



RECONSTRUCTION OF FACIAL SKIN DEFECTS BY VARIOUS LOCAL FLAPS IN RURAL INDIA

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ABSTRACT **INTRODUCTION:** Face is the index of mind. Facial deformities affect the impression of an individual. For larger defects or in situations where direct suture is neither applicable nor available, facial skin defects in the head and neck can be filled by free grafts, local skin flaps or either pedicled or free tissue transfer.

METHODOLOGY: A prospective observational study was conducted to study different facial skin defects, their etiological factors, reconstructive techniques using local flaps and outcome of reconstructed flaps. The study was conducted on 53 patients between 2-70 years, comprising of 30 males and 23 females with facial skin defects due to various etiologies, willing to undergo reconstructive procedure using local flaps presenting at a tertiary care hospital for a duration of 18 months.

RESULTS: Reconstruction was done using 18 (33.96%) rhomboid flaps, 16 (30.19%) linear advancement flaps, 5 (9.43%) V-Y advancement flaps, 5 (9.43%) cervicofacial advancement flap, 9 (16.98%) nasolabial flaps. After surgery, all patients were assessed on post operative day 1, day 7, 4 weeks and 12 weeks for evaluation of outcome. All flaps survived on postoperative day 1. The ultimate cosmetic outlook at 12 weeks postoperatively is good in rhomboid flap and fair in all other flaps analysed in our study.

CONCLUSION: Thus reconstruction by local flaps is an easy and cost effective technique, requires less hospital stay, can be performed even at remote places under local anesthesia with excellent functional and aesthetical results.

KEYWORDS : local flaps, facial injuries, cutaneous malignancies, aesthetics.

INTRODUCTION:

Face is the index of mind. There are many situations when due to disease, trauma or head and neck surgery a facial defect arises which requires reconstruction. Facial deformities affect the impression of an individual, with greater attention given to deformities of the central face compared with those located more laterally. This topic is admittedly broad. Therefore, this study will focus on the repair of cutaneous defects of the cheek (largest facial aesthetic region), nose and posterior auricular region using local flaps.

Defects following head and neck surgery can often be closed by direct suture. This technique is used when the defect is small and where local conditions allow adequate amounts of mobile tissue. However, for larger defects or in situations when direct suture is not applicable, surgical defects may be filled by free grafts, local skin flaps, with pedicled flaps or with free tissue transfer[1]. In this study we have assessed different facial skin defects, etiological factors and their reconstructive techniques using local flaps.

MATERIALS AND METHODS:

It is a prospective observational study conducted at a tertiary care hospital over a period of 18 months from January 2018 and June 2019. The study included 53 patients, comprising of 30 males and 23 females between 2-70 years presenting with facial skin defects due to various etiologies, willing to undergo reconstructive procedure using local flaps. Data tabulated and analysed using percentages and proportions. Patients of all age groups with small (<3cm) to moderate (3 to 6cm) facial skin defects due to animal/human bite, avulsion injuries caused by road traffic accident /assault, due to any disease, defects following head and neck surgery, defects following excision of cutaneous lesions giving consent to undergo reconstructive procedure using local flaps were included in study. Whereas larger defects (>6cm), Patients with recurrent tumour or regional/distant metastasis, patients suffering from diabetes, immunocompromised state, uncontrolled hypertension, pregnancy, lactation or any major medical

illness who failed to get medical fitness or which could affect flap viability were excluded from study. After clearance from the local ethical committee and taking informed, written, valid consent from patients, a detailed history of all patients was taken and a thorough clinical examination was performed and necessary laboratory tests were done. Preoperative preparation included administration of injection Tetanus Toxoid 0.5ml intramuscularly over deltoid for tetanus prophylaxis and Xylocaine sensitivity test by injecting 0.1ml of 2% Xylocaine subcutaneously over volar surface of forearm to identify and prevent Xylocaine hypersensitivity. Detailed examination of defect was done and its measurements were noted down. After explaining procedure, possible outcome and prognosis of surgery to patient, pre-anesthetic fitness was obtained. General anesthesia was used for children below 12 years of age whereas adults were operated under local anesthesia with 2% lignocaine+ adrenaline (1:10000) infiltration with or without sedation depending upon patient's pain threshold. Planning of local flap to be executed as per the size and location of defect.

In case of cutaneous malignancies, biopsy was done to confirm the type of malignancy and assess the extent of underlying tissue involvement. For this purpose, an elliptical wedge of tissue including small area of normal skin was taken and submitted to laboratory for histopathological examination. After confirmation by histopathology report, cutaneous malignancy (Basal Cell Carcinoma, Squamous Cell Carcinoma or malignant melanoma) entire skin lesions were excised with safe margin and sent to histopathology. In cases of basal cell carcinoma, excision margin was 4mm from the tumor, were as in cases of Squamous cell carcinoma, excision margin was 4mm-6mm, and for malignant melanoma 5mm margin excised and reconstruction of the small to moderate sized defect (3-6 cm) done by various local facial flaps. In case of dog bite patients, all wounds initially received irrigation under high pressure with a needle and 50 ml syringe with normal saline solution up to a total volume of 500 ml. Subsequently, local scrubbing with the use of povidone-iodine (Betadine 10%

solution) was used for wound cleansing. Surgical debridement was performed in all cases as needed. All category III exposures assessed as carrying a risk of developing rabies were given post exposure prophylaxis with equine rabies immunoglobulin (40 IU per kg body weight) and anti rabies vaccination. The full dose of rabies immunoglobulin, or as much as is anatomically feasible, was administered into and around the wound site. Any remainder was injected intramuscularly at a site distant from the site of vaccine administration. Antirabies vaccine was given as one intradermal injection at two sites on days 0, 3, 7 and 28. Volume per intradermal injection is 0.1 ml. Daily dressing was done until third dose of anti rabies vaccine was given. Wound was sutured after third dose of antirabies vaccine with the use of Ethilon 3-0 or 4-0 nylon sutures in single layer depending on the location of the wound under local anesthesia (general anesthesia in children) and pressure dressing given. Simple interrupted sutures were used in all cases after infiltrating the wound with immunoglobulin. Injectable antibiotics were given for 5 days in all patients as antibiotic coverage and analgesics were given as per requirement. Daily dressing done. Suture removal was performed at day 7.

In patients with keloid lesion intralesional triamcinolone acetonide (10 mg/mL) was given preoperatively 1 week before surgery. Intraoperatively it was injected at the wound margins immediately after excision. Repeated injections were given at 3 to 6 week intervals. Multiple injections are usually necessary.

In road traffic accident /assault patients wound management is done by assessment of mode of injury, time of injury, type of wound, location, depth and direction, potential foreign body, potential underlying structural injury. Removal of harmful debris and necrotic tissue done. Hemostasis achieved. Tetanus prophylaxis given. Skin preparation and wound toileting done. All patients were operated under strict aseptic conditions, primary wound closure using desirable local flaps as per the size and location of defect done. Flaps were secured with non-absorbable sutures and aseptic dressing was given to all patients.

After surgery, all patients were assessed on post operative day 1 for any bleeding/ hematoma of the flap and ischemia of the flap. All patients were re-assessed on post operative day 7 for wound dehiscence, flap necrosis or wound infection. After suture removal, patients were asked to follow up on post operative 4 weeks for assessing hypertrophic scar formation/keloid, hyperpigmentation of scar, contracture formation. At post operative 12 weeks follow-up period final esthetic look of face is noted and assessment of patient satisfaction, was done using a scale ranging from 0 to 10 (0-3= not satisfactory, 4- 7=fair,8-10=good).

RESULTS:

Table 01 Distribution Of Cases As Per Age In Decades

Etiology	Age Distribution In Decades								Total number of cases	Percentage
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th		
Squamous Cell Carcinoma	0	0	0	0	1	5	5	1	12	22.64%
Basal Cell Carcinoma	0	0	0	0	1	8	3	1	13	24.53%
Malignant Melanoma	0	0	0	0	3	1	2	1	7	13.21%
Dog Bite	5	2	2	0	2	1	0	0	12	22.64%
Road traffic accident	0	2	1	1	3	0	0	0	7	13.21%
Keloid	0	0	1	0	0	0	0	0	1	1.89%
Nasolabial Fold Sinus	0	0	0	0	0	1	0	0	1	1.89%
Total	5	4	4	1	10	16	10	3	53	100%

In our study, among 53 patients maximum number of patients belong to 6th decade (30.18%) and minimum number belong to 4thdecade (1.88%). Dog bite is the most common etiological factor of facial skin defects in 1st decade (100%) and 50% of cases in 2nd and 3rd decades in the study. Children being weak and susceptible, dog bite wounds over face are common in children. The incidence of cutaneous malignancies in the study starts from 5th decade with steadily increasing trend upto 8th decade. The most common etiological factor in the study is basal cell carcinomas (24.53%). Maximum number of patients (73.58%) in our study belong to ≥ 5th decade of life, as malignancies are more common in these age groups and our study being conducted in rural setup most of our patients are farmers exposing themselves to excessive sunlight thereby ultraviolet radiations, thus basal cell carcinoma is the most

common etiological factor in our study. Defects due to road traffic accidents /assault were seen in 2nd,3rd,4th,5th decades in the study but with maximum incidence in 4th decade. Thus road traffic accidents are more common in middle age.

Table 02 Distribution Of Cases As Per Gender

Gender	Number Of Cases	Percentage
Male	30	56.60%
Female	23	43.39%
Total	53	100%

In our study, among 53 patients, 30(56.6%) are male and 23(43.39%) are female with male to female ratio of 1.3:1. Total 5 types of local flaps are analysed in the present study, among them the rhomboid flap used in 18 patients (33.96%) is the most commonly used local flap in the study. whereas V-Y advancement flap used in 5 patients (9.43%) and cervicofacial advancement flap used in 5 patients (9.43%), linear advancement flaps are used in16 patients (30.19%), nasolabial flaps are used in 9 patients (16.98%). Due to the simplicity of the rhomboid flap design, reliability with which it may be used to reconstruct cutaneous defects and the scars from the flap typically cause minimal distortion of surrounding structures, rhomboid flap is most preferred type of flap used in the study.

Table 03 outcome of local flaps in the study at various intervals

Post-operative Followup	Outcome Assesment	Rhomboid Flap	Linear Advancement Flap	V-Y Advancement Flap	Cervicofacial Advancement Flap	Nasolabial Flap
1 Day	Hematoma	-	-	-	-	-
	Ischemia Of Flap	-	-	-	-	-
1 Week	Wound Dehiscence	2	-	-	2	-
	Flap Necrosis	-	-	-	-	-
	Wound Infection	-	-	-	-	-
4 Weeks	Hypertrophic Scar	-	1	-	-	-
	Scar Hyperpigmentation	-	-	-	-	-
	Contracture	-	-	-	-	-
12 Weeks	Cosmetic Outlook	Good	Fair	Fair	Fair	Fair

Outcome is assessed by the presence or absence of hematoma and ischemia of flap on post operative day 1, wound dehiscence, flap necrosis, wound infection on 1 week post operatively, hypertrophic scar, scar hyperpigmentation, contracture on 4 weeks post operatively, cosmetic outlook on 12 weeks postoperatively. All flaps survived on postoperative day 1 follow-up. At postoperative 1-week follow-up, we observed wound dehiscence in rhomboid flap reconstruction in 2 patients (11.11%) out of 18 patients in whom rhomboid flap is used. Dehiscence is seen at post auricular area in keloid excision and buccomandibular area in malignant melanoma excision. Total number of cervicofacial advancement flaps done in the study are 5 out of which 2 patients showed wound dehiscence at buccomandibular area in SCC excision, which healed by secondary intention. There was hypertrophic scar formation at 4 weeks post operatively in 1 patient with category 3 dog bite wound reconstructed by linear advancement flap. The ultimate cosmetic outlook at 12 weeks postoperatively is good in rhomboid flap and fair in all other flaps analysed in our study.



Figure 01 Shows squamous cell carcinoma over right buccomandibular area and reconstruction by cervicofacial advancement flap

- shows squamous cell carcinoma over right buccomandibular area,
- shows defect after tumour excision
- shows reconstruction by cervicofacial advancement flap,
- shows flap after 1 week postoperatively,
- shows flap after 12 weeks postoperatively



Figure 02 Shows squamous cell carcinoma on left suborbital area and reconstruction by rhomboid flap

- shows squamous cell carcinoma growth,
- shows defect after excision of tumour,
- shows reconstruction by rhomboid flap,
- shows flap after 1 week postoperatively,
- shows flap after 4 weeks post operatively.



Figure 03 Shows basal cell carcinoma with left suborbital area facial skin defect after excision of lesion and reconstruction by linear advancement flap

- Shows basal cell carcinoma skin lesion over left lateral wall of nose.
- Shows reconstruction of skin defect by linear advancement flap.
- Shows flap on post operative day 1.
- Shows flap on post operative day 7 after suture removal.
- Shows flap after 4 weeks post operatively.

DISCUSSION:

Face represents complete personality of human being. Cosmetically it is very important part of a person especially for woman. There are many situations when due to disease or trauma, facial defect arises, which requires reconstruction by either local or distant surgical flaps.

Primary closure is the most commonly used method to treat soft tissue defects. In the reconstruction of primary closure for circular defects, a dog-ear had been considered the standard approach. To avoid dog-ears, an elliptical excision would be needed that would include adjacent normal tissue. As a result, it would create a longer scar than the defect. Therefore, primary closure may not be appropriate for use in the facial region from a cosmetic perspective [2].

Skin grafting is usually performed when defects are large and unsuitable for primary closure. However, skin grafts are less desirable due to the colour differences between the donor and recipient sites and scarring[3]. A number of different techniques have been described for

reconstruction of facial defects. To date, there is no clear criteria for selection of one or the other technique[4]. Therefore, in our study, patients with small-to-medium defects, a local flap was preferred over skin graft.

In the present study, maximum number of patients were in the age group of 41-70 years with mean age of presentation 44 (43.49) years. All cutaneous malignancies in the study (SCC, BCC, Malignant Melanoma) are seen after 5th decade of life in our study with mean age of cutaneous malignancies in the study being 55.93 years. Similar results were observed in a study by **Farooq et al**[5], the mean age of cutaneous malignancies is 47±7.694 years. **Rolekar NG et al**[6] mean age of presentation of cutaneous malignancies is 55 years. In a study by **Rao JK et al**[7] mean age of patients with facial malignancies is 61 years. In **Ebrahimi A et al**[8] study mean age of cutaneous malignancies is 53.02±4.2. In our study among cutaneous malignancies number of males were 19 (59.37%) and number of females were 13(40.62%) male to female ratio is 1.46:1. Similar results were observed in a study by **Farooq et al**[5] out of 300 cases of cutaneous malignancies studied, the males were 195 (65%) and females were 105 (35%), showing M: F ratio of 1.85: 1. In **Rolekar NG et al**[6] study males were 20 and females were 10,M:F=2:1. In a study by **Rao JK et al**[7] males were 45 and females were 25,M:F=1.8:1.

Among 60% patients of cutaneous malignancies, 40.6 % patients had basal cell carcinoma, 37.5% patients had squamous cell carcinoma, 21.8% patients had malignant melanoma. Thus in our study we found basal cell carcinoma to be more common among cutaneous malignancies. While in a study by **Rolekar NG et al**[6] ,56.6% patients had BCC, 33.3% had SCC, 10% had malignant melanoma. In a study by **Farooq et al**[5] 61% patients had BCC, 32% had SCC, 7% had Malignant melanoma. An increase in incidence of basal cell carcinoma is expected because of the aging population and greater exposure to solar ultraviolet radiation from depletion of the ozone layer[9, 10].

In our study defect analysis was done as per the subunits of cheek and selection of flap design was based on size and location of defect. Excellent cosmetic outcome was achieved. In a study by **Ebrahimi A et al**[8], also cheek was divided into subunits like suborbital, buccomandibular, auricular and reconstruction was planned. A study by **Wei, M & Luo et al**[11] and **Ghali G et al**[12] supports our study.

Table 04 Comparison Of Local Flaps In Various Studies

Local Flaps	Ebrahimi et al[8]	Rolekar NG et al[6]	Rao JK et al[7]	Present study
Rhomboid flap	6	-	-	18
Advancement flap	-	-	-	16
VY advancement flap	10	7	34	5
Cervicofacial advancement flap	-	-	-	5
Nasolabial flap	-	8	24	9

Most common local flap in our study is rhomboid flap. In a study by **Ebrahimi et al**[8] most common flap studied is V-Y advancement flap. In **Rolekar NG et al**[6] nasolabial flap is the most common local flap studied. In **Rao JK et al**[7] study V-Y advancement flap is the most common local flap studied.

Assessment of patient satisfaction, was done using a scale ranging from 0 to 10 (0 -3= not satisfactory, 4- 7=fair,8-10=good). All patients in our study experienced fair to good results in terms of cosmetic outcome. Similar results were observed in other studies like **Kyung Suk Lee et al**[13] in 2017, **Ebrahimi et al**[8], **Rao JK et al**[7] and **Rolekar NG et al**[6].

Bites are common injuries, usually seen in hospital emergencies, accounting for 0.3% to 1.1% of visits[14]. Children are the main victims of canine attacks, both in morbidity and lethality[15]. It is believed that half of the children were bitten by dogs at some stage of their lives, and one of the main injury sites in this age group is the head, which increases morbidity[14]. In our study also we found similar pattern, we analyzed 12 patients of category 3 dog bite wounds over face of which 58.3% belong to first and second decades of life. 6 were males and 6 were females. Similar results were observed in other study conducted by **Mcheik JN et al**[16]. We believed in delayed closure of canine bite wounds, and reconstruction by local flaps done after 3rd dose of anti rabies vaccine.

CONCLUSION:

Face represents complete personality of a human being; therefore, adequate cosmetic correction of facial defects is very important. In our experience, local flaps give the best results and are the first choice for reconstruction of the face. Although many flaps are described, most defects can be best closed by rhomboid flap, advancement flap, v-y advancement flap and nasolabial flap. Outstanding functional and cosmetic results can be achieved. Excellent cosmetic outcome can be achieved by defect analysis as per subunits of cheek and selection of flap design based on size and location of defect. Proper execution requires considerable technical skill and experience. Reconstruction of facial defects has recently undergone rapid evolution. However, the local flaps are still the workhorse for facial reconstruction, placing them at prior step in reconstruction ladder.

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