (Fig. 5). The mean change in SNOT-22 score was 21.3 ± 17.3 . There was a significant difference between pre- and postoperative measures ($p < 0.001$). This difference exceeded the MCID for the SNOT-22 questionnaire (8.9).²⁵ Eighty-eight percent of patients had an improvement in their SNOT-22 score. Eleven patients (42%) had more than one measurement; for these patients, SNOT-22 improved at first postoperative visit and remained low.

Nasal Obstruction

Twenty-six patients completed preoperative and postoperative nasal obstruction questionnaires at every visit after 6 months postoperatively—the last result obtained was used. Preoperative and postoperative values for nasal obstruction were 3.6 ± 1.3 and 0.69 ± 1.2 , which was a significant difference ($p < 0.001$). Eighty-five percent had an improvement of at least 1 point on the Likert scale. MCID for this score is 0.8.²³ Eleven patients (42%) had more than one measurement; for these patients, nasal obstruction score improved at first postoperative visit and remained low.

Anchor Scores

Twenty-six patients completed postoperative anchor scores for nasal function and cosmesis change at every postoperative visit after 6 months; the last result obtained was used. These are presented in Figs. 6 and 7. The postoperative obstruction improvement score was 2.58 ± 0.76 . Ninety-six percent ($n = 29$) had an improvement in function. The postoperative cosmesis improvement score was 1.54 ± 1.53 . Seven patients reported no change in cosmesis (27%) and only one reported deterioration (4%).

SF-36 Questionnaire

Twenty-four patients completed preoperative and postoperative SF-36 questionnaires at every postoperative visit after 6 months—the last result obtained was used. Physical component summary (PCS) and mental component summary (MCS) scores were calculated (Figs. 8 and 9). The mean PCS preoperatively and postoperatively was 53.1 ± 8.6 and 53.2 ± 7.9 , respectively ($p = 0.94$). The mean MCS preoperatively and postoperatively was 48.2 ± 10.3 and 51.4 ± 9.9 , respectively ($p = 0.1$). Mean of the differences showed an improvement for both scores, but neither attained significance. The MCID for the PCS is 2–3 points and for MCS is 3 points.²⁸

DISCUSSION

The literature offers little information about which approach is best for particular septal deviation configurations. However, there is some guidance on when external approaches should be used. Guyuron *et al.* attempted to classify septal deviations²⁹ and commented that an anterior deviation was best treated surgically in their series with the use of unilateral or bilateral spreader grafts and an external approach. Fluid dynamic analysis suggests that these anterior septal deviations are the most important clinically.³⁰ Baumann and Baumann³¹ graded septal deviations and also commented on turbinate enlargement and conchae bullosa. They note that high septal deviations may be most suited to extracorporeal approaches. Other

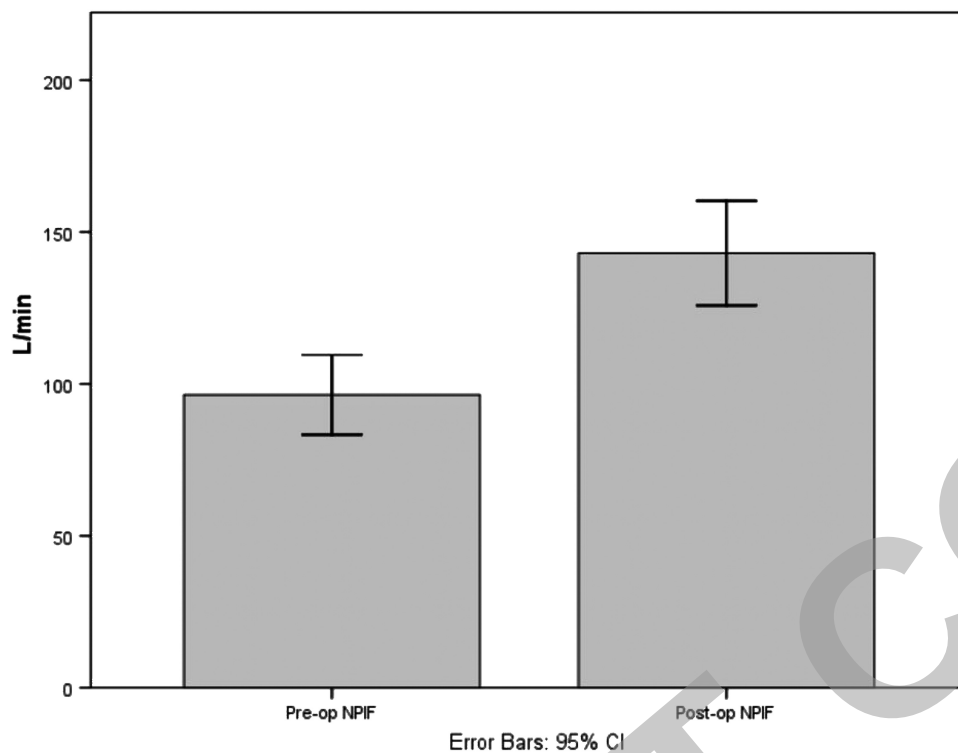


Figure 4. Bar graph showing a significant improvement in mean nasal peak inspiratory flow (NPIF) values postoperatively, with 95% confidence intervals indicated by error bars.

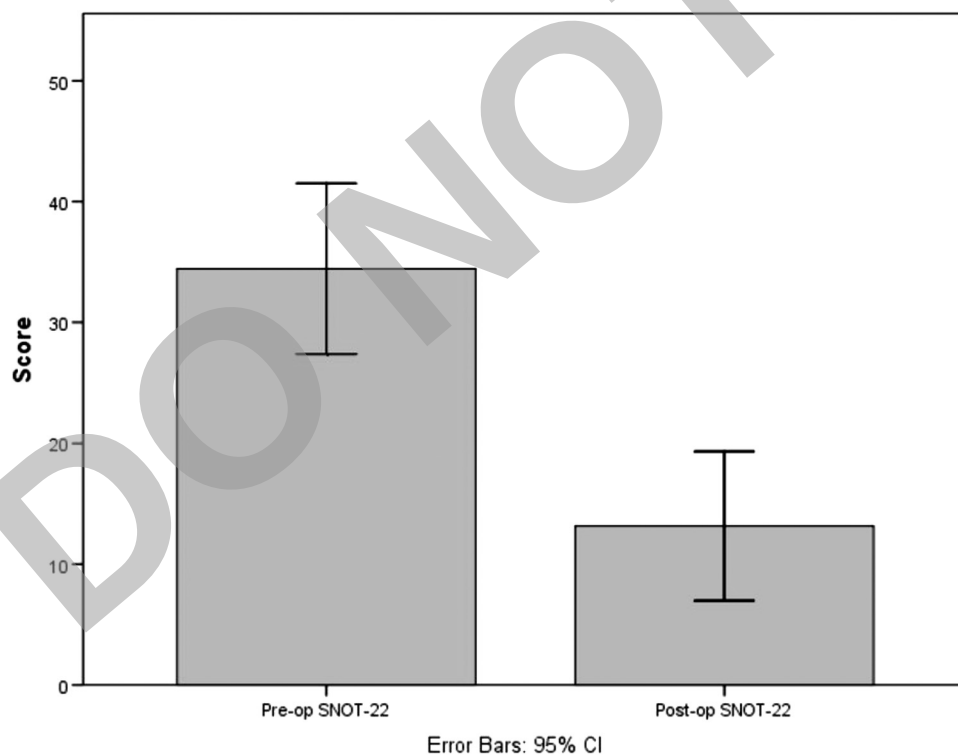


Figure 5. Bar graph showing a significant improvement in mean 22-Item Sino-Nasal Outcome Test (SNOT-22) scores postoperatively, with 95% confidence intervals indicated by error bars.

authors have noted the usefulness of external approaches to treat complex deviations.^{32,33}

Little further guidance as to the best approach for the severely deviated septum is offered in the literature, and no attempt has been made to assess results. An external septoplasty approach that maintains the septal L-strut has been described by Byrd *et al.* Although they have used the approach primarily for cosmetic

correction, they have not published functional outcomes for their cohort.³⁴

We try to maintain the dorsal and caudal L-strut where possible. In the case of severe dorsal deviation, we use a combination of cartilage scoring and spreader graft placement to correct the deformity. The exposure granted by the external approach makes this relatively simple. Our view is that the external approach for septoplasty retains

Figure 6. Bar graph showing postoperative anchor obstruction scores: +3 = significant improvement, +2 = moderate improvement, +1 = mild improvement, 0 = no change, -1 = mild deterioration, -2 = moderate deterioration, and -3 = significant deterioration.

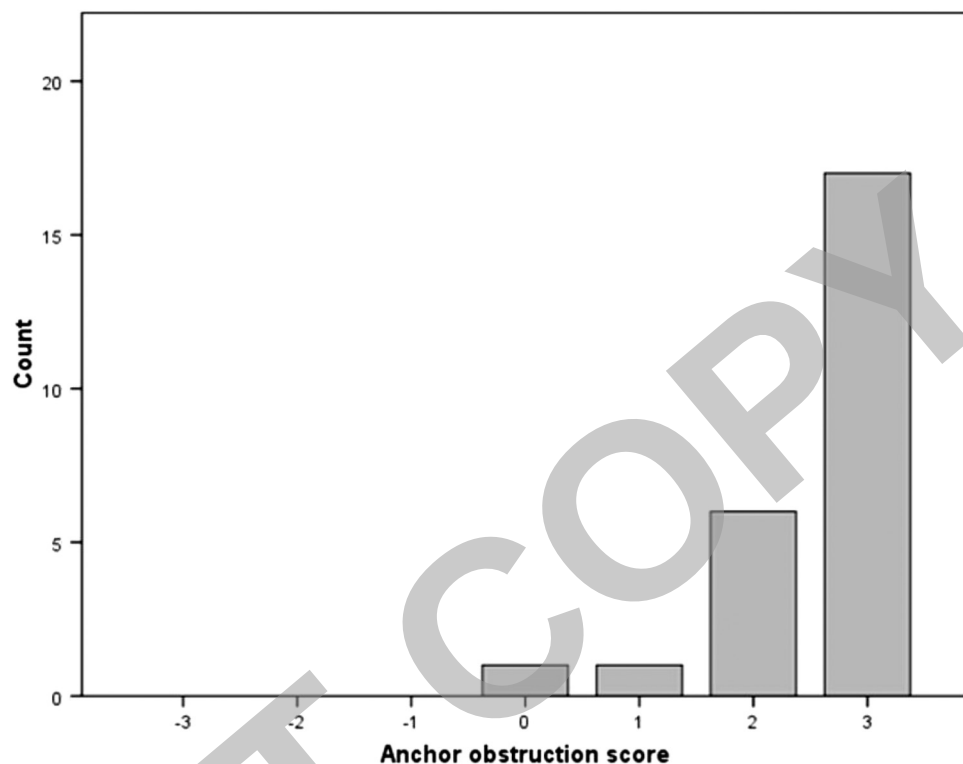
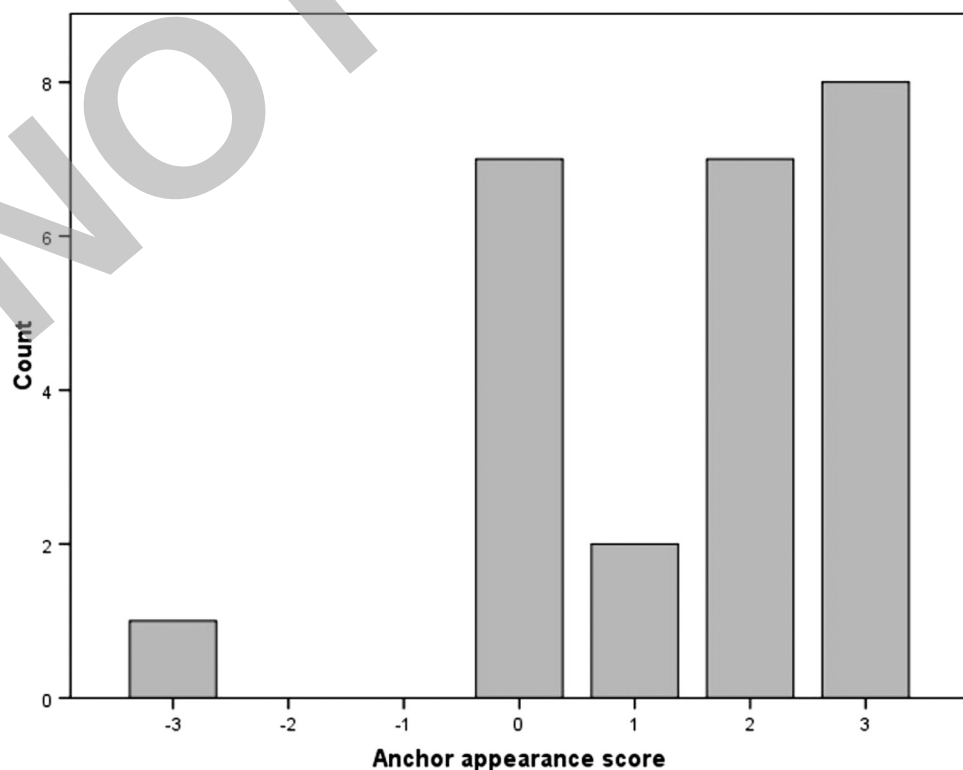


Figure 7. Bar graph showing postoperative anchor appearance scores: +3 = significant improvement, +2 = moderate improvement, +1 = mild improvement, 0 = no change, -1 = mild deterioration, -2 = moderate deterioration, and -3 = significant deterioration.



the integrity of the nasal dorsum by preserving cartilage *in situ*, while permitting flexibility to address deformities of dorsal, posterior, and caudal septum. Detachment of the septum from surrounding submucosa and upper lateral cartilages eliminates extrinsic forces that might otherwise lead to persistence of the septal deviation. The surgical plane for septal dissection is often easier to find in revision patients where a previous endonasal approach has been used.

The external approach does have the limitations of an incision and the subsequent postoperative edema. However, the incision is cosmetically acceptable.³⁵ Tip and dorsal edema are greater than extracorporeal approaches, but without tip-modifying surgery techniques are short lived.

We found clinically significant improvements in NPIF, nasal obstruction, and SNOT-22 scores that were present at the first postoperative visit and were sustained subsequently. We chose assessment

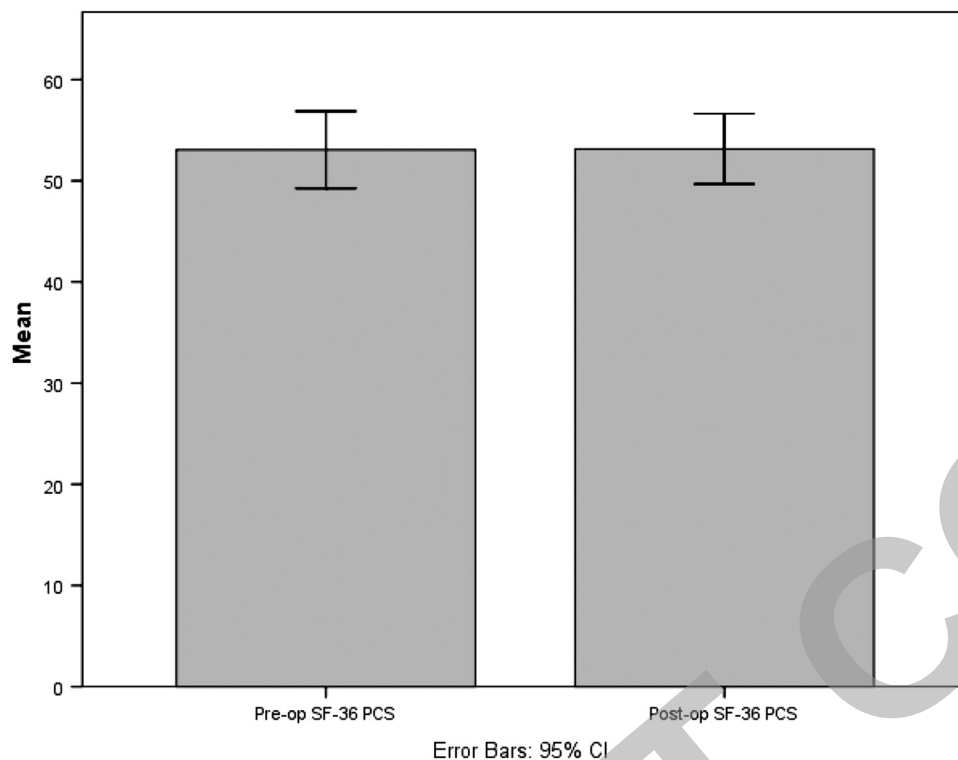


Figure 8. Bar graph showing no significant difference between pre- and postoperative Short Form 36 (SF-36) physical component scores.

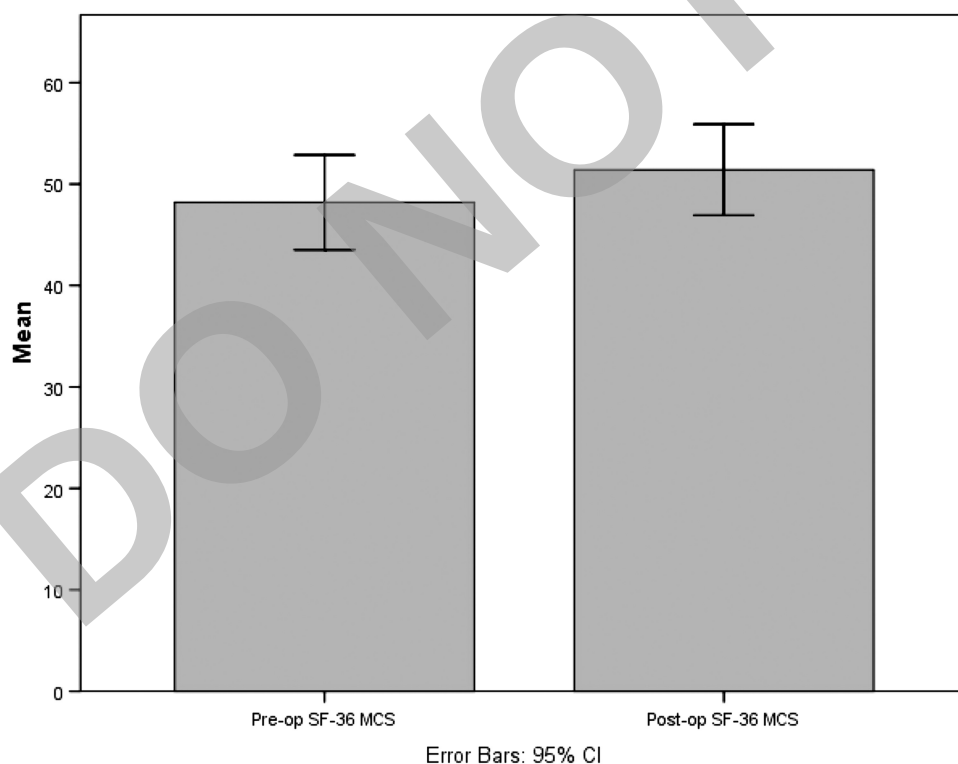


Figure 9. Bar graph showing no significant difference between pre- and postoperative Short Form 36 (SF-36) mental component scores.

measures that were practical and have been used previously in the assessment of rhinological procedures. The SNOT-22 instrument has already been shown to be of use in the assessment of treatment of septal deviation *via* closed procedures.²⁰ We felt that its combination of measures of sinonasal and general health made it most suitable for outcome measurement in our patients. NPIF requires only simple

equipment and is quick to perform, making it practical for routine use in the office/clinic environment. The anchor scores showed that subjectively there was an improvement in both function and appearance, despite the fact that this was not an operation performed primarily for cosmetic reasons. Any cosmetic improvement was probably caused by a relocated columella or caudal septum.

The SF-36 questionnaire has not previously been used to assess outcomes for septoplasty. It has been shown to be significantly improved after endoscopic sinus surgery.³⁶ The nonsignificant improvement in our study may reflect the fact that a general health questionnaire is too blunt a measure to reflect the change, as is consistent with previous endonasal septoplasty and external approach for rhinoplasty studies using other quality-of-life instruments.^{17–19,35}

Turbinate reduction was performed on all septoplasty patients. The external approach for septoplasty corrects nasal septal deformities directly and optimizes the function of the upper lateral cartilages by placement of spreader grafts. We address the third component of the valve by endoscopic reduction of the inferior turbinate regardless of the severity of turbinate hypertrophy. Reduction of the turbinate, in particular the head, allows for further cross-sectional area gain for this patient population.

It should be noted that we do not propose the external approach as an alternative to the endonasal approach. Rather, we feel it is an approach with its own indications, notably a nose that requires full access to, and full correction of internal nasal valve obstruction. The current study has made no attempt to objectively define degrees of septal deviation and nasal valve obstruction such that a particular operative approach can be recommended given a particular set of preoperative criteria—additional work is required to achieve this.

CONCLUSION

The power and flexibility of the external approach for septoplasty makes it an appropriate option for the markedly deviated nasal septum. The external approach should not be seen as more radical surgery but as a way to fully expose septal deviations, often allowing greater cartilage retention and structural integrity, and allowing the surgeon to comprehensively address the internal nasal valve. The approach produces significant and clinically important improvements in NPIF, nasal obstruction scores, anchor scores, and SNOT-22 scores.

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