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The Role of Extracorporeal Septorhinoplasty in Severely Deviated Noses: A Prospective Cross-Sectional Study

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ABSTRACT

Introduction: Patients with gross septal deviations often present with both aesthetic and functional problems, demanding precise preoperative evaluation and accurate surgical planning. Managing such gross septal deviations often present technical surgical challenges. Extracorporeal septorhinoplasty (ECS) is a reliable solution for treating severely deviated noses. This study aims to assess the functional and aesthetic outcomes of ECS in patients with markedly deviated noses.

Methods: This prospective cross-sectional study, conducted at Kathmandu Medical College between February 2023 and April 2025, evaluated patients with severe nasal deviation treated using the ECS technique. Nasal obstruction was assessed pre- and postoperatively using a Visual Analog Scale (VAS), while anthropometric parameters such as nasofrontal, nasolabial, and external deviation angles were analyzed from standardized photographs taken six months after septorhinoplasty.

Results: Among 68 patients (43 males, 25 females; aged 18–48 years) who underwent extracorporeal septoplasty, the mean operative time was 115 minutes. Postoperatively, all patients achieved a near-straight septum with significant improvement in nasal obstruction (VAS 8.41 ± 1.05 pre-op to 1.76 ± 0.99 at 6 months, $p < 0.001$). Marked aesthetic enhancement was also observed, with statistically significant improvements in the nasofrontal, nasolabial, and external deviation angles.

Conclusions: Extracorporeal Septorhinoplasty offers a definitive solution for gross septal deviations, delivering durable structural correction, improved function, and high patient satisfaction. Continuous refinements and modifications in technique have solidified its role as a reliable approach in reconstructive nasal surgery.

Keywords: *Conventional septoplasty*, *Extracorporeal septoplasty*, *Polydioxanone plates*, *Structural stability*

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INTRODUCTION

Severe nasal deviation is due to birth or childhood trauma, with subsequent asymmetric abnormal growth leading to the so-called "congenital" twisted nose.[1] Gross septal deviations especially on dorsal and caudal end of cartilaginous septum which are difficult to treat by classical septoplasty. Extracorporeal septorhinoplasty (ECS) is an important surgical option for such gross deviations, enabling complete correction through septal replacement rather than limited reshaping.

Significant trauma in later life can also lead to severely deviated nose, and more rarely it occurs as a complication following rhinoplasty. Patients complain of both aesthetic and functional problems as a result of this nasal deformity, which requires careful preoperative evaluation and surgical planning. In the recent years, new procedures in septoplasty have been presented, however they are not suitable for massive septal deformities. [2,3,4,5,6]

The objective of this study is to measure the outcomes of extracorporeal septorhinoplasty in severely deviated noses.

METHODS

This prospective cross-sectional study was performed in the department of ENT-HNS at Kathmandu Medical College from February 2023-April 2025. Approval for ethical clearance was taken from ethical committee for research and development council of Kathmandu Medical College (Ref. 12082024/16). Written consent was taken from all the patients undergoing extracorporeal septorhinoplasty.

All the patients with severely deviated nose having both aesthetic and functional problems who underwent septorhinoplasty using the ECS technique during study period were included in the study.

Patients undergoing revision rhinoplasty, patients having nasal polyposis, patients with Body Dysmorphic Disorder (BDD) and those patients who were unable to do follow-up were excluded from the study.

Convenience sampling methods was used where all 68 patients with severely deviated noses with age ranging from 18-48 years seeking for septorhinoplasty using the ECS technique were included in the study.

Data were entered in Microsoft Excel and analyzed using SPSS vs 20. Descriptive statistics were described by mean, median, standard deviation (SD) and interquartile range (IQR). Inferential statistics were performed using paired t-tests. A significance level of $\alpha = 0.05$ was considered for all statistical analyses.

Surgical technique

All the patients underwent extracorporeal septorhinoplasty (ECS) under general anaesthesia with an open approach. Preoperatively 3D CT scan (Computed Tomography) with multiple images from different angles to create detailed, interactive three-dimensional models of nasal framework, for diagnosis and treatment planning was done. ECS was planned preoperatively when the patient had severe septal deviation seeking for aesthetic and functional improvement. The osseocartilaginous skeleton was exposed with an open approach using inverted V incision, and the septal mucoperichondrial flaps were elevated. The entire septal cartilage was removed leaving behind about 10 mm of the dorsal stump *in situ* to avoid injury to the keystone. Twisted septal cartilage was then cut along the maximum deflection angle, and the neo-L strut was rebuilt with an optimal tip projection and pleasant dorsal profile (Figure 1). The posteroinferior portion of the septal cartilage was used for caudal strut as this portion of cartilage is straighter and stronger. Different types of osteotomies were done prior to reinsertion of the septal cartilage. The neo-L strut was then reimplanted and fixed to the dorsal stump and to the soft tissues around the anterior nasal spine (ANS) in the middle using 5-0 polydioxanone (PDS) sutures.

Additional spreader grafts were shaped in rectangular bars from harvested septal cartilage, approximately 2–3 cm long, 3–5 mm wide, and 1.5 mm thick and were inserted either unilateral or bilateral to stabilize the dorsal support and camouflage the defect in all the cases. Dorsal part of the septal cartilage was reconnected to the upper lateral cartilage with 5-0 PDS. Trans-septal mattress (quilting) sutures using 4-0 vicryl was placed through the septal mucosa to avoid septal hematoma. Tip definition was secured by transdomal and interdomal suturing using 5-0 PDS. Additional tip onlay graft was added if required to improve tip definition. Finally, the skin incision

was closed with 6-0 nylon sutures and external nasal splints were applied for 1 week. All the patients were discharged on the second postoperative days. Swelling and bruises around the eyes were seen for 3-5 days. Patients also complained of nasal congestion for 4-5 days. Suture and external splint removal was do after 7-10 days of surgery.

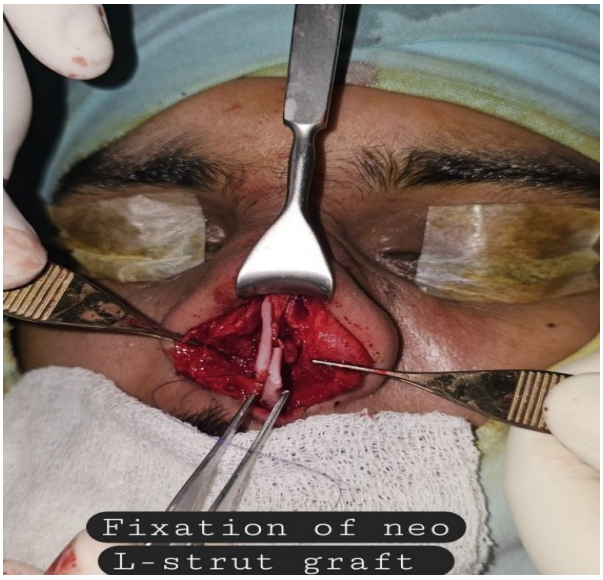
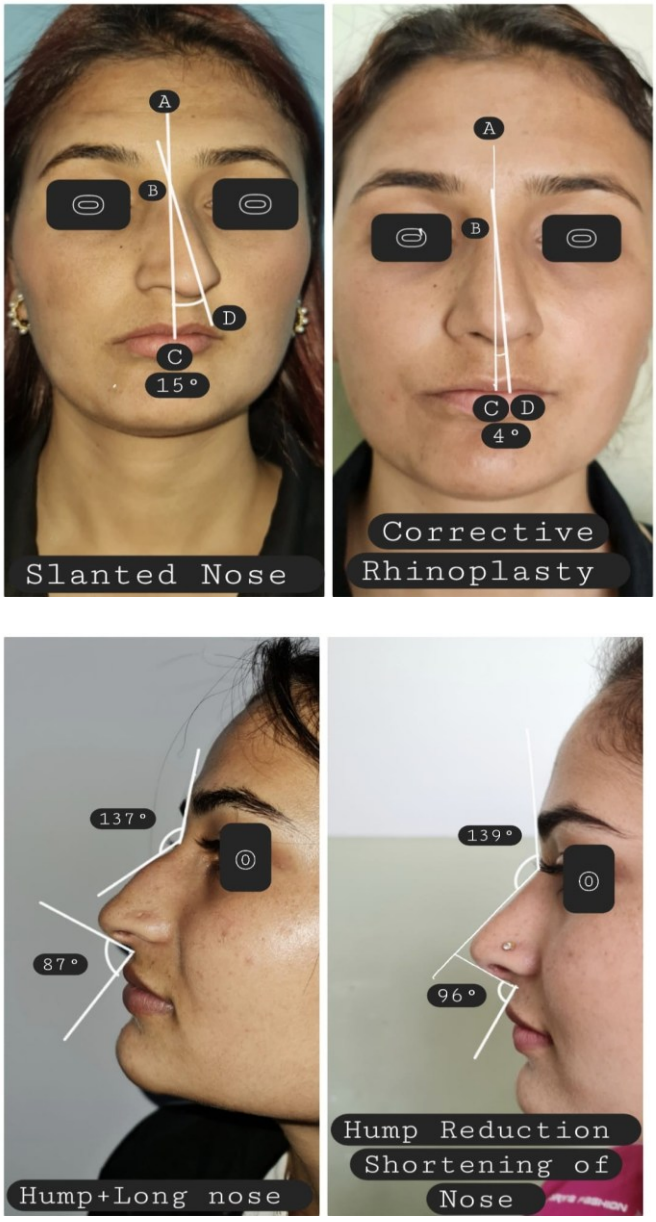


Figure 1: Showing Neo L-strut reshaping and its fixation on dorsal stump and ANS.

Nasal obstruction symptoms were evaluated preoperatively and postoperatively using a visual analog scale (VAS) graded from 0 means (no discomfort) to 10 (maximal symptoms). Anthropometric changes such as nasofrontal angle (NFA), nasolabial angle (NLA) and external deviation angle were assessed preoperatively and postoperatively using facial photographs taken 6 months postoperatively (Figure 2). The preoperative and postoperative degree of nasal obstruction and anthropometric measurements of the nose were analysed by using paired *t*-tests (SPSS ver. 20).

Figure 2: Showing anthropometric measurements of External deviation, Nasofrontal and Nasolabial angles.



RESULTS

This study included 68 patients (43 males and 25 females) with age ranging from 18-48 years who underwent rhinoplasty using the ECS technique. The mean operative time from incision to external splinting was 115 minutes. The concomitant procedures are listed in (Table 1). The neo-L strut graft was used for structural support, along with bilateral spreader graft in 28 cases and unilateral in 40 cases. Dorsal onlay septal graft was used in 27 cases. Different types of osteotomies (paramedian, lateral, transverse, intermediate) was done in all the cases. Cap graft was used in 38 cases for making the tip more projected and defined.

Nasal endoscopy revealed almost straight septum in all patients postoperatively, and the VAS scores for nasal obstruction were (8.41±1.05) preoperatively and (2.11±1.09), (1.76±0.99) respectively in 3, 6 months postoperative period (P<0.001). The mean NFA was 129.97(4.92)^0 preoperatively and 132.82(4.94)^0 postoperatively (P<0.001). The mean preoperative NLA was 88.98(3.27)^0 and 92.63(3.90)^0 postoperatively (P<0.001). Significant changes in postoperative values of NFA and NLA was seen in our study. The postoperative change in the external deviation angle was also statistically significant 11.76(3.67)^0 preoperatively to 2.47(1.30)^0 postoperatively, (P<0.001) (Table 2).

No major postoperative complications such as infection, saddling and change in shape of nose to its original one were seen in 6 months follow-up period. Small perforation (<1cm) was seen in 3 patients. In addition, there were no revision cases.

Table 1: Surgical Procedures performed. (n=68)

Surgical Procedure	**No. of Patients**			
Spreader graft	Unilateral		Bilateral	
	40		28	
Dorsal onlay graft	27			
Osteotomies	Paramedian	Lateral	Transverse	Intermediate
	68	68	50	33
Cap graft	38			

Table 2: Preoperative and postoperative anthropometric measurements. (n=68)

Anthropometric measurements	**Preoperative Mean (Std)**	**Postoperative Mean (Std)**	**P value**
Nasofrontal angle (NFA)	129.97(4.92)	132.82(4.94)	<0.001
Nasolabial angle (NLA)	88.98(3.27)	92.63(3.90)	<0.001
External Deviation angle	11.76(3.67)	2.47(1.30)	<0.001

DISCUSSION

In septorhinoplasty (SRP), septoplasty serves three crucial purposes such as straightening of dorsal and caudal septum, reestablishing robust structural support, and providing essential graft material for sculpting the nasal framework. [7,8] A severely deviated septum retains an inherent elastic "memory," making definitive correction a considerable surgical challenge. Conventional septoplasty techniques, such as scoring, often fail to overcome the cartilage's natural tendency to recoil to its original form. This phenomenon underscores the inherent limitations of traditional septoplasty in achieving stable, long-term correction of severe septal deformities. Extracorporeal septorhinoplasty (ECS) has emerged as a highly effective approach for managing severe nasal deviations, providing superior functional improvement and comparable aesthetic refinement to that achieved with traditional septoplasty in rhinoplasty. [9]

To overcome this issue, extracorporeal septorhinoplasty (ECS) was introduced by Gubisch in 1995 as a reliable surgical option for correcting markedly deviated septum. In this technique, instead of weakening bent cartilage, ECS involves complete removal of the septum, straightening it externally, and reimplanting it as a new structural framework.[10] The memory of cartilaginous septum is eliminated and more durable correction is

achieved. A large series of Gubisch demonstrated that ECS consistently improves both nasal function and aesthetic outcomes, particularly in patients with complex C- and S-shaped deformities.[11] Lee et al. [12] found that patients who underwent ECS had significantly fewer residual symptoms of nasal obstruction compared to those treated with conventional septoplasty. Although, ECS can be used to accomplish all three pivotal goals of septoplasty, however there is possibility of septal perforation due to submucosal bilateral tunneling in ECS.[13] This is in accordance to our study we found septal perforation in three patients.

Functional outcomes following ECS are well established in the literature. A systematic review of 17 studies involving 1,418 patients reported significant improvements in nasal airflow, 70% increase in airflow on rhinomanometry, with mean NOSE score reduction from 75 preoperatively to 19.5 postoperatively.[14] In three years follow-up period, Fahmy et al. observed a median reduction in NOSE score from14.5 to 3.0, confirming the durability of symptom improvement.[15]Dramatic improvement in both nasal obstruction and cosmesis after anterior septal reconstruction in patients with severe caudal deviation was documented by Toriumi and Becker.[16] Similarly, in our study we found significant improvement in nasal obstruction , the VAS score was (8.41±1.05) preoperatively and (2.11±1.09), (1.76±0.99) respectively in 3, 6 months postoperative period (P<0.001).

The concept of facial aesthetic triangles given by Powell and Humphreys describes the ideal range for Nasofrontal angle as 115–130°.[17] Radix augmentation can improve the angry look of the patient or ameliorate the appearance of a wide intercanthal distance. A low radix can produce a flattened, wide and washed-out face; appropriate projection of this area by augmenting the profile and framing the eyes makes a more beautiful appearance.[18] Our study, showed increment of nasofrontal angle (NFA) from 129.97(4.92)^0 preoperatively and 132.82(4.94)^0 postoperatively by augmenting the radix area with crushed septal cartilage graft, thus maintaining the ideal NFA. Study done by Sinno et al. [19] found that the ideal and most aesthetic nasolabial angle (NLA) ranged from 100.9 to 108.9 degrees in the female nose and 90.7 to 103.3 degrees in the male nose. Likewise, in

our study, the mean average preoperative NLA was $88.98(3.27)^0$ which increased to $92.63(3.90)^0$ postoperatively, thus maintaining the ideal NLA. A study done by Jo et al. [20] found that in the frontal view, external deviation angle differences from preoperatively 5.79 ± 3.36 degrees to postoperatively 1.07 ± 1.24 degrees ($P < 0.05$). Similarly, we found statistically significant differences in external deviation angle from $11.76(3.67)^0$ preoperatively to $2.47(1.30)^0$ postoperatively.

Recent innovations continue to enhance the outcome of ECS. Study done by Nivas et al. compared ECS using absorbable polydioxanone (PDO) plates with conventional septoplasty in 100 patients and reported superior nasal patency, lower complication rates, and higher patient satisfaction in the ECS group.[21] Such adjunct helps in improving fixation stability and further reduce relapse or septal perforation risks. Taken together, these findings establish ECS as the most reliable technique for correcting severely deviated septum. It addresses the problem of cartilaginous memory, providing more durable structural support, and consistently yields superior functional and aesthetic outcomes compared with traditional septoplasty. Though technically demanding, advancement in fixation techniques and use of adjunctive materials have improved its safety and reproducibility, reinforcing ECS as a foundation in treating gross septal deformities.

CONCLUSIONS

In conclusion, the ECS technique in septorhinoplasty achieved effective and reliable results in terms of esthetic and functional outcomes thus confirms the validity of this procedure in treating the patient with severe septal deviation rather than conventional septoplasty.

CONFLICT OF INTEREST

None

SOURCES OF FUNDING

None

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