

PARAMEDIAN FOREHEAD FLAP AS A RECONSTRUCTIVE MODALITY: AN EXPERIENCE IN A TERTIARY CARE INSTITUTION

Priyanka Koushal ¹, Rupal Sharma ² and Ratnakar Sharma ^{3*}

¹ Senior Resident, Department of Surgery, GMC Jammu.

² Internship, ASCOMS Jammu.

³ Professor and Head, Department of Surgery, GMC Jammu. (*Corresponding Author)

DOI: [10.5281/zenodo.11162098](https://doi.org/10.5281/zenodo.11162098)

Abstract

Forehead Flaps have been in use since ancient times as has been depicted in the classical paintings of the great Susrutha at work repairing the nose of those unfortunate to have their noses cut off as a punishment. The Paramedian forehead flap is used not only for the reconstruction of nasal defects, but it can be used for reconstruction of lid and cheek defects too. The flap is designed vertically and axially along the supratrochlear vessels. A total of 25 patients undergoing reconstruction of nasal/ lid/cheek defects arising out of various reasons over a period of three years from June 2021 to May 2023 are presented. All flaps survived and there were no complications encountered. The donor site in all the cases was closed primarily. Conclusion The paramedian forehead flap is a versatile flap for nasal and eyelid defects with an excellent colour match owing to proximity with the defect.

Keywords: Paramedian Forehead Flap, Nasal Defects, Eyelid Defects, Reconstruction.

1. INTRODUCTION

The earliest accounts of forehead flaps appear in the *Susrutha Samhitha* where skin from the centre of the forehead was utilised to reconstruct noses as far back as 600 – 700 B.C[1]. This knowledge was transferred to a family of potters who continued to use it even during the time of British rule in India. A thorough understanding of the vascular anatomy underlying the forehead flaps was provided by the cadaver injection studies of Conway et al[3], Corso[4] and Behan & Wilson[5]. They showed the 4 major vascular territories supplied by the 6 named vessels with extensive anastomoses between each other. The ability of a narrow pedicle to support a forehead flap was further demonstrated clinically by Monks (lower eyelid reconstruction 1989)[6]. The Paramedian forehead flap is an interpolation flap raised as an axial flap based on Supratrochlear artery. It is commonly used as a reconstructive modality for nasal defects[7]. It is useful for the reconstruction of acquired defects of lid and cheek too.

2. METHODOLOGY

Subjects

The present study was conducted retrospectively by analysing the available data in a single unit in the Department of Surgery, Government Medical College Jammu. A total of 25 patients undergoing reconstruction of nasal/ lid defects arising out of various reasons utilizing Paramedian Forehead Flap over a period of three years from June 2021 to May 2023 are presented. All the patients were treated as in-patients. The informed consent was obtained from the patients after explaining them the procedure and the the stages needed.

Data Processing

Paramedian Forehead flaps were done for a total of 25 patients for various indications. The proforma for the collection of data was made. All the relevant details of the patient

during preoperative, surgical, post operative and follow up periods were collected and analysed. The Paramedian forehead flap was employed as a coverage modality for defects involving nose /eyelid/cheek arising out of various causes as -Post-excision defects of BCC; post traumatic defects ; defects arising out of animal bite; defects due to Human bite and kite string injury.

All the patients underwent pre-operative investigations for requisite anaesthesia. The patients diagnosed to have BCC involving the lid/cheek underwent resection of BCC with a margin of 5mm. The marginal clearance was confirmed with frozen section biopsy in all the cases. All the defects were evaluated for size, depth, and status of the base of the defect (presence of gross contamination or infection, integrity, and viability of the wound edges). The defect was then suitably covered by Paramedian Forehead flap. The flap is designed vertically and axially along the supratrochlear vessels.

The base of the flap is made no wider than 1.5 cm for easy mobility without strangulation. The flap is designed slightly larger to allow for the edema at the recipient area and for the tissue shrinkage of the flap. A right-sided flap usually rotates clockwise and a left-sided flap usually rotates anticlockwise. . Flap division and inset was done after interval of three weeks. Nearly all-sutures are removed by 7 days .Twenty one days later, the skin pedicle is excised and discarded. Patients were followed-up periodically in the post-operative period in OPD Department of Surgery, GMC Jammu.

Inclusion Criteria

Patients undergoing reconstruction of nasal/ lid/cheek defects arising out of various reasons by Paramedian forehead flap.

Exclusion Criteria

Poor or no signal from Supratrochlear artery on hand held Doppler.

Patients with deranged coagulation profile.

Statistical Analysis

Data were entered in Microsoft Excel spreadsheet Version 2013 and analyzed. Data was represented in tables as below.

3. RESULTS AND DISCUSSION

Age And Sex Incidence

| Age Group | Male | Female | Total |
|---------------|------|--------|-------|
| 1 – 20 years | 1 | 0 | 1 |
| 21 – 40 years | 2 | 2 | 4 |
| 41 – 60 years | 8 | 5 | 13 |
| 61 – 80 years | 4 | 3 | 7 |
| Total | 15 | 10 | 25 |

The age range of the patients was from 1-80 yrs (mean age 42 yrs). The youngest patient in the study was 4 years old whereas the oldest patient was 76 years old.

The study included 15 male patients and 10 female patients. Male to female ratio was 1.5:1. Maximum number of patients were in age group of 41-60 years(52%).

Etiological Incidence

| S. No. | Cause | Number |
|--------|--------------------------|--------|
| 1 | BCC excision | 12 |
| 2 | Post Animal bite defects | 4 |
| 3 | Post Human bite defects | 3 |
| 4 | Post traumatic | 6 |

Maximum number of Paramedian forehead flaps were utilized for defects arising out of excision of BCC (48% cases); whereas post traumatic, post animal bite, post human bite defects needing coverage by Paramedian forehead flap accounted for 24%,16% and 12% of cases.

Site of Defect

| S. No. | Site of Defect | Number |
|--------|----------------|--------|
| 1 | Nose | 12 |
| 2 | Lower Lid | 10 |
| 3 | Cheek | 2 |
| 4 | Upper Lid | 1 |

R Nasal reconstruction using Paramedian Forehead flap was achieved in 48% of cases; whereas lower lid , cheek and upper lip defects were reconstructed by Paramedian Forehead flap in 40%.8% and 4% of cases. All the defects involving the nose(n=12) and one defect over the cheek managed by coverage by Paramedian Forehead Flap were post traumatic, post animal bite and post human bite. The Paramedian Forehead flap was utilized for coverage of defects arising out of excision of BCC involving Lower lid (n=10), Upper Lid(n=1) and cheek(n=1).

All patients tolerated the surgical procedures well with no systemic or anesthesia-related complications. There were no infections or hematomas. All flaps survived completely . Follow-up ranged from 1 to 2 years. Tumor recurrence was not seen in any of the patients. In cases of Eyelid reconstruction by Paramedian Forehead Flap, the lid closure was adequate. Epiphora was noticed in 2 cases due to excision of Punctum since lacrimal system reconstruction was not performed. Patients requiring nasal reconstruction using Paramedian Forehead flap had no complication. 12 patients required debulking of the flaps because of the bulky appearance. Debulking was done 3–6 months following the reconstructive procedures. The flap donor site was primarily closed in all the cases and healing was uneventful in all the cases. All patients were satisfied with the functional and cosmetic outcomes.

In our Retrospective study, 25 patients undergoing Paramedian Forehead flap for reconstruction of defects involving nose/lid/cheek over a period of 3 years w.e.f. June 2021 to May 2023. The present study was conducted retrospectively by analysing the available data in a single unit in the Department of Surgery, Government Medical College Jammu. A total of 25 patients undergoing reconstruction of nasal/ lid defects arising out of various reasons utilizing Paramedian Forehead Flap over a period of three years from are presented. All the patients were treated as in-patients. The informed consent was obtained from the patients after explaining them the procedure and the the stages needed. The data was collected analyzed and discussed with previously available literature. The mean age of the patients in our study was 42 yrs. The youngest patient in the study was 4 years old whereas the oldest patient was 76 years old. Maximum number of patients were in age group of 41-60 years(52%).

The study included 15 male patients and 10 female patients. Male to female ratio was 1.5:1. Different authors have observed comparable findings in their studies on Paramedian Forehead flap as a reconstructive modality[8],[9]. Maximum number of Paramedian forehead flaps were utilized for defects arising out of excision of BCC (48% cases); whereas post traumatic, post animal bite, post human bite defects needing coverage by Paramedian forehead flap accounted for 24%,16% and 12% of cases. Different authors have utilized Paramedian Forehead flaps for reconstruction of defects arising out of different causes in their studies[10],[11],[12].

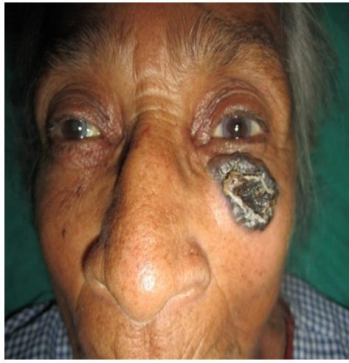
Nasal reconstruction using Paramedian Forehead flap was achieved in 48% of cases; whereas lower lid, cheek and upper lip defects were reconstructed by Paramedian Forehead flap in 40, 8% and 4% of cases. Various authors have utilized Paramedian Forehead flap to provide ample tissue coverage for defects involving various subunits of upper face [13],[14],[15],[16]. In our study, all the flaps survived completely and there was no partial or complete flap failure. Our study goes well with the study by other authors [8]. Epiphora was noticed in 2 cases in our study due to excision of Punctum since lacrimal system reconstruction was not performed. A variety of post surgical minor and major complications have been encountered by various authors in their studies[17],[18],[19]. In our study, all the patients were satisfied with the functional and cosmetic outcome after reconstruction of various defects employing Paramedian forehead flap. The cosmetic outcome after Paramedian forehead has been viewed positively by both Surgeon and patients in a study by other authors too[20].



Post traumatic Nasal defect covered with Right Paramedian Forehead flap.



Healed Donor site and Flap inset.



BCC left Cheek .



Defect Left Cheek after resection of BCC.



Defect covered with Left Paramedian Forehead flap.

4. CONCLUSION

Paramedian Forehead Flap is a reliable flap with robust vascularity. It is one of the local flaps for reconstruction of midfacial unit . Properly planned flap is effective for most of the nasal defects and defects involving lid and upper cheek.

References

- 1) The Forehead Flap for Nasal Reconstruction. Charles M. Boyd, MD; Shan R. Baker, MD; Darrell J. Fader, MD; Timothy S. Wang, MD; Timothy M. Johnson, MD Arch Dermatol, vol.136,pp.1365-1370,2000.
- 2) Mazzola RF, Marcus S. History of total nasal reconstruction with particular emphasis on the folded forehead flap technique. Plast Reconstr Surg,vol 72,pp408-414,1983.
- 3) Conway H, Stark B, Kavanagh J D Variations of the temporal flap. Plastic and Reconstructive Surgery,vol 9,pp 410-423,1952.
- 4) Corso P F 1961 Variations of the arterial, venous and capillary circulation of the soft tissues of the head by decades as demonstrated by the methyl methacrylate injection technique, and their application to the construction of flaps and pedicles. Plast and Reconstr Surg,vol 27,pp160-184,1961.
- 5) Behan F C, Wilson J S P The vascular basis of laterally based forehead island flaps, and their clinical application. Presented at the 2nd Congress of the European Section of the International Confederation of Plast and Reconstr Surg, Madrid. Royal college of Surgeons of England, London,1973.

- 6) Monks G H The restoration of a lower eyelid by a new method. Boston Medical and Surgical Journal, vol139, pp385-387, 1898.
- 7) Titt A, Malphrus E, Hannan C et al. Paramedian Forehead Flap for reconstruction of Nasal tip defect. Plast REconstr Surg, vol 8, no.4, pp 2713-2716, 2020.
- 8) Kim JH, Kim JM Reconstruction of Medial Canthus using an ipsilateral Paramedian Forehead Flap. Arch Plast Surg, vol 40, pp. 742-747, 2013.
- 9) Shope, Chelsea, Parrilla G et al. The utility of Paramedian Forehead Flap in Lower Lid Reconstruction. Annals of Plast Surg, vol 91, no.6, pp 726-730, 2023.
- 10) Salzano G, Maffia F, Vaira LA et al. Locoregional flaps for Midface Skin Defects: A collection of Key surgical techniques. Clin. Med. vol 12, pp 3700, 2023.
- 11) Hammer D, Williams F, Kim R. Paramedian Forehead Flap. Oral Maxillofacial Surg Clin. Vol. 28, pp 23-28, 2020.
- 12) Sharma R, Singh K, Singh A. Profile of Human Bite Facial injuries and their management. JK Science, vol 17, no. 1, pp 21-24, 2015.
- 13) Apaydin F, Kaya I, Uslu M, et al. Paramedian Forehead Flap in Large Nasal Skin defects: Twenty year's experience. Turk. Arch otorhinolaryngol. Vol60, pp 155-160, 2022.
- 14) Rajan S, Akhtar N, Kumar V et al. Paramedian Forehead Flap reconstruction for skin tumors involving central subunit of face: an analysis of 37 cases. J Oral Biol Craniofacial Res. Vol10, pp764-767, 2020.
- 15) Gupta R, John J, Hart J. Chaiyasate k. Medial canthus Reconstruction with the Paramedian Forehead Flap. Plast Reconstr Surg Glob open vol 10, pp e4419, 2022.
- 16) Terrence WA, Valerie J, Dinesh S. The use of Paramedian Forehead Flap alone or in combination with other techniques in reconstruction of periocular defects and orbital exenterations. Eye vol 37, pp560-565, 2023.
- 17) Lo Tarto F, Redi U, Cigna E et al. Nasal Reconstruction with two stages versus three stages Forehead Flap : what is better for Patients with high vascular risk? J Craniofacial Surg vol 31, pp 57-60, 2020.
- 18) Little SC, Hughley BB, Park SS. Complications with forehead flaps in nasal reconstruction . Laryngoscope vol119, pp1093-1099, 2009.
- 19) Chakraborty SS, Goel Ad, Sahu RK et al. Effectiveness of of Nasolabial flap versus Paramedian Forehead Flap for Nasal reconstruction: A systemic review and metaanalysis. Aesthetic Plast Surg vol 47, pp.313-329, 2019.
- 20) Peters F, Mucke M, Mohlhenrich SC, et al. Esthetic outcome after nasal reconstruction with Paramedian forehead flap and bilobed flap. J Plast Reconst Aesthetic Surg. Vol 74, pp 740-746, 2021.