

Comparison of Local Flaps and Skin Grafts to Repair Cheek Skin Defects

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ABSTRACT

Background and Objective: Selecting the appropriate technique for surgical incisions, and reconstruction of facial defects after skin tumour excision has always been one of the surgeon's biggest concerns. The aim of this study is to compare the results between the local flap and skin graft to reconstruct cheek defects after basal cell carcinoma excision. **Patients and Methods:** In this retrospective study, 40 patients with skin defects resulting from skin tumour (Basal cell carcinoma) excision in cheek zones (16 sub-orbital, 18 bucco-mandibular and six auricular) were treated using local flap ($n = 20$) and skin graft ($n = 20$) from October 2010 to April 2012. All patients were followed up for 12 months, postoperatively. In addition, general assessments including complications, patient satisfaction, tissue co-ordination, skin colour and hospitalisation days were obtained. **Results:** Five patients had postoperative hyper-pigmentation complication in the skin graft group and none occurred in the local flap ($P = 0.046$). In the early postoperative period (2 weeks), mean scores in patient satisfaction, tissue co-ordination and skin colour were statistically significant increase in the local flaps ($P < 0.001$, $P < 0.001$, $P < 0.001$, respectively) and in the later postoperative period (12 months) only mean scores in skin colour significantly increased in the local flaps ($P < 0.001$). The mean postoperative length of hospitalisation days was 1.7 ± 0.4 days in the local flap group, and 3.63 ± 1.16 days in the skin graft group ($P = 0.001$). **Conclusion:** In the local flap group: Patient satisfaction, tissue co-ordination and skin colour were improved after 2 weeks. Also in 12-months follow up visits, skin colour was improved significantly and the hyperpigmentation was reduced. Generally, in this study the local flaps had better results in clinical outcomes and patient satisfaction. However, for each cheek defect the surgeon must choose the appropriate reconstruction strategy to avoid undesirable outcomes.

KEYWORDS: Cheek reconstruction, local flap, skin grafts, tumours, basal cell carcinoma

BACKGROUND

Skin cancer is the most common malignancy occurring in humans.^[1] The most common malignant tumours of the face are basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanoma.^[2-5] BCC is the commonest skin cancer.^[6] Current treatment modalities for skin cancers and premalignant lesions include surgical excision, electrocautery, curettage, cryotherapy, and irradiation, but surgical excision has been reported to be the best treatment modality for cancer treatment and preventing recurrence.^[7] Cutaneous carcinomas of the cheek may involve the

epidermis, dermis and, subcutaneous tissues that overlie the superficial musculo-aponeurotic system (SMAS) and can also involve deeper structure of the face.^[8,9] There are several reconstruction options after excision of skin tumours in this region of the face including primary repair, skin graft, local flap, regional flaps, distant and free flaps. The choice of reconstructive procedure is dependent upon several factors, including size, location, involvement of deeper structures, etc. Primary repair is used in small defects less than 2 cm when there is no tension on the edges of the defect. Depending on the donor site and the needs of the patient graft can be split-thickness or full-thickness. A split-thickness skin graft contains epidermis and a variable amount of dermis.^[10] A full-thickness skin graft includes all of the dermis as well as the epidermis.^[10] In skin grafts, the aesthetic outcome can be poor due to colour and texture mismatch of the transplanted skin. Flaps are classically categorised based on their vascular supply, composition, method of transfer and

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design.^[11,12] Proper execution of facial reconstruction also relies on appropriate analysis and characterisation of the defect.^[12] Local flaps for cheek reconstruction including Rhombberg transposition flap, advancement flap, rotation- advancement flap (Mustarde flap) and v-y advancement (kite flap).^[13] Due to the unique characteristics of the cheek subunit, few complex local flap designs can be used to reconstruct the vast majority of defects.^[9,13] For larger cheek defects (>6 cm), we need some type of regional or distant flap.^[13] Free flaps are applicable for complex soft tissue and bone defects or through and through defects.^[13] The surgeon should choose the simplest type that can achieve the desired effect. With all surgical procedures, complications can occur on reconstruction in the facial areas. Dehiscence generally occurs within the first 2 weeks after surgery. Complications that appear at a later stage usually involve the aesthetic outcome. Typical aesthetic deficits consist of the trapdoor or bulkiness phenomenon for local flaps and colour mismatch between the reconstructed area and the neighbouring skin or atrophy and shriveling of the graft with secondary distortion of the surrounding soft tissue for full-thickness skin graft.^[14-16]

OBJECTIVE

Selecting the appropriate technique for surgical incisions, and reconstruction of facial defects after skin tumour excision have always been one of the surgeon's biggest concerns. The aim of this study is to compare the results between the local flap and full thickness skin graft for reconstruction of the defect after excision of skin tumours on the cheek.

PATIENTS AND METHODS

A retrospective review of all patients ($n = 40$) who presented with skin defects resulting from skin tumour (BCC) excision in cheek zones [Figure 1] (16 sub-orbital, 18 bucco-mandibular and 6 pre-auricular) were reconstructed using local Flap [Figure 2] ($n = 20$) and skin graft [Figure 3] ($n = 20$) between October 2010 and April 2012.

The present study was conducted at the department of plastic surgery in Baqiyatallah University of medical sciences, Tehran, Iran. This study was approved by the ethical committee of our University. Patients with a history of taking certain medications such as corticosteroids or chemotherapy and the presence of comorbidities such as diabetes, lupus erythematosus or scleroderma, those who withdrew from follow-up and patients with defect >6 cm were excluded from the study. We usually performed wide local excision in our facial tumours, in rare cases we did Mohs surgery. Local flap reconstruction included (six Rhombberg transposition flaps, four rotation-

advancement flaps (Mustarde flap) and ten v-y advancement (kite flaps)), Skin graft surgery included (12 full-thickness skin graft and eight thick split-thickness skin graft) harvested from post auricular and medial arm respectively. All patients were followed up for 12 months postoperatively. Three patients were lost for follow-up (two patients of local flap and one of skin graft). The study was conducted on patients of a single surgeon and all postoperative examinations were performed in plastic surgery clinic by a surgeon other than the primary surgeon,

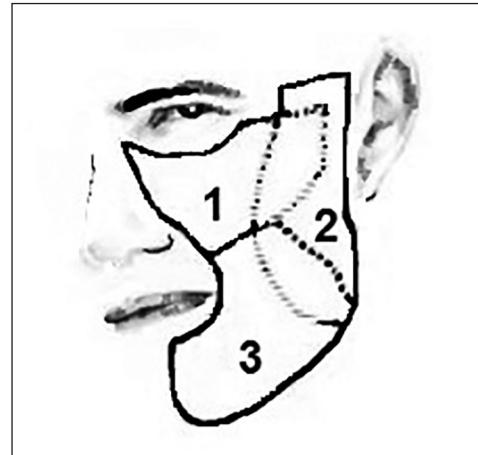


Figure 1: Aesthetic cheek zones according to Mathez textbook of plastic surgery: 1) Sub-orbital, 2) Pre-auricular and 3) Bucco-mandibular. Areas with dotted lines are overlapped zones between two zones

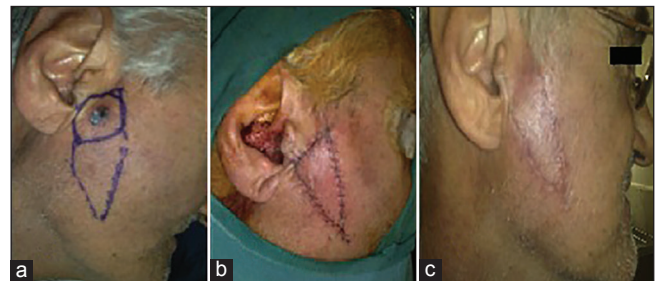


Figure 2: (a) A man with a basal cell carcinoma in the Pre-auricular zone of the cheek and design of the kite flap (b) Closure of the defect with no distortion of the surrounding structures after operation (c) Six months postoperatively



Figure 3: Longterm aesthetic results of skin graft and local flaps in two middle age women with a basal cell carcinoma in the Sub-orbital zone of the cheek (left) and buccomandibular zone (right)

but for reasons of patient satisfaction, the primary surgeon saw the patient on every visit as well. In addition, general assessments including complications (hypopigmentation, hyperpigmentation, infection, ischaemia, necrosis, keloids and hypertrophic scars), patient satisfaction, tissue co-ordination, skin colour and hospitalisation days were obtained. Assessment of satisfaction, tissue coordination and skin colour were done using a scale ranging from 0 to 10 (0 = no satisfaction, 1-4 = mild satisfaction, 5-7 = moderate satisfaction, 8-9 = satisfaction, 10 = extreme satisfaction).

Preoperative, intra-operative and postoperative photography was performed in all patients and the results were compared between the two groups in terms of skin colour and texture. All data were checked for a normal distribution using the Kolmogorov-Smirnov test. Quantitative variables were compared between groups using the Student's t-test or Mann-Whitney U-test, depending on whether normal or non-normally distributed variables were used, respectively. For qualitative data, Chi-square test and in the absence of circumstances Fisher's exact test was used. Data were analyzed using SPSS 20 software (SPSS, Chicago, IL, USA). A P-value less than 0.05 was considered statistically significant.

RESULTS

Forty patients were included in this study; (20 patients in local flap group and 20 with the skin graft group) [Figures 2 and 3]. The mean age of the patients was 53.02 ± 4.2 years. The mean maximum lesions diameter of the patients was 2.93 ± 0.24 cm. There was statistically no significant difference between the two patient groups in respect to gender, age and maximum lesions diameter [Table 1]. There was no case with complications (hypopigmentation, hyperpigmentation and infection) in two groups after 2 weeks and no case was observed with hypopigmentation in two groups after 12 months of follow-up. Five patients had postoperative hyperpigmentation in the skin graft group and none occurred in the local flap group and there was statistically significant difference between the two patient groups (P = 0.046). Also, there was no significant difference between the two patient groups in respect to complications (ischaemia, hypertrophic scars, necrosis and keloid) [Table 2].

In the early postoperative follow-up visit (2 weeks), mean scores in patient satisfaction, tissue coordination and skin colour were comparable in the two groups and there was statistically significant difference between the two patient groups (P < 0.001, P < 0.001, P < 0.001, respectively) [Figure 4].

In the later postoperative follow-up visit (12 months), mean scores in patient satisfaction, tissue coordination and skin colour were comparable in the two groups (P = 0.112, P < 0.064, P < 0.001, respectively) [Table 3]. Also, there were significant correlation between the patient satisfaction, tissue coordination and skin colour in 2 weeks and 12-months follow-up (0.55, 0.52 and 0.57, P < 0.001, P < 0.001 and P < 0.001, respectively).

The mean postoperative length of hospital stay was 1.7 ± 0.4 days in the local flap group and 3.63 ± 1.16 days

Table 1: Demographic and maximum lesions diameter data (mean ± SD except for gender data)

Items	Local flap	Skin graft	P value
Gender (M/F)	8/10	10/9	0.62
Age (y)	53.9±4.52	52.2±4.42	0.39
MLD	3.14±0.34	2.84±0.42	0.58

MLD: Maximum lesions diameter

Table 2: Complications (ischemia, hypertrophic scars, necrosis and keloid) (number of cases)

Items	Local flap	Skin graft
Ischemia	1	4
Hypertrophic scars	1	2
Necrosis	0	1
keloid	0	1

No statistically significant between two groups

Table 3: Patient satisfaction, tissue coordination and skin colour after 12-month follow up (mean ± SD)

Items	Local flap	Skin graft	P value
Patient satisfaction	6.3±0.9	5.3±0.9	0.112
Tissue coordination	6.2±0.8	5.2±0.8	0.064
Colour	6.2±0.8	5.1±0.42	0.001

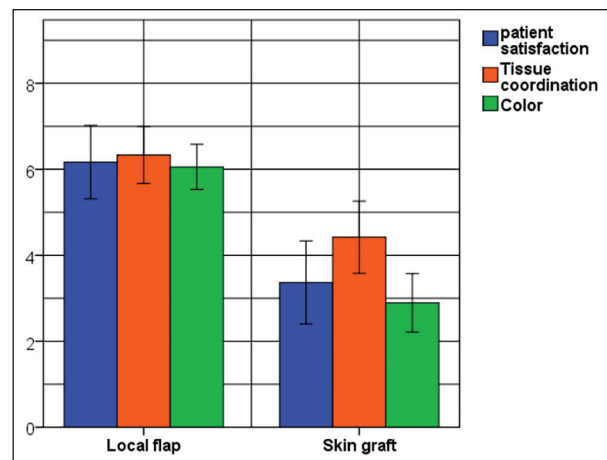


Figure 4: Means ± SD score for evaluated patient satisfaction, tissue coordination and color two weeks after operation. The results were 6.2 ± 1.7 vs. 3.4 ± 2.0, 6.3 ± 1.3 vs. 4.4 ± 1.7, 6.1 ± 1.6 vs. 2.9 ± 2.0 for local flap vs. skin graft, respectively (P < 0.001, P < 0.001, P < 0.001).

in the skin graft group. There was significant difference between the groups with respect to length of hospital stay ($P = 0.001$). We had no recurrence of tumour during follow-up and in all patients safe margins were confirmed by frozen section intraoperative and permanent pathologic report postoperatively.

DISCUSSION

The reconstruction of skin and soft tissue defects of the cheek can be challenging.^[9] There are several reconstructive options after excision of skin tumours of the cheek, including primary repair, skin grafts, different local flaps, regional flaps, distant and free flaps. The choice of reconstructive procedure is dependent upon several factors, including size, location, involvement of deeper structures, etc.^[13] In the present study we assessed patients with cheek defects resulting from skin tumour (BCC) excision that were treated with local flap or skin graft. Patient satisfaction, tissue co-ordination and skin colour were significantly higher in local flap group. In postoperative follow-up patient satisfaction and tissue coordination were similar in both groups, but skin colour was improved in the local flap group. Skin grafting was used successfully in reconstructing defects situated in concavities and over a bony foundation, which provides the underlying structure critical to the flap and prevents excessive contraction.^[9] Another study showed that skin grafting was one of the most useful reconstructive modalities for skin and subcutaneous tissue defects; however, postoperative scars were sometimes a determining factor of patient satisfaction; in particular, the colour match between the grafted skin and surrounding recipient skin was important.^[17] Split-thickness skin grafting is widely used for primary wound coverage after skin cancer resection or relatively extensive skin defect coverage, such as extensive burns; because donor-site morbidity is lower and wider skin grafts are available.^[18] Particular attention should be given when skin graft is considered for defect closure adjacent to eye lid, nasal margin, or oral commissure due to concern of skin graft contraction.^[3] In the present study we didn't have any complications (hypopigmentation, hyperpigmentation and infection) in the two groups at two weeks. Another study reported that when the size of the defect was smaller than 4 cm; flaps can make efficient coverage with fewer complications.^[19] In our study hyperpigmentation in the skin graft group was significantly higher compared to local flap group. The ideal facial reconstruction should provide a good colour and texture harmony with adjacent tissues. Optimal aesthetic reconstruction of facial defects is dependent on the availability of donor sites with similar colour, texture, sebaceous quality, and

thickness to the defect tissues. We explain advantage and disadvantage of both flaps and grafts to our patients but most of them have more inclination to flap coverage in facial cheek reconstructions due to better cosmetic outcome and second ary morbidity due to harvesting of the graft at the donor site. A great number of local flaps, pedicled flaps and micro-vascular free flaps have been employed over the years for the reconstruction of mid-facial defects.^[13] Nevertheless, reconstruction of the mid-face remains a challenging and still varied problem due to the different defects and the complex three-dimensionality of the region.^[20]

CONCLUSION

In this study local flaps had better results in clinical outcomes and patient satisfaction as compared to grafts. However, for each cheek defect the surgeon must choose the appropriate reconstruction strategy to avoid undesirable outcomes. We recommend local flap reconstruction in on the cheek that are skin defects less than 6 cm and where there is no fear of recurrence of the tumour.

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