The Role of Extracorporeal Septoplasty in Severely Deviated Nasal Septum

Brajendra Baser¹ · D. K. Patel¹ · A. Mishra¹

Received: 19 August 2017 / Accepted: 15 November 2017 / Published online: 28 November 2017
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Abstract Extracorporeal septoplasty is a valuable tool in the armamentarium of the nasal surgeon for the reconstruction of the severely deviated septum. Extracorporeal septoplasty offers the surgeon the opportunity to correct the septum under direct visualization, shape the nasal vault and address the nasal dorsum with the ultimate goal of providing both form and function for the patient with a complex septal deviation. The study was conducted with the aim to measure the outcomes of extracorporeal septoplasty in severely deviated nasal septum, relief of symptoms (nasal obstruction), surgical complications, if any, revision, if any with objective to evaluate the functional outcome and aesthetic aspects of extracorporeal septoplasty. This was a prospective observational study of 35 patients with severe deviated nasal septum with or without external deformity of nose attending the ENT OPD between Jan 2015 and Jan 2016 at Sri Aurobindo Medical College and Post Graduate Institute, Indore (M.P.). In this study, 17 patients (48.57%) shows excellent improvement on VAS scale, out of which 13 patients shows excellent improvement and 4 patients shows good improvement on photographic assessment. 11 patients (31.43%) show good improvement on VAS as well as photographic assessment and 7 patients (20%) show moderate improvement on VAS scale and fair improvement on photographic assessment. Extracorporeal septal reconstruction is an important surgical option for the correction of the markedly deviated nasal septum. Fixation of the straightened and replanted

septum at the nasal spine and dorsal septum border with the upper lateral cartilages is essential. Spreader grafts for stabilization of the internal nasal valve and dorsal onlay grafts to prevent dorsal irregularity are strongly encouraged.

Keywords Rhinoplasty · Septo-rhinoplasty · Crooked nose correction · Extracorporeal septoplasty

Introduction

The nasal septum is an important physiological and supportive structure of nose. Deviated nasal septum has been implicated in various rhinological complaints, which includes nasal obstruction, epistaxis, sinusitis and obstructive sleep apnea. At birth, the nasal septum is usually straight and remains straight in the childhood. As age progresses, there is a tendency for the septum to bend on one side or the other.

Trauma during birth, including forceps placement or passage through a narrow pelvic canal, can cause injury that may lead to early septal deviation or to a deviation that is not evident until the more active growth phase of puberty. Septoplasty is one of the most common procedures performed by otolaryngologists. The goal of septoplasty is to provide a straight septum to alleviate anatomic nasal obstruction.

To control the tendency of the cartilaginous septum to retain its original bent shape, a number of techniques can be employed, including cartilage resection, cartilage scoring, shifting of the septum, modifications of the bony septum or maxillary crest, or a combination of the above.

Most septoplasties are done internally via hemi-transfixion incision for access to the cartilaginous and bony

✉ Brajendra Baser
baserbv@gmail.com

¹ Department of Otorhinolaryngology, Head and Neck Surgery, Sri Aurobindo Medical College and Post Graduate Institute, NH3 Manorama Ganj, Indore, MP 452 001, India

septum, with or without endoscopic assistance. “As the septum goes, so goes the nose” said by Irwing Goldman and therefore septoplasty has been a common adjunct in rhinoplasty.

It also serves as a source of grafting material in rhinoplasty surgeries. Surgical treatment of the nasal septum in the form of submucous resection of the deviated bony and cartilaginous septum to relieve nasal airway obstruction was first described by Ingals in 1882 and later modified in 1902 by Freer [1, 2] and in 1904 by Killian [1, 2].

Attention to increased cartilage preservation and selectively raising submucoperichondrial flaps was the focus of studies by Metzenbaum [3], Cottle [4], Goldman [5] and Converse with their descriptions of septoplasty. Since these descriptions of septoplasty in the middle of the 20th century, multiple variations have been proposed.

Closed, open, and endoscopic approaches are all now accepted methods to access the nasal septum. Cross-hatching, vertical and horizontal strip excision, suture techniques utilizing the premaxilla, and variations on the swinging door technique are just some of the many modifications described to address the deviated nasal septum.

We define limited septal deviation as septal deviation in the limited part of the septum, usually in Cottle’s areas I, II and/or III. A septal spur which impinges on the lateral wall at the level of the ostio-meatal complex and sphenoethmoidal recess may cause nasal obstruction, mucociliary clearance problems and chronic sinusitis, and may also impede the introduction of instruments during functional endoscopic sinus surgery (especially in cases with a deviated nasal septum or spur of Cottle’s area III (i.e. the turbinate area).

The deviations causing obstruction in the nasal valve areas are described as severe septal deviations. In 1952, King [1] and Ashley [2] were the first to propose the concept of extracorporeal septoplasty to address the most difficult septal deformities. This technique found followers starting only in the 1980s and 1990s. Reporting a large series of extracorporeal septoplasties, Gubisch [3–7] suggested this method for the reconstruction of the “difficult septum.” Gubisch suggested complete removal of the septum via a combination of hemitransfixion and intercartilaginous incisions. He would then reshape a straight septum from pieces of the deformed one using fine sutures or glue. The new septum is reinserted and fixed with two sutures to the anterior nasal spine and medial crura of the lower lateral cartilages.

Extracorporeal septoplasty is a valuable tool in the armamentarium of the nasal surgeon for the reconstruction of the severely deviated septum. Extracorporeal septoplasty offers the surgeon the opportunity to correct the septum under direct visualization, shape the nasal vault and address the nasal dorsum with the ultimate goal of providing both

form and function for the patient with a complex septal deviation [6–11].

Aims and Objectives

Aim

To measure the outcomes of extracorporeal septoplasty in severely deviated nasal septum, relief of symptoms (nasal obstruction), surgical complications, if any and revision, if any.

Objectives

- Evaluate the functional outcome of extracorporeal septoplasty.
- Evaluate the aesthetic aspects of extracorporeal septoplasty.

Materials and methods

Place of Study

OPD of Department of Otorhinolaryngology, Head and Neck Surgery, Sri Aurobindo Medical College and Post Graduate Institute, Indore (M.P.).

Study Design

Prospective, observational study.

Sample Size

Thirty-five patients with severe deviated nasal septum with or without external deformity of nose attending the OPD of Department of Otorhinolaryngology, Head and Neck Surgery were included in the study.

Study Period

January 2015–January 2016.

Inclusion Criteria

1. Patients attending the ENT OPD between Jan 2015 and Jan 2016 Sri Aurobindo Institute of Medical Science Indore.
2. Age group above 18 year.
3. Symptomatic severe deviated nasal septum.
4. External nasal deformity ($\pm$).

5. Severe deviated nasal septum in operated cases of cleft lip and palate.
6. Subjects who gave consent for the study participation.

Exclusion Criteria

1. Subjects with simple deviation of nasal septum.
2. Subjects with Active nasal disease.
3. Subjects with Allergic rhinitis.
4. Subjects with Nasal polyp.
5. Subjects with Chronic rhinosinusitis.
6. Subjects with Atrophic rhinitis.

Consent

Patient's consent was obtained prior to undertaking the surgical procedure.

Surgical Procedure

Patient kept supine and general anaesthesia is achieved.

Painting and drapping is done. Nose is prepared and local infiltration is done with lignocaine 2% with adrenaline (1:100,000).

Marginal Incision Start at the dome, give gentle traction to the alar cartilage with third finger so that the caudal edge of the alar cartilage herniates in the nostril. Follow the caudal edge of the lateral crus posteriorly as it moves up, extend the incision medially up to the mid columellar area (Figs. 1, 2, 3, 4, 5, 6).

Trans-columellar Incision Retract the nasal tip with an alar retractor with one arc in each nostril and columella in

Fig. 2 Pre operative side view

Fig. 3 Pre operative three quarter view

Fig. 1 Pre operative front view

centre. Put a finger at the base of columella, and the columella stretches. Make stair step or inverted v mid columellar incision through the skin and subcutaneous tissue. Then columellar incision is extended and join the marginal incision.

Then the skin flap elevation is done with the help of curve pointed scissor. Plane of dissection is maintained on the cartilage superficial to the periconderium and subperiosteal on the bone.

The nasal septum is exposed by dividing the ligamentous structure joining the domes of lower lateral cartilages.

Now elevate the mucoperichondrium below the dorsum septum and medial part of upper lateral cartilage to create the submucoperichondrial tunnels, release the upper lateral cartilage from the septum.

Fig. 4 Pre operative basal view

Fig. 5 Post operative front view

The caudal border of the quadrilateral cartilage is exposed by continuing dissection up to nasal spine area.

Now the septum is freed from caudal and dorsal borders and removed.

Now the septum is reconstructed into a L shaped frame and than kept back in the nose and then fixed at two points namely nasal bone and anterior nasal spine.

Fig. 6 Post operative side view

Sometimes spreader grafts are prepared from the remaining nasal septum and placed unilaterally or bilaterally at or above plane of dorsal septum for aesthetic indication and below it for functional indication and this graft is fixed with 5-0 PDS horizontal mattress suture to the septum.

Whenever required osteotomies are done (medial, lateral or intermediate) before fixing L-shaped frame.

Now upper lateral cartilages are attached to the graft-septum complex.

Mucoperichondrial flaps are repositioned and marginal and columellar incisions are sutured.

Merocell pack kept in both nasal cavities and nasal cast is applied.

Post operative—after 24–48 h merocell pack are removed.

Nasal cast is changed after 6–7 days and digital manipulation if required will done accordingly.

Suture removal done on 7th post-op day.

Postoperative regular follow up photography was conducted for 1, 3 and 6 month. Preoperative and postoperative photographs were studied to evaluate surgical outcome.

Statistical Technique

The association of presence and absence of symptoms between preoperative and postoperative assessment was done using Pearson Chi square test. A P value < 0.05 was considered statistically significant. The final results presented in the form of table.

Assessment of Outcomes and Complications

Assessment of deviation improvement was based on:

Comparisons between the preoperative photograph and the postoperative photograph taken at the final follow-up. According to this, Outcomes were classified as:

- 0 = no change.
- 1 = fair.
- 2 = good.
- 3 = excellent.

Subjective analysis for aesthetic score using Visual Analogue Scale (VAS) for their symptom. Aesthetic scores are plotted from 0 to 4 for subjective improvement; where:

- 0 = no improvement.
- 1 = mild improvement.
- 2 = moderate improvement.
- 3 = good improvement.
- 4 = excellent improvement.

Postoperative histories were reviewed to assess complications, including postoperative infection, postoperative deformity (e.g., saddling or notching), incomplete correction, recurrence of deviation and loss of tip support or projection.

All the results were tabulated and statistically analyzed.

Result

This study includes 35 patients with functional or aesthetic nasal complaints, age range from 18 to 41 years. Among 35 patients there were 5 females (14.28%) and 30 males (85.72%). There was a male preponderance.

Age ranged from 18 to 41 years with maximum number of patients i.e. 20 (57.14%) between 18 and 23 while 24–29 and 30–35 years age group had similar number of cases i.e. 6 (17.14%). Only 3 patients (8.57%) had age between 36 and 41 years.

According to types of DNS, there were maximum 17 (48.57%) patients with C shaped cephalocaudal deviation while S shaped cephalocaudal and C shaped cephalocaudal deviation were present in 6 (17.14%) cases each, S shaped anteroposterior deviation present only in 4 cases (11.42%)

while Sharp septal deviation with angulation type DNS in 2 cases only (5.7%).

Nasal obstruction was the most common complaint seen in 17 (48.57%) patients. 10 (28.57%) patients complained of cosmetic disfigurement, 2 (5.7%) patients complained of headache and PND, while 1 patient each (2.8%) complained of epistaxis, AND, snoring and hyposmia/anosmia.

Post-operative assessment (Table 1)

Post-operative analysis was done on two parameters. First is visual analogue scale (VAS) and other one is photograph.

Improvement was measured using Visual analogue scale. Cosmetic results showed that 17 (48.57%) patients showed excellent improvement, 11 (31.43%) patients showed good improvement and 7 (20%) patients showed moderate improved.

On examination, 32 (91.43%) patients showed straight septum and only 3 (8.5%) patients showed no improvement of nasal septum misalignment.

In addition to the above, 3 (8.5%) patients developed nasal synechia and one patient (3.3%) patient developed septal perforation.

On comparison between the preoperative and postoperative photographs, 15 (42.86%) patients showed good improvement, 11 (31.43%) showed with excellent improvement and 7 (20%) patients showed fair improvement.

On comparison between the results obtained from the photographic assessment and that from patient satisfaction we found that it is statistically highly significant (P value = 0.0001), indicating that patient satisfaction is greater than expected from the photographic assessment.

Except for 2 (11.76%), all the other patients were relieved from nasal obstruction and END, 3 (30%) patients were relieved by epistaxis, AND and PND.

Table 1 Preoperative and postoperative comparison of symptoms

Main complaints	Pre-operative (present)		Post-operative (present)		<i>P</i> value
	No.	%	No.	%	
Nasal obstruction	17	48.57	2	11.76	0.0001*
END (cosmetic disfigurement)	10	28.57	3	30	0.031*
Epistaxis	1	2.8	0	0	0.314, NS
PND	2	5.7	0	0	0.151, NS
AND	1	2.8	0	0	0.314, NS
Headache	2	5.7	1	50	0.555, NS
Snoring	1	2.8	1	100	1.00, NS
Hyposmia/anosmia	1	2.8	0	0	0.314, NS

Postoperative correction of the external nose deviation angle was statistically significant (P value = 0.031).

Discussion

Numerous surgical techniques have been proposed for deviated nose correction. In general, a deviated bony pyramid can be corrected using a number of osteotomy methods. Deviation of the dorsal septum can be corrected using several grafting techniques such as spreader, batten, or septal bone grafts [6]. In severe deviations of the septal cartilage involving both dorsal and caudal portions of the L-strut, the extracorporeal septoplasty technique may be effective.

Extracorporeal septoplasty is a newer, rapidly evolving technique. It was first discussed in the 1950s by King [12] and Ashley [13]. Gubish [14–18] was the first to publish series of more than 1000 patients during a 15-year clinical experience. Two follow up studies are performed in 1999 and 2005. A few other authors have reported their cases but there are still relatively few data about the complications of this surgical technique, especially with further application of some of the technique modifications described by Most [8].

Matt and Mobley [19] in their study found that of the 26 patients, 20 patients presented for revision surgery from outside facilities. Ten revision cases required ear cartilage graft, and 5 required rib graft. The overall complication rate was 9% (4 patients), with 4% (2 patients) each for minor and major complications.

Jang and Kwon [20] found that postoperative correction of the external nose deviation angle was statistically significant. 24 (89%) patients were satisfied with the cosmetic outcome, and all 23 patients with moderate to severe pre-operative nasal obstruction were satisfied with the post-operative improved nasal breathing.

King and Ashley [12] showed a residual dorsum irregularity as the most common postoperative complication (8% of cases).

Results of our study are in corroboration with the above stated studies.

Conclusion

Extracorporeal septal reconstruction is an important surgical option for the correction of the markedly deviated nasal septum. Fixation of the straightened and replanted septum at the nasal spine and dorsal septum border with the upper lateral cartilages is essential. Spreader grafts for stabilization of the internal nasal valve and dorsal onlay

grafts to prevent dorsal irregularity are strongly encouraged.

Acknowledgements We heartfully thank all the teachers of the department who helped in collection of data. We also thank colleagues and juniors and seniors for their help.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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