

**Surgical outcome following Facial Mohs Micrographic Surgery and its Reconstruction****Manish Jain<sup>1</sup>, Saurabh Garg<sup>2</sup>, Priyanshi Gupta<sup>3</sup>**<sup>1</sup>Associate Professor, Department of Plastic Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur, India<sup>2</sup>Assistant Professor, Department of Plastic Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur, India<sup>3</sup>Assistant Professor, Department of ENT, Mahatma Gandhi Medical College and Hospital, Jaipur, India

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**Abstract:**

The recent advancement in the treatment of cutaneous malignancy has seen Mohs Micrographic surgery being the preferred treatment with meticulous reconstruction keeping in mind the principle of facial aesthetics. The challenge lies in patient dissection and assessment of all margins to be negative. Reconstruction depends upon the size, location, and patient preference. The aim of our study is to assess the surgical outcome of Mohs Micrographic surgery performed for cutaneous neoplasms located in facial region along with their reconstruction along with possible relationship between patient characteristics, techniques performed and multidisciplinary approach. All the patients were prospectively followed and their data collected who underwent Mohs Micrographic surgery and reconstruction in our institute between 2021-2023. Patient characteristics, tumour pathology, surgical specifics, reconstructive modalities, and surgical outcomes were analysed. A total of 82 patients were included, predominantly light skinned, Indians (83%) and males (52%) with a mean age of  $56 \pm 11.3$  years. Tumour pathology was predominantly Basal cell carcinoma in 73% of all cases. The nasal aesthetic unit was most commonly affected (44%). Local advancement flaps and different types of flaps were used in 60% and 24% of reconstructions, respectively. Complications were observed in 6% of cases and recurrence in 3% of cases. In depth understanding of facial aesthetics is of paramount significance in providing a good cosmetic outcome with lower complication rates involving multidisciplinary team like plastic surgeons and pathologists when dealing with cutaneous neoplasms especially over facial region.

**Keywords:** Mohs Micrographic surgery, Facial reconstruction, Regional Flap, Local Flap, Split skin thickness graft, Full thickness skin graft.

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**Introduction**

Cutaneous malignancy has a low prevalence in India[1]. Recent surveys suggest that the incidence may have increased by as much as 65% from 1980 [2]. Skin cancer however accounts for more than one third of cases of malignancy in the United States [2].

With the rising incidence of skin malignancies along with prompt diagnosis, the treatment including Moh's Micrographic surgery (MMS) and subsequent reconstruction has also seen an upward trend. Skin malignancies mostly tend to affect facial region at the site of functional and aesthetic concern[3].

The predominance of this anatomical site involvement would mean higher cosmetic morbidity, given their visually prominent location

of skin loss with increased potential for poor cosmesis and function [3-5].

The recent national US guidelines for skin cancer treatment recommended MMS for high-risk BCC and SCCs, specifically located in the face resulting in better preservation of skin and decreased tumour recurrence [6-7]. In depth understanding of facial Aesthetic units and subunits is essential to plan a reconstructive surgery that serves dual function of good aesthetic outcome and preserves facial function.

The aim of this study is to provide an overview of our institutional experience with facial reconstructions per aesthetic unit following MMS. Along with that, patient characteristics, techniques performed and surgical outcome were investigated.

## Methodology

This is a prospective interventional study done in our institute between January 2021- January 2023, where all patients who presented with cutaneous malignancy were enrolled. Patients who presented with more than one skin lesions were excluded from the study. These patients then underwent MMS and a reconstructive procedure for the facial defect after consent. Appropriate institutional board review was obtained.

The data was collected which included patient demographics: age, sex, race, comorbidities (cardiovascular disease, diabetes mellitus, obesity (BMI>25), smoking, current anti coagulation therapy and steroid use( oral, injected, or topical). A detailed history regarding the risk factors was taken including, family history of skin cancer, prior history of head and neck radiotherapy, excessive exposure to sun, immunosuppressive drugs, or diseases.

Patient then underwent Mohs micrographic surgery where in precise surgical excision was done and checked my microscopic margin control. The tumour is progressively removed in stages followed by margin examination in horizontal sections under microscope for tumour cells until the margins are negative. MMS involves complete circumferential peripheral and deep margin assessment.

The tumour histopathology included Basal cell carcinoma(BCC), Squamous cell carcinoma(SCC), Lentigo Maligna(LM), Malignant Melanoma (MM) and others. The size of the defect in mm were recorded. We categorized the defect based on the facial aesthetic unit and subunit involved ( nasal, periorbital, cheek, forehead, periauricular and perioral regions). Defects crossing multiple units were categorized into the unit which it maximally involved. These patients then underwent reconstructive procedure. Various types of reconstruction were performed including Linear closure, Local or regional flap, and grafts ( split- or

full thickness skin graft). These patients were admitted in the hospital till post-operative day 5, following which if general condition was stable were discharged and called for follow-up and suture removal after 10 days. Serial follow-up was done monthly until 6 months. There post-operative complications were recorded. Data was analysed using SPSS 24 software. Demographics, surgical specifics, and outcomes were summarized using mean, percentages, and standard deviation(SD). A statistically significant difference was defined as  $P < 0.05$ .

## Results

### Patient Demographics

In our study, we had a total of 82 cases who underwent MMS and subsequent reconstructive procedure. Amongst these, 43 patients were males (52%) and 39 patients were females (48%). The mean age of the patient was  $56 \pm 11.6$  years. 30 cases (37%) had pre-existing cardiovascular disease and 11cases (13%) had diabetes. 10 cases (12%) were active smokers. 5 cases ( 6%) had history of steroid use and 15 cases (18%) had history of anti-coagulant use.

### Oncologic Characteristics

Of the skin malignancies, 58 ( 70%) were Basal cell carcinoma, 14 (17%) were squamous cell carcinoma , 7(9%) were Lentigo Maligna, 3 cases were classified as others which included Dermatofibrosarcoma protuberans, Angiosarcoma, Microcystic adnexal cancer.

Amongst these cases, 73 patients ( 89%) had primary tumour and only 9 cases ( 11%) had recurrent tumour which was previously excised. Skin malignancies were primarily located at the nose (n=26), followed by cheek ( n = 18), forehead (n= 16), Perioral region (n = 12), Periorbital region (n= 12) and Periauricular region (n = 4). Table 1, depicts tumour distribution per aesthetic unit involved.

**Table 1: Tumour distribution per aesthetic unit involved**

Main Aesthetic Unit Involved	Number of Patients	BCC (%)	SCC (%)	Melanoma/Lentigo Maligna (%)	Other NMSC (%)
Forehead	16	12 (75%)	3 (18.75%)	1 (6.25%)	0
Cheek	18	14 (77.77%)	2 (11.11%)	1(5.55%)	1 (5.55%)
Periorbital region	6	5 (88.33%)	1 (16.66%)	0	0
Nose	26	18 (75%)	4 (15.38%)	3 (11.53%)	1 (3.84%)
Perioral region	12	3 (25%)	7 (58.33%)	2 (16.66%)	0
Periauricular region	4	2 (50%)	1(25%)	0	1 (25%)
Total	82	54	18	7	3

Other NMSC: 1) Dermatofibrosarcoma Protuberans 1) Angiosarcoma 1) Microcystic adnexal cancer. Defect size was calculated in mm. Ranging between 5mm to 120mm in diameter with a median of 15mm. Defects involving a single aesthetic unit accounted for 70 (85.36%) of all cases, 9(10.97%) defects encompassed 2 units

and only 3 (3.65%) cases encompassed 3 units. Table 2: depicts the distribution of defects in Aesthetic Unit and Subunit (n = 82)

**Table 2: Distribution of defects in Aesthetic Unit and Subunit (n = 82)**

Main Aesthetic Unit	Subunit	Patients with unit involved	Defect subunits involved	Combined units involved	Type of reconstruction used for defect closure			
					Linear Closure	Local Flap	Regional Flap	Graft
Forehead	Forehead Scalp Temple	16		5	6	5	1	4
			6					
			3					
			2					
Cheek	Infraorbital Subunit Mandibular subunit Zygomatic subunit	18		3	4	10	4	0
			7					
			4					
Periorbital Region	Periorbital subunit Brow involvement	6			4	1	1	0
			6					
Nose	Nasal side walls Tips Columella Alae Dorsum	26		12	2	18	4	2
			3					
			7					
			1					
			1					
Perioral region	Upper lip Lower lip Chin	12			3	8	1	0
			7					
			4					
Periauricular region	Ear Retroauricular area	4	3		1	3	0	0
			1					

**Surgical Outcomes**

All of our reconstructions were done on the same day of excision following procuring negative margins after Mohs Micrographic surgery. Complications were recorded in 9 (10.97%) cases.

The most common complication was wound dehiscence seen in 3 cases. 2 cases developed post-

operative hematoma, 1 case each had partial flap failure, total flap failure, infection, and obstructive scar contracture of medial canthal fold. Within this subset of patients 3 occurred in subunit of nose while 2 each occurred in forehead and cheek subunit. Periorbital and periauricular region had 1 each whereas none occurred in perioral region as shown in Figure 1.

# Surgical Outcomes

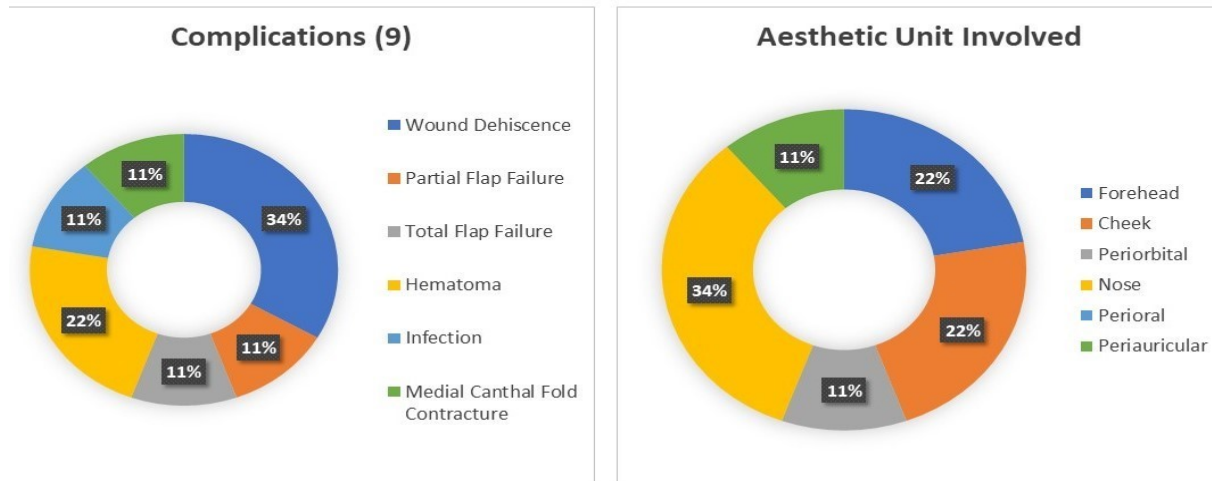


Figure 1: Surgical outcome in terms of complication and Aesthetic unit involvement.

## Reconstruction per Facial Aesthetic Unit and Subunit

### Forehead

There were 16 defects in the forehead region, of which 6 were in forehead proper, 3 in scalp and 2 in temple. 1 defect each overlapped scalp and forehead, scalp and temple, temple, and forehead whereas 2 defects overlapped all three subunits. Linear closure was done in 6 cases, Advancement flap in 5 cases, 1 case underwent composite graft and 2 each had split thickness and full thickness skin grafting.

### Cheek

There were 18 defects in the cheek region, of which 7 were in Infraorbital subunit, 4 each in zygomatic and Mandibular subunit. 3 defects overlapped between Infraorbital and Zygomatic subunit. Linear closure was done in 4 defects, 10 underwent advancement flap, 2 had nasolabial flap, 1 had bilobed flap. Grafting was not done in cases of cheek defects.

### Periorbital region

There were 6 defects in the periorbital region all involving the periorbital subunit and none extending to the brow. 4 defects underwent linear closure and 1 defect each underwent Advancement flap and Nasolabial flap.

### Nose

There were 26 defects in the nose region. This region was unique as majority of cases had more than 1 subunit involvement with significant overlap. 7 defects were on Tip, 3 involving nasal side walls, 2 involving Dorsum and 1 each on Alae and Columella. 3 defects were overlapping Alae and Nasal side walls, 3 Tip and Nasal Side walls, 3 Dorsum and Columella, 2 Alae and Dorsum and 1 overlapping columella and Tip.

2 defects underwent linear closure, 2 had V-Y flap, 5 had Advancement flap, 2 had rotation flap, 4 had bilobed flap, 1 had Dorsalnasal flap, 3 had Rhomboid flap, 1 had nasolabial flap, 1 had forehead flap, 3 had composite graft and 2 underwent split thickness skin grafting.

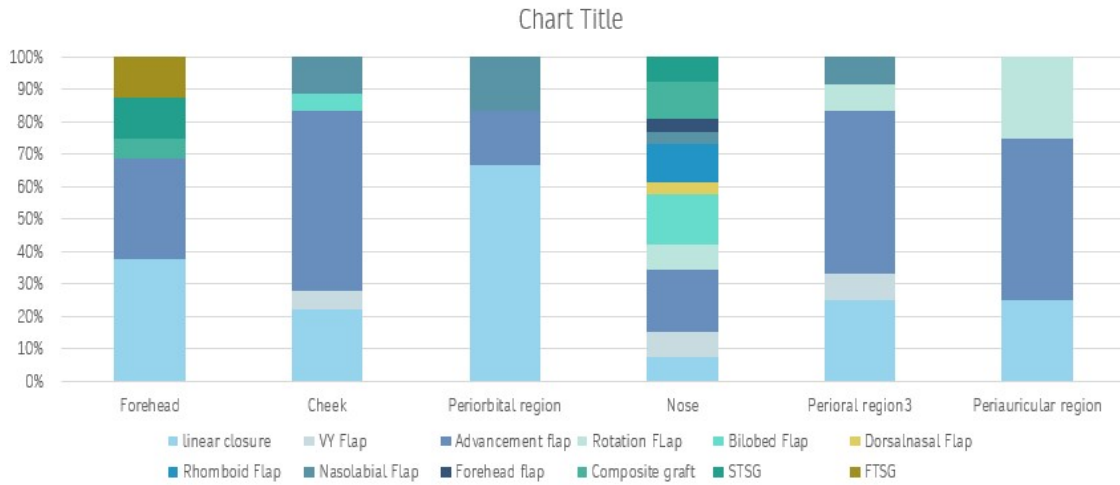
### Perioral region

There were 12 defects in the perioral region. 7 defects were in upper lip, 4 in lower lip and 1 in chin region. In our study, there were no defects overlapping this unit. 3 defects underwent linear closure, 1 had V-Y flap, 6 had Advancement flap, 1 had rotation flap, 1 had nasolabial flap.

### Periauricular region

There were 4 defects in the periauricular region. 3 defects were in the ear and 1 in Retroauricular area. 1 defect underwent linear closure, 2 had Advancement flap and 1 had Rotation flap. (Figure 2) Figure 3-6 depicts surgical pictures of patients, reconstruction and follows up.

## TYPE OF RECONSTRUCTION PER FACIAL AESTHETIC SUBUNIT



**Figure 2: Comprehensive assessment of the type of reconstruction per Aesthetic unit that was performed**



**Figure 3:** A & B - Basal cell carcinoma infraorbital subunit + cheek C & D - Mohs Micrographic Surgery with forehead flap marking. E & F- Tripier flap for eyelid reconstruction and V-Y advancement flap for cheek defect. G- Closure of defect H- 6 month follow-up



Figure 4- A- Basal cell carcinoma, B & C - MMS with Propeller flap D- 6 days follow-up.

**Figure 4:**



Figure 5: A- Basal cell carcinoma of upper lip. B- Regional flap. C- Flap being raised. D- Flap being positioned. E- reconstruction done.

**Figure 5:**

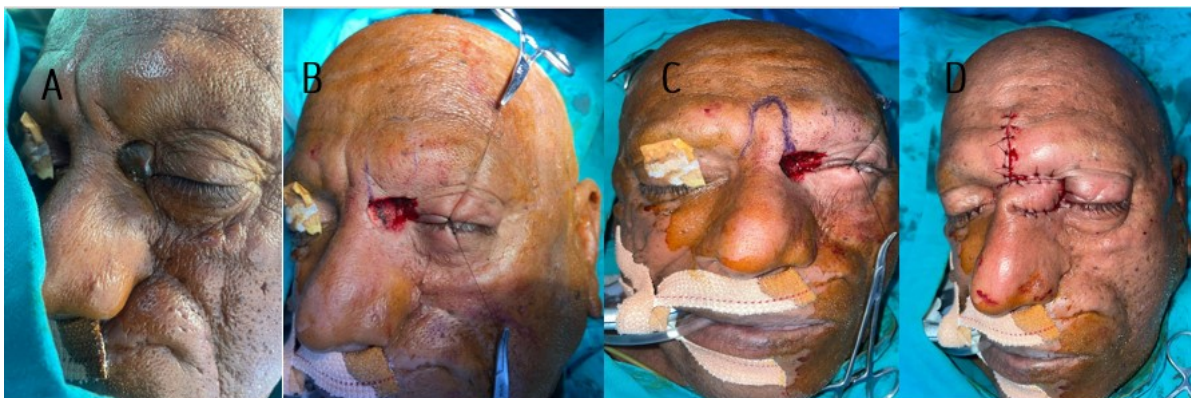


Figure 6: A- Basal Cell Carcinoma of inner canthus eye. B- MMS with defect. C- Glabellar flap. D- Closure.

**Figure 6:**

**Discussion**

Overtime, the technique of two stage procedure with excision and biopsy and subsequent reconstruction in second stage have been evolved and Mohs Micrographic surgery has become the preferred method of excision with single stage reconstruction in the Head and Neck region[8]. MMS has now been increasingly used for minimally invasive and invasive melanoma[9,10].

The major limitation while performing a reconstruction over face is to provide a good cosmetic outcome along with preserving the facial function. Cosmetic outcome is a subjective concern

therefore patients’ preference and circumstances have to be taken into consideration and therefore for the same reason, numerous questionnaires regarding patient reported outcome have been devised to understand their preference [11,12]. With MMS, the incidence of same day reconstruction has significantly increased which is in contrast to wide excision and biopsy which would delay the reconstruction by weeks[13]. This is in concordance with our study where all the cases underwent same day reconstruction. The overall complication rate in our study was 10.97% which was similar to other studies which noted the complication rate between 5.5% - 11.9% [3,13].

Similar to other studies, nose was the predominant location for cutaneous malignancies with about 32% of all reconstructions done [3, 14,15]. The nose has been described as a difficult to reconstruct unit of face due to its prominence over others and topographical anatomy [16,17]. This is consistent with our study given the variety of regional and local flaps along with grafts that have been used for reconstruction of nose. In a study by Sclafani et al,[16] reconstruction of the nasal ala subunit appeared to be an independent risk factor for complications including pin cushioning and the need for a corticosteroid's injection. Another study demonstrated that the use of cartilage grafts was an independent risk factor for postoperative complications[14]. Furthermore, reconstructions of large defects involving the ala/tip with an inner lining reconstruction using a mucoperichondrial flap instead of a 3-stage folded flap, more often lead to nostril stenosis [17]. This shows the complexity of these nasal reconstructions.

Following nose, perioral region is also a difficult to reconstruct area given the soft tissue topography and proximity to important anatomical landmarks. Along with this, because of inadequacy of fascial and bony support it can lead to adverse outcome by soft tissue contraction and swelling [18]. For perioral region, facial artery perforator (FAP) flap is ideal to prevent these complications[19]. Local flaps were most commonly used for perioral reconstruction. There was a low incidence of skin grafting (n=2). This should be underscored, as skin grafts for perioral reconstruction have been associated with scar contracture, poor colour matching, and donor-site morbidity[20].

In a study by Soliman et al,[21] direct linear repair was shown to be feasible and was associated with a low complication rate for many facial aesthetic units. In our study, direct linear repair was used whenever possible to achieve closure in most facial units, barring the nose. This is especially important in older comorbid patients where a less invasive modality is preferred[21]. The periorbital region has a delicate anatomy, function, and cosmesis[5]. Skin malignancies presented are often nonextensive, although reconstructions are often demanding[5]. There is region specific complications that should be given the utmost attention like ectropion, entropion, lid retraction, and lagophthalmos [5,22].

The major limitation of our study is the relatively small sample size and short-term follow-up of these patients.

### Conclusion

In depth understanding of facial aesthetics is of paramount significance in providing a good cosmetic outcome with lower complication rates

involving multidisciplinary team like plastic surgeons and pathologists when dealing with cutaneous neoplasms especially over facial region.

### Declarations

Ethical Approval- This article does not contain any studies which experiments with human participants or animals and all institutional and international ethical standards have been followed. This article is in compliance with the ethical standards.

Informed consent - Informed consent was obtained from the individual participants included in this article.

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