

Mustarde Cheek Advancement Flap: A Versatile and Robust Option to Resurface Infraorbital and Cheek Defects

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ABSTRACT

Objective: To determine the outcomes of Mustarde cheek flap for reconstruction of infraorbital and cheek defects.

Study Design: Prospective observational study.

Place and Duration of Study: Pakistan Institute of Medical Sciences, Islamabad, Pakistan from Aug 2024 to Jan 2025.

Methodology: Sixty patients who presented with infraorbital and cheek defects were enrolled in the study and planned to undergo reconstruction of infraorbital and cheek defects by applying Mustarde's flap. The primary outcome measure was success that was absences of any sort of complication and accurate placement of flap. SPSS version 22 was used to analyze the data.

Results: In this study, 60 patients were enrolled with median age of 40.00 (IQR:20.00) years. There were 28(46.7%) males and 32(53.3%) females. Out of 60 patients, success was achieved in 47(78.3%) cases without any complication. Out of 13 patients in whom complications were developed, sagging of the flap was noted in 8(61.5%) cases, ectropion of the lid margin in 2(15.4%) cases, hematoma 4(30.8%), infection 5(38.5%), distal flap necrosis 5(38.5%) cases, facial nerve injury 2(15.4) cases and recurrence in 1(7.7%) patient.

Conclusion: Mustarde cheek flap was found to be effective and successful method for reconstruction of infraorbital and cheek flap.

Keywords: Cheek Defects, Flap Loss, Infraorbital Defects, Mustarde Cheek Flap, Reconstruction.

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INTRODUCTION

The cheek, which occupies a prominent location on the face, is the biggest facial unit. Common causes of harm include burns, traumatic injuries, and skin cancer resections. These may result in abnormalities that heal naturally and leave obvious scars.¹ Two different tissue types and cosmetic components are involved in the repair of an oncologic defect involving the lower eyelid and the infraorbital cheek, which often leads to complicated reconstructive issues.² The cheek that covers the orbital bone and the lower eyelid have a somewhat blurry but significant border. One-stage reconstruction is unquestionably the best option for achieving both functional and cosmetic restoration after tumor removal. For plastic surgeons, finding a dependable and appropriate flap for a one-stage repair is still quite difficult.^{3,4} Infraorbital cheeks are often the site of skin cancer and consequently surgical abnormalities. To get the best possible aesthetic and functional results, reconstruction in this area must

preserve surrounding free margins. Using inferior or lateral tissue reservoirs, a flap may be necessary for large lesions.^{5,6}

The three aesthetic components of the cheek that are usually recognized are the preauricular, buccomandibular and suborbital. The gingival sulcus, anterior sideburn, lower eyelid and nasolabial line are the boundaries of the suborbital unit. Repair of these deficiencies must account for the possibility of blunting of the nasofacial sulcus and the creation of ectropion, with involvement of the nasal and lower eyelids, respectively.^{7,8} The rotating Mustardè flap is used to repair the lower eyelid area, the lateral nasal wall, and significant cheek deformities. Harvesting starts at the margin of the excision defect, continues into the lateral canthus of the lower eyelid, and concludes with a superior and lateral incision near the temple. Subcutaneous dissection is used to avoid damaging any nerve branches. Since the MF is a large flap, securing it to the zygomatic arch helps prevent the flap from insertion being too stressed. Burow's triangles are used to aid in the direct suture closure of the donor site.^{9,10} Therefore, we conducted this study to examine the role of Mustarde's flap in local setting

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to improve our practice and implement a type of flap which is highly successful and has better cosmetic results.

METHODOLOGY

This Prospective observational study was conducted for 06 months from August 2024 to January 2025 at Pakistan Institute of Medical Sciences, Islamabad Pakistan after taking approval from institutional review board (F-5-2/2024(ERRC)/PIMS dated 15 Aug 2024). The total calculated sample size was 60 patients. The sample size was calculated using the WHO calculator by taking a 95% confidence interval, 10% absolute precision required and percentage of success i.e. 81% with Mustarde's flap.¹¹ Patients were enrolled from surgery wards by applying Non-probability, consecutive sampling technique.

Inclusion Criteria: Patients of age 16-60 years, either gender, presented with infraorbital and cheek defects were enrolled in the study and planned to undergo reconstruction of infraorbital and cheek defects by applying Mustarde's flap.

Exclusion Criteria: Patients who required multiple reconstructive interventions, history of prior surgery in same region or at same site, previous failed surgery, or patients having preexisting ectropion, ASA III-IV were excluded from the study.

Informed consent was taken and basic information including name, age, gender, medical history, size and location of defect were recorded. Then patients were shifted to operation theatre for surgical procedure. General anesthesia was used for every surgery. Both the area and the flap were delineated with a 3–4 mm margin. Two different kinds of sutures—one for the medial side of the defect and another for the lateral side—were utilized to identify the orientation of the defect in the excised material. Following excision, flap marking was verified using the opposite technique of planning. In the subcutaneous plane, flap was lifted. Only when the cheek flap has been compromised by the layer of subcutaneous fat and after tests to evaluate if further incisional extension and cheek rotation are required can the ultimate length of the incision be established. By attaching the flap to the orbital margin's periosteum, tension was removed from it. A composite nasomucoperichondrium graft, attached to the medial and lateral canthal ligament was used to repair the inner lamellae of the lower eyelid. To fit the globe's shape, the septal cartilage must be scored and thinned. All the patients were followed up in OPD for

6 months. During follow-up, period graft was examined carefully. If hematoma or infection developed within 30 days of surgery before stitch removal, then they were noted. Patients were followed up further and if graft intake was good and absorbed with the surrounding tissues, then success was noted. If there was sagging of flap, ectropion of lid margin observed, distal flap necrosis or facial nerve injury was observed, then complication was considered. Recurrence was also noted if occurred. All the data was noted in proforma.

All data was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 28. Median and Interquartile range were calculated for variables like age and size of defect, as these variables were not following normal distribution (Shapiro-Wilk test was applied). Success, and complication were presented as frequency and percentage. Data was stratified for effect modifiers including age and gender. Frequency of success was compared in age and gender strata by using chi-square test, considering $p\text{-value} \leq 0.05$ as significant.

RESULTS

In this study 60 patients were enrolled with median age of 40.00 (IQR:20.00) years. There were 28(46.7%) males and 32(53.3%) females. Out of 60 patients, 27(45.0%) had history of type II diabetes, 25(41.7%) had history of hypertension, and 27(45.0%) were anemic. Out of 60 patients, mostly left side cheek was involved [43(71.7%)]. The mean size of defect was 3.28 ± 1.18 mm. (Table-I).

Table-I: Demographic characteristics of Patients (n=60)

Characteristic(s)	Values
Age of patients (in years)	40.00 (IQR:20.00)
Gender	
Male	28(46.7%)
Female	32(53.3%)
Medical history	
Diabetes mellitus	27(45.0%)
Hypertension	25(41.7%)
Anemia	27(45.0%)
Lateral side involved	
Left	43(71.7%)
Right	17(28.3%)
Size of defect (mm)	3.00 (IQR: 2.00)

Out of 60 patients, success was achieved in 47(78.3%) cases without any complication while in 13(21.7%) patients, complications were noted (Figure).

Out of 13 patients in whom complications were developed, sagging of the flap was noted in 8(61.5%)

cases, ectropion of the lid margin in 2(15.4%) cases, hematoma in 4(30.8%), infection rate was 5(38.5%), as well as distal flap necrosis was also observed in 5(38.5%) cases, facial nerve injury was observed only in 2(15.4) cases, which was later resolved by medication. Recurrence was noted in 1(7.7%) and that patient underwent repeat reconstruction as shown in Table-II.

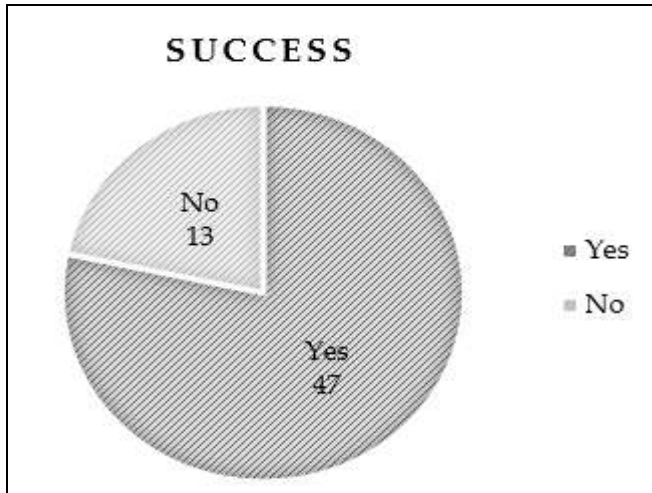


Figure: Success of Mustarde's Flap to resurface infraorbital and cheek defects

Table-II: Distribution of Complications in Patients (n=13)

Complication(s)	n (%)
Sagging of flap	8(61.5%)
Ectropion of the lid margin	2(15.4%)
Hematoma	4(30.8%)
Infection	5(38.5%)
Distal flap necrosis	5(38.5%)
Facial nerve injury	2(15.4%)
Recurrence	1(7.7%)

We also compared success rate in different age groups and observed that success rate was almost similar in all age groups, but in patients aged <30 years, success was achieved in about 93% cases as shown in Table-III. Females showed more success than males, although insignificant statistics was obtained (p -value>0.05). Success rate was also high in non-diabetics (85%) as compared to diabetics (70.4%), similarly, among non-hypertensive (80%) than hypertensive (76%), although the difference was insignificant (p -value>0.05). But a different pattern was observed in anemia patients in whom success was almost 89% while among non-anemic patients, success was achieved in about 70% patients (p -value>0.05). In patients with larger flap, success was achieved in 83.3% cases while in small sized flap, success was achieved in 75% cases (p -value>0.05).

Table-III: Association Between Patient Characteristics and Treatment Success (n=60)

	Success		p -value
	Yes (n=47)	No (n=13)	
Age (in years)			
<30 years	13(92.9%)	1(7.1%)	0.314
31-45 years	21(75.0%)	7(25.0%)	
45-60 years	13(72.2%)	5(27.8%)	
Gender			
Male	20(71.4%)	8(28.6%)	0.225
Female	27(84.4%)	5(15.6%)	
Diabetes mellitus			
Present	19(70.4%)	8(29.6%)	0.176
Absent	28(84.8%)	5(15.2%)	
Hypertension			
Present	19(76.0%)	6(24.0%)	0.711
Absent	28(80.0%)	7(20.0%)	
Anemia			
Present	24(88.9%)	3(11.1%)	0.073
Absent	23(69.7%)	10(30.3%)	
Lateral side involved			
Left	32(74.4%)	11(25.6%)	0.242
Right	15(88.2%)	2(11.8%)	
Size of defect (mm)			
2-3 mm	27(75.0%)	9(25.0%)	0.443
4-5 mm	20(83.3%)	4(16.7%)	

DISCUSSION

In our study, we observed success in 47(78.3%) cases without any complication. Out of 13 patients in whom complications were developed, sagging of the flap was noted in 8(61.5%) cases, ectropion of the lid margin in 2(15.4%) cases, hematoma 4(30.8%), infection 5(38.5%), distal flap necrosis 5(38.5%) cases, facial nerve injury 2(15.4) cases and recurrence in 1(7.7%) patient. Jain *et al.*, found recurrence in two instances, one of which had revision excision and one declined reoperation. The flap contracted and sagged and the lid edge entropized in three instances (19%), although 81% of cases were successful. To avoid them, the flap must be properly constructed, rotated, and sutured high so the palpebral fissure is a tiny slit postoperatively.^{11,12}

Pre-operative planning is crucial for the complicated process of reconstructing the midface utilizing locoregional flaps. A number of critical factors affect the outcome of the treatment, including selecting the appropriate flap, honouring the vascular pedicles, and comprehending the face components. Among many choices, locoregional pedunculated flaps are often the best treatment for skin abnormalities in the midfacial area.^{10,13}

Esser and Mustardé devised the cervicofacial rotation-advancement flap in 1918 to reduce inferior

lid margin strain by recruiting tissue lateral to the defect rather than below it. These complicated lower eyelid and cheek restorations have yielded several successes, but they remain risky. The surgeon and patient would benefit from reduced dissection, surgical time, and hospital stays without increasing ectropion risk.^{14,15}

Unfortunately, the cervicofacial flap's random blood supply and subcutaneous dissection make it prone to distal edge necrosis and dehiscence, particularly for bigger defects. A flap with distal edge necrosis requires local wound care and patient education on healing. The cervicofacial flap (Mustarde's flap) was still considered a viable choice for moderate- to large-sized cheek deformities. For tissue colour and texture similarities, the residual cheek and neck tissue is appropriate for restoration.^{16,17}

The Mustardé method has drawbacks. Vascular integrity. Smoking, scar tissue from prior operations or radiation, and other vascular compromising hazards might reduce blood flow to new flaps. A patient's history of vascular problems should be considered. Cosmetic preferences also affect repair method selection. In males with beards, facial hair may transfer from the preauricular to the cheek area, restricting the Mustardé flap to patients without facial hair.^{9,18} The size of the Mustardé increases the likelihood of ectropion, therefore tracking sutures must be carefully placed to divert stress vectors and prevent distorting free margins, especially on the eyelids and nasal alae. Despite outstanding results, surgeons unfamiliar with bigger face flaps may not use the Mustardé flap for nasal surgery due to these obstacles. Physicians should consider all possibilities to maintain nasal function while reducing scarring, ectropion, and surgical dehiscence.^{19,20}

All surgeons treating orbito-palpebral abnormalities must understand its flap design and adaptability. It's an easy flap to learn. Patient satisfaction is good. It has modest problems that are readily treated.¹¹ Limited trial had been conducted before regarding this issue.

CONCLUSION

Mustarde cheek flap is found to be effective and successful method for reconstruction of infraorbital and cheek defects. In future, we will implement Mustarde cheek flap to increase the chances of successful flap placement and reduce risk of complications and recurrence of infraorbital and cheeks defects.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

HK & AKM: Data acquisition, data analysis, critical review, approval of the final version to be published.

RS & HS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SA & HA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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