



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 8.4  
IJAR 2022; 8(7): 523-526  
[www.allresearchjournal.com](http://www.allresearchjournal.com)  
Received: 19-04-2022  
Accepted: 21-06-2022

**Rahul Sharma**  
Senior Resident, Department  
of Plastic Surgery, SMS  
Hospital, Jaipur, Rajasthan,  
India

**Sunil Srivastav**  
Senior Professor, Department  
of Plastic Surgery, SMS  
Hospital, Jaipur, Rajasthan,  
India

**Pradeep Goil**  
Senior Professor, Department  
of Plastic Surgery, SMS  
Hospital, Jaipur, Rajasthan,  
India

**Pranay Ahari**  
Senior Resident, Department  
of Plastic Surgery, SMS  
Hospital, Jaipur, Rajasthan,  
India

**Milan Pumbhadiya**  
Senior Resident, Department  
of Plastic Surgery, SMS  
Hospital, Jaipur, Rajasthan,  
India

**Corresponding Author:**  
**Rahul Sharma**  
Senior Resident, Department  
of Plastic Surgery, SMS  
Hospital, Jaipur, Rajasthan,  
India

## Soft tissue reconstruction in traumatic nasal defects by forehead flap: A tertiary care centre experience

**Rahul Sharma, Sunil Srivastav, Pradeep Goil, Pranay Ahari and Milan Pumbhadiya**

DOI: <https://doi.org/10.22271/allresearch.2022.v8.i7e.10011>

### Abstract

Forehead flap is the gold standard for nasal soft tissue reconstruction. The nose is a complex three-dimensional structure and along with the eyes, represents a major aesthetic focus of the face. The aim of this study is to review the use of forehead flap in nasal reconstruction and prospectively evaluate the outcome of treating nasal defects as an easy, effective and economical treatment in the Indian population.

**Material and Methods:** This prospective study was conducted from March 2020 to May 2022. Patients with subtotal nasal defect who were above 18 years of age, and patients who were willing to give informed consent for treatment. Each participant underwent surgical debridement under loupe magnification combined with forehead flap cover after a full clinical assessment.

**Results:** Twenty three participants were included in this study with an age range of 18–62 years with mean age (36.1±8.71). Out of these 6(26.1%) were female and 17(73.9%) were males. The defect were located over the dorsum and lateral nasal wall in 3 participants (13.1%), tip in 2(8.7%) patients, ala in 1(4.3%) patients and involved multiple subunit in 17(73.9%).

**Conclusion:** The forehead flap represents the ideal reconstructive choice in patients with nasal defects. It has good textural, thickness and color match when compared with the recipient site tissues, with minor complications.

**Keywords:** Nasal defect, Forehead flap, Trauma, Nasal reconstruction

### Introduction

The nose is a complex three-dimensional structure and along with the eyes, represents a major aesthetic focus of the face. Mutilation of the nose has always meant a very severe impairment, not only of the body, but of the individual's personality. The nose was considered, already in very ancient times, the principal element of one's physiognomy. The patients who, submitted to this type of mutilation, felt deprived of part of their very personality and attempted in every possible way, to disguise the lesion with reconstructive surgery or application of prosthesis. Although discussion of nasal reconstruction often focuses on the visible, aesthetic result, the functional outcome is also paramount to a successful operation.

Reconstruction of nose depend on severity of injury and structures that are lost. Nasal reconstruction can be conceptualized into three main components: lining, support, and coverage. The three, lining failure is most likely to lead to a total reconstructive failure. Reconstruction of near-total and total nasal defects is extremely challenging because of the difficulty in recreating the esthetic and functional qualities of this complex facial subunit <sup>[1, 2]</sup>. The use of microvascular free tissue for internal lining is an excellent option when the defect includes the nasal floor and/or the surrounding cheek-lip complex on which the nasal reconstruction must sit.

However, for near-total or total nasal defects with intact supporting structures, an alternative to microvascular free tissue for internal lining is the use of a staged interpolated forehead flap. It offers several advantages as there is no need for microvascular anastomosis, shorter operative times for most surgeons and donor site morbidity is arguably better for forehead flaps.

The forehead flap is one of the earliest recorded surgical procedure for nasal reconstruction [3-7].

Because of the ideal quality of its color and texture, forehead skin has been acknowledged as the best donor site to resurface the nose [8, 9]. Broad pedicle and rich vascular supply makes this most robust and dependable flap [10].

Based on the site and arterial supply there are three types median, paramedian and laterally based forehead flaps [11]. Traditionally forehead flap is described as a two staged procedure consisted of flap elevation, thinning, and inset, with division of the pedicle during a second stage approximately 3 weeks later [12]. Burget and Menick introduced an intermediate stage between flap transfer and division during which the flap is re-elevated from the recipient site, thinned, and contoured. As proposed by Menick, this inter-mediate stage maximized blood supply to all nasal layers, expanded our options for nasal lining, and a good aesthetic outcome [13].

The aim of this study is to review the use of forehead flap in nasal reconstruction and prospectively evaluate the outcome of treating nasal defects as an easy, effective and economical treatment in the Indian population and highlighting our experience in the management of cases of nasal defect.

### Material and Methods

This prospective study was conducted in the department of plastic surgery, S. M. S. Medical College and Hospital, Jaipur from March 2020 to May 2022. This study was approved by institutional review board of hospital. During this time, 23 patients who presented with nasal trauma were enrolled. Each participant underwent surgical debridement under loupe magnification combined with forehead flap cover after a full clinical assessment and necessary laboratory tests.

Demographic data of patients and anatomical location of defect were noted. Inclusion criteria were patients with subtotal nasal defect who were above 18 years of age, and patients who were willing to give informed consent for treatment. Pregnant and lactating women; children < 18yr were excluded from study. Photographic records were made before starting treatment and at each subsequent visit.

All procedures were done under general anesthesia. Widely infiltrating the surgical field with saline and adrenaline will help define the surgical planes and minimize blood loss. After thorough debridement, defect is assessed and template was made. Now using the template flap marking done over forehead area keeping in mind the course of supratrochlear artery (paramedian). Full thickness forehead flap was raised till 1 cm from supraorbital rim for maintaining "zone of safety" and avoiding injury to superior orbital plexus. Donor defect was closed primarily in two layers wherever possible. If closure was not possible then raw area was grafted with split thickness skin graft or left as it is to heal by secondary intention.

Flap elevation begins distally. The tip of the flap, for the initial 1.5 to 2 cm, is raised in the subcutaneous plane with removal of subcutaneous fat and underlying frontalis muscle. After that flap is elevated to the level of the galea, and then 1 cm above the brow, the dissection is carried subperiosteally and continued over the orbital rim. Elevation continues until sufficient flap length for defect coverage

without undue tension is achieved. Flap in setting done in single layer using ethanol 5-0 suture. Minor modifications and flap thinning done at this stage to achieve a good aesthetic result keeping in mind the vascularity of terminal part. For alar rim defects the flap is rolled up and suture line preferably be placed inside vestibule. The posterior raw side of the pedicle is a significant source of patient inconvenience. A good hemostasis from raw edges is paramount at the end of the case with use of gel foam or surgical. Patient was discharged after couple of days and followed up after a week for suture removal.

Flap division and in setting done at 3 weeks from previous surgery. This procedure was done under local anesthesia on outpatient basis. Additional thinning and contouring of flap was done at this stage. Patient was then followed after a week for suture removal and after that on monthly basis for 3 months.

Patients were asked to complete questionnaire to assess aesthetic satisfaction (Visual Analogical Scale, VAS = 1-10) one month postoperatively and three month postoperatively. (VAS: 1 no satisfaction, 10: total satisfaction) The collected data were subjected to statistical analysis. Further flap thinning and contouring were done under local anesthesia in patients who were less satisfied with the outcomes.

Data collection was conducted within the study period and analyzed by SPSS software (Version 20, Chicago, IL, USA). Descriptive data is presented as mean±SD. Numerical data were presented using mean ± SD or medians and ranges if not normally distributed, whereas percentages were used for categorical data.

### Results

Twenty-three participants were included in this study with an age range of 18–62 years with mean age (36.1±8.71). Out of these 6(26.1%) were female and 17(73.9%) were males. The defect were located over the dorsum and lateral nasal wall in 3 participants (13.1%), tip in 2(8.7%) patients, ala in 1(4.3%) patients and involved multiple subunit in 17(73.9%). (Table 1).

None of the patients were lost to follow-up. Healing was uneventful for 22 (95.7%) participants after surgery, but one patient (4.3%) showed partial dehiscence after removal of stitches, and complete healing was achieved by local wound care within an additional week. None of the patient had partial or complete flap failure. Two of the patients developed hypertrophic scarring. Scarring was managed by intraregional triamcinolone injections (Table 2).

The average values of aesthetic satisfaction in patients (VAS) were 5±0.892 at one month post-operatively and 6.1±1.285 three month postoperatively (Table 3).

**Table 1:** Demographic and clinical data

S. No.	Variables	Number (Percentage)
1	Mean Age	36.1±8.71
2	Sex	
	Female	6(26.1%)
	Male	17(73.9%)
3	Defect Location	
	Dorsum+ Lateral wall	3(13.1%)
	Tip	2(8.7%)
	Ala	1(4.3%)
	Multiple subunit	17(73.9%)

**Table 2:** Complications following surgery

S. No.	Complication	Number (Percentage)
1	Post Op Infection/ Suture dehiscence	1 (4.3%)
2	Hypertrophic scar	2 (8.7%)
3	Flap Failure(Partial/Complete)	0 (0%)

**Table 3:** Aesthetic evaluation by patient at 1 and 3 months postoperatively

S. No.	VAS 1 Month	VAS 3 Month
1	5±0.892	6.1±1.285

(VAS: 1 no satisfaction, 10: total satisfaction)



**Fig 1:** (a, b) Pre Op, (c) Intra op and (d) immediate post op and (e) after division and in setting of flap (3 weeks)



**Fig 2:** (A) Pre Op, (B) Intra op and (C) post op at the time of discharge and (D, E) after division and in setting of flap (3 weeks)



## Discussion

There are variety of novel techniques for nasal reconstruction but, forehead flaps carry the advantage of rich vascular supply and are robust enough to cover large defects. Also they allow mobilization of tissue in a variety of ways. There are variety of forehead flaps like transverse, median and paramedian forehead flaps. Among them transverse forehead flaps are reported to have maximum post-operative complications (partial / complete flap necrosis).

Paddack *et al.* published their retrospective review of 107 patients to determine the factors contributing to the failure of interpolation flaps used in nasal reconstruction [14]. Patients underwent nasal reconstruction with either a paramedian forehead flap (77%) or nasolabial flap (23%). They reported an overall 6% failure rate for forehead flaps. While in our study there is no flap failure. Variables like thickness of the defect, cartilage grafts, flap type (paramedian forehead flap or nasolabial flap), and presence of comorbidities did not affect the outcome.

Multiple revisions are often required for proper contouring and good aesthetic result. During these revisions secondary cartilage grafts are put in place if required. However, the skin is not easily shaped as it is rigid, shrunken and refractory, because of subcutaneous fibrosis.

To solve these problems, an intermediary phase was described by Millard between the transfer of the flap and the division of the pedicle to model ala and tip, as he believed that thinning the flap would be less dangerous if the pedicle was intact [15].

Later, Burget and Menick recommended initial transfer a forehead flap with no distal thinning in large reconstructions. All contouring would then be performed during the second stage, and the pedicle would be divided during a third stage [16].

Ribuffo *et al.* demonstrated that patients who underwent the 3-stage technique of nasal reconstruction were more satisfied than patients who underwent the 2-stage technique. They also concluded that for defects which require bone or cartilage reconstruction and in particular for all defects in the distal area (tip and nostrils) 3-stage approach was better suited [17].

When loco-regional flaps are not feasible, a micro-vascular free flap may be required for soft tissue coverage, which has shown good results in terms of safety and reliability in nasal reconstruction [18-21].

## Limitations

Smaller sample size, short follow-up and multiple stages are few shortcomings in this study.

## Conclusion

The forehead flap represents the ideal reconstructive choice in patients with nasal defects. It provides good textural, thickness and color match when compared with the recipient site tissues. It has many favorable characteristics, notably high vascularity, pliability, and potential for surgical adaptations, facilitating successful restoration of form and function, with minor complications. It can be safely and reliably performed even in hands of a novice surgeon. Aesthetic satisfaction in patients is good and increases with further corrections and with time.

**Financial support and sponsorship:** Nil

## Conflict of Interest

The authors declare that they have no conflicts of interest.

## References

- Burget GC, Menick FJ. Nasal reconstruction: seeking a fourth dimension. *Plast Reconstr Surg.* 1986;78:145-157.
- Burget GC, Menick FJ. The subunit principle in nasal reconstruction. *Plast Reconstr Surg.* 1985;76:239-247.
- Converse JM. *Reconstructive Plastic Surgery.* Philadelphia, PA: WB Saunders, 1964.
- Burget GC, Menick FJ. Nasal support and lining: the marriage of beauty and blood supply. *Plast Reconstruct Surg.* 1989;84:189-202.
- Jackson IT. *Local Flaps in Head and Neck Reconstruction.* St Louis, MO: Mosby, 1985.
- Antia NH, Daver BM. Reconstructive surgery for nasal defects. *Clin Plast Surg.* 1981;8:535-563.
- Conley JC, Price JC. The midline vertical forehead flap. *Otolaryngology Head Neck Surg.* 1981;89:38-44.
- Athanasopoulos I, Peridis K, Parpounas K, Houlakis M. Unilateral choanal atresia in one monozygotic twin: A case report. *Eur Rev Med Pharmacology Sci.* 2011;15:103-105.
- Gillies HD, Millard DR. *The Principles and Art of Plastic Surgery.* Boston: Little, Brown, 1957, 104-110.
- Herford AS, Ghali GE. 3<sup>rd</sup> ed. USA: People's Medical Publishing House. Local and regional flaps. *Peterson's principles of oral and maxillofacial surgery.* 2010, 773.
- Shumrick KA, Smith TL. The anatomic basis for the design of forehead flaps in nasal reconstruction. *Arch Otolaryngol Head Neck Surg.* 1992;118:373-9.
- Menick FJ. Nasal reconstruction with a forehead flap. *Clin Plast Surg.* 2009;36:443-459
- Menick FJ. A 10-year experience in nasal reconstruction with the three-stage forehead flap. *Plast Reconstruct Surg.* 2002;109:1839-55; discussion 1856
- Paddak AC, Frank RW, Spencer HJ, *et al.* Outcomes of paramedian forehead and nasolabial interpolation flaps in nasal reconstruction. *Arch otolaryngology Head Neck Surg.* 2012;138:367-371.
- Millard DR. Reconstructive rhinoplasty for the lower half of a nose. *Plast Recount Surg.* 1974;53:133-139
- Burget GC, Menick FJ. *Aesthetic Reconstruction of the Nose.* St Louis, MO: Mosby, 1994.
- Ribuffo D, Serratore F, Cigna E. Nasal reconstruction with the two stages vs three stages forehead flap: a three centres experience over ten years. *Eur Rev Med Pharmacology Sci.* 2012;16:1866-1872.
- Stamatopoulos C, *et al.* Use of free flaps in aesthetic reconstruction of face and neck deformities. *Microsurgery.* 1992;13:188-191.
- Hsiao YC, Huang J-J, Zelken JA, *et al.* The folded ulnar forearm flap for nasal reconstruction. *Plast Reconstruct Surg.* 2016;137:630-635.
- Sinha M, Scott J, Watson SB. Prelaminated free radial forearm flap for a total nasal reconstruction. *J Plast Reconstruct Aesth slugger JPRAS.* 2008;61:953-957.
- Pribaz JJ, Weiss DD, Mulliken JB, *et al.* Prelaminated free flap reconstruction of complex central facial defects. *Plast Reconstruct Surg.* 1999;104:357-365.19.