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Eyelid Reconstruction with Full Thickness Skin Grafts After Carcinoma Excision

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Background: Various techniques have been proposed for reconstruction of the eyelid anterior lamella after carcinoma excision: among these are the transposition of skin flaps, and full-thickness skin grafts or combination of these two.

Aim: To present our experience in eyelid reconstruction with full-thickness skin grafts and to assess the aesthetic and functional outcomes.

Patients and methods: The present retrospective study included 39 patients (20 males, 19 females, mean age 71 yrs) with surgically excised eyelid carcinoma, followed by reconstruction using full-thickness skin grafts. The patients were treated between 2005 and 2014. Parameters recorded were patient demographics, histological classification of malignancy, tumor localization and size, postoperative defect size. In cases of large full-thickness lower lid defect Hughes tarsoconjunctival flap was used for reconstruction of posterior lamella. Full-thickness skin grafts donor sites included upper eyelid, preauricular area and inner brachial area. We appraised the grafts viability one week after surgery and the aesthetic results - 6 months after surgery by the graft colour and lid position.

Results: In 95% of the cases the skin grafts were viable. The full-thickness skin graft (FTSG) failed in two patients because of subcutaneous haematoma. There were a few early postoperative complications including graft hypertrophy, graft contraction, and partial graft failure, which were managed without additional surgery. All 39 patients had normal postoperative lid function. All 39 had either good (14) or excellent (25) cosmetic results.

Conclusions: Our findings suggest that full-thickness skin graft is a good choice in periocular reconstructive surgery after carcinoma excision. The surgical technique is easy to perform producing proper functional and aesthetic results.

INTRODUCTION

Periocular skin tumours are the most common tumours encountered in ophthalmic practice. Basal cell carcinoma (BCC) is the most common malignant eyelid tumour; it has a low risk for metastasis but considerable invasive potential. Complete surgical excision remains the “gold” standard of treatment – it produces excellent results if the tumour is completely removed.¹

Reconstruction of the eyelids after tumour excision is a highly complex procedure because of their function and critical role in appearance. Optimal restoration of eyelid form and function depends on a firm understanding of their normal position, the structural support system of the eyelids, and the forces that keep the eyelids in precise balance. Surgeons can choose among numerous reconstruc-

tive techniques to correct a deficit, depending on its location, depth and size in restoring normal eyelid function, and an aesthetically pleasing form.^{2,3}

In cases with excision of large tumours there are different options for eyelid anterior lamella reconstruction including a variety of flap procedures, full-thickness skin grafts (FTSG) or combination of both. Although known for almost 3000 years, FTSG were introduced to the Western world only in the nineteenth century.^{4,5}

The periocular area is considered a suitable host as it has a rich vascular supply for capillary regrowth. The main advantages of FTSG are availability and low metabolic requirement.^{6,7} Complications associated with periocular FTSG are not common: these include subcutaneous haematoma formation, graft failure, graft hypertrophy, graft

contraction and ectropion formation. Most of these often do not require surgical retreatment.⁶

AIM

The aim of the present study was to present our experience in eyelid reconstruction with full-thickness skin grafts and to assess the functional and aesthetic outcomes.

PATIENTS AND METHODS

Between 2005 and 2014, we conducted retrospective case series study that included 39 consecutive patients treated with surgical excision of eyelid carcinoma followed by reconstruction with FTSG.

The parameters recorded were patient demographics, histological classification of malignancy, tumour localization and size, postoperative defect size. Tumour and postoperative defect size were defined into four groups based on the maximum diameter using a straight rule: 0–0.9 cm, 1–1.9 cm, 2–2.9 cm, 3–3.9 cm.

The surgical technique was as follows. All lesions were excised under local anaesthesia using lidocaine 2%. The excision line was measured and marked 3 mm from the visible tumor edge with skin under tension. Standard excision techniques were used and specimens were fixed on hard pad and marked with different colored needles for orientation. The specimens were sent for histological examination in formalin. In cases with well demarcated tumours the wound was closed after excision. In cases of poorly demarcated tumours after hemostasis, the wound was treated with tobramycin ointment and a non-adherent dressing while awaiting a paraffin section histological confirmation of tumour clearance (3–4 days). If the tumour was found to extend to any margin of the specimen, a further 2 mm of tissue was excised from the involved margin and repair delayed until clearance was achieved.

In cases of full-thickness lower lid defect Hughes

tarsconjunctival flap was used for reconstruction of posterior lamella. In all cases we used FTSG for reconstruction of anterior lamella of the eyelid. FTSG donor sites included upper eyelid, preauricular area and inner brachial area. The graft size was approximately 2 mm larger than the postoperative defect size. The graft was thinned with dissecting scissors, in order to remove the subcutaneous and fatty tissue, and then carefully sutured to the area that had to be covered with interrupted 6-0 silk suture. The compressive gauze dressing with gentamicin solution was prepared and removed after 48 hours. A new dry gauze dressing was changed daily for the next 5 days. Sutures were removed 7 to 10 days after surgery depending on skin graft appearance. Hughes tarsconjunctival flap was divided 4 weeks after surgery.

We appraised grafts viability one week after surgery by their colour and presence or absence of dark spots. We scored the result as follows: poor results - FTSG is dark coloured with necrotic spots; good results - white to light pink skin graft with dark spots; excellent results - light pink colored FTSG. Aesthetic results were appraised 6 months after surgery by a team of two eyelid surgeons (authors of this work), according to lid position and graft colour (**Table 1**). For final score we accepted the lower result. Eyelid function was assessed according to the ability for lid closure. Also, we asked patients how they evaluate their appearances 6 months after surgery.

Follow up examination was done every 3 months the first year after surgery, every 6 months in the second year and annually thereafter.

RESULTS

The study included 39 patients who underwent complete tumour excision followed by reconstruction using FTSG. There were 20 males (51.3%) and 19 females (48.7%), mean age 71 years (range

Table 1. Appraisal of aesthetic result after surgery according to FTSG colour and lid margin position

Appearance	Results		
	Poor	Good	Excellent
FTSG colour at 6 months	Widely different than surrounding skin	Slightly different than surrounding skin	Identical with surrounding skin
Lid margin position at 6 months	Ectropion and/or more than 2 mm retraction	Insignificant retraction of lid margin (up to 2 mm)	Normal position, symmetrical to the respective lid

26–95 yrs). Thirty-five patients (89.7%) were diagnosed after histological conformation with basal cell carcinoma and 4 (10.3%) with squamous cell carcinoma. The tumour involved the lower eyelid in 29 patients (74.4%), the upper eyelid in 5 patients (12.8%), and medial canthus in 5 patient (12.8 %). The majority of tumours 30 (76.9%) were smaller than 2 cm and most of the post-surgical defects 32 (82.1%) were between 1.5 cm and 3 cm. Delayed repair was performed in 6 patients. In 17 patients (43.6%) surgical excision of the tumour resulted in full-thickness eyelid defect and Hughes tarsoconjunctival flap was used for reconstruction of posterior lamella. The most common site for FTSG harvesting was the upper lid - 24 (61.6%), followed by inner brachial area - 10 (25.6%) and preauricular area – 5 (12.8%). Grafts viability was appraised as poor in two patients, good in 7 patients and excellent in 30 patients on seventh day after surgery. In 95% of the cases the skin grafts were viable. FTSG failed

because of subcutaneous haematoma formation in two patients. There were a few early postoperative complications including graft contraction (3 patient), graft hypertrophy (5 patients), and partial graft failure (3 patients), which were managed without additional surgery. There was no difference in FTSG viability in the cases with Hughes tarsoconjunctival flap. There were no differences in viability of the grafts depending on donor sites or time of eyelid reconstruction. Partial graft failure was observed in cases with FTSG maximal diameter greater than 2.5 cm. Mean follow up period was 18 months (range 6 – 62). All 39 patients had normal postoperative lid function. All 39 had either good (14) (**Fig. 1**) or excellent (25) (**Fig. 2**) cosmetic results six and more months after surgery. Better aesthetic results achieved when FTSG harvesting site was the upper

Figure 1. Basal cell carcinoma of the lower eyelid. Reconstruction with Hughes tarsoconjunctival flap and FTSG from inner brachial area. **a.** Before surgery; **b.** Six months after surgery.

Figure 2. Basal cell carcinoma of the lower eyelid. Reconstruction of anterior lamella with FTSG from upper eyelid. **a.** Before surgery; **b.** Two years after surgery.

lid. All patients were satisfied with the appearance of the repaired sites and donor sites at their follow-up examinations.

DISCUSSION

Eyelid malignancies represent the leading cause of plastic reconstruction in the orbital region, followed by cicatricial retraction, post-traumatic tissue loss and congenital colobomas.⁸ The goals of eyelid reconstruction after carcinoma excision are corneal protection, restoration of the integrity of the lid lamellae, normal lid movement and achievement of proper aesthetic result.⁹

Reconstruction of the eyelid after large tumour excision is possible to perform with different surgical procedures, including Tenzel semicircular flap, Fricke flap, Mustarde flap, etc. In our practice we prefer to use FTSG for reconstruction of anterior lamella of the eyelid and Hughes tarsoconjunctival flap for reconstruction of posterior lamella in cases with large defects, because these techniques allow us to achieve recovery of the eyelid without any facial scars. FTSG are usually harvested from several possible donor sites (upper lid, preauricular, retroauricular, neck, clavicular and supraclavicular, and inner brachial areas) yielding different graft thicknesses accordingly.^{4,5,10,11} In the present study, the upper eyelid was the most common donor site (61.6% of the cases). We prefer to use eyelid donor skin in cases when postoperative defect size and excess of upper eyelid skin permit because of the better cosmetic results achieved. In cases with FTSG harvested from inner brachial and preauricular area the main postoperative problem was different thickness and color of tissue.

Success of skin transplantation depends on graft revascularization. The blood supply to the graft comes from recipient bed.^{4,5} Therefore, important conditions for graft revascularization are rich vascular supply of recipient bed and very close contact between graft and recipient surface. Possible reasons for graft failure are hematoma formation beneath the graft, infection, or graft movement. In the relevant literature, the most common early postoperative complication after skin transplantation is hematoma formation.⁶ To prevent it, we made numerous small incisions on the graft to create ways for blood drainage. Nevertheless, in two patients with skin graft bigger than 3 cm in diameter, hematoma formation beneath the graft was the reason for the graft failure. In the present study, we found that in 95% of the cases the skin grafts were viable.

It is important to emphasize that we did not find any difference in graft viability in patients with Hughes tarsoconjunctival flap compared to those with anterior lamella reconstruction alone. In our study, we did not have any serious complications after flap division, although other authors reported complications in 31% (14/49) of cases.¹²

We have to be very cautious when assessing the viability of the graft in the first days after surgery. Usually the colour of the graft is mixed, with dark and light spots and with time (after a week) it appears vital, light pink in colour. If there are signs of ischemia after the first week, we can wait for 3 to 6 weeks, because survival rate is better than expected. A black graft signifies partial or total graft failure and necrosis.⁶ Risk for necrosis increased in cases with very thick graft with remaining subcutaneous fat tissue.^{13,14} There were three patients in the present study that we detected with partial graft failure 10 days after surgery. Several weeks after the necrotic tissue was removed, spontaneous re-epithelialization was observed.

It is well known that all grafts contract, once immediately after excision from donor site and again after revascularization. Primary shrinking is due to contraction of dermal elastic fibers, secondary shrinking is result of myofibroblast activity. In cases with FTSG primary shrinking is more prominent than secondary.^{12,15} In the present study we observed early graft contraction in 3 (7.7%) of 39 patients. Contraction was overcome by massage with a steroid ointment for one month after surgery, without functional or cosmetic consequences. Although we did not find a significant rate of lid malposition, it is worth noting that contracture of FTSG in the periocular region carries the potential risk for ectropion formation or lid retraction.

The process of skin graft hypertrophy is not fully understood. It probably is aberration in the process of wound healing, which includes cell proliferation, inflammation, and increased synthesis of cytokines and extracellular matrix proteins.¹⁶ There are different treatment approaches that include observation, pressure garments, massage, and silicone gel sheets. Intralesional injection of steroids provided good results according to Leibovich et al.⁶ Steroid injection may be associated with local side effects such as pain, dermal atrophy, necrosis, ulceration, and hypopigmentation.^{16,17} Conservative measures such as observation in cases of graft hypertrophy may be a reasonable treatment modality which may result in improvement or resolution in many

cases.⁶ In the present study, we have followed five patients with graft hypertrophy (donor site, inner brachial area), without any treatment. Three years after surgery skin graft was on the level of surrounding skin, and the difference was only in the graft colour. Despite the fact that there are no studies to support this finding, many clinicians have reported similar findings⁶, and we confirm it based on our modest experience.

Normal lid position and functions are very important for eye protection and eye function. All 39 patients in this study achieved normal postoperative lid function, including lid movement, ability for eye closure and keeping a healthy ocular surface. Aesthetic result after surgery is important not only for the patient, but also for the surgeon. All 39 participants in the present study had either good (14) or excellent (25) cosmetic results. Better aesthetic results were achieved when FTSG harvesting site was the upper lid. In other patients, six months or one year after surgery there was a difference in colour of grafted from inner brachial area skin.

We can conclude that despite the possible complications, the full-thickness skin graft is a good choice in periocular reconstructive surgery because of its high level of viability. Generally, it is possible to overcome complications without additional surgery, with local steroid treatment or observation alone. The surgical technique is easy to perform and yields good functional and aesthetic results.

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Реконструкция глазного века с помощью полнослойного кожного трансплантата после удаления карциномы

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Введение: Были предложены различные методы реконструкции передней пластинки века после иссечения карциномы: среди них транспозиция кожных лоскутов и полнослойный кожный трансплантат или сочетание этих двух техник.

Цель: Представить наш опыт в реконструкции глазного века с помощью полнослойных кожных трансплантатов и оценить эстетические и функциональные результаты.

Пациенты и методы: В настоящее ретроспективное исследование были включены 39 пациентов (20 мужчин, 19 женщин, средний возраст 71 год) с хирургически удаленной карциномой глазного века, восстановленного затем путем реконструкции с использованием полнослойных кожных трансплантатов. Пациенты лечились между 2005 и 2014 г. Записываемые параметры были демографические данные пациента, гистологическая классификация злокачественных опухолей, локализация опухоли и размера, послеоперационный размер дефекта. В случае большого полнослойного дефекта нижнего века для реконструкции задней пластинки использовался конъюнктивальный хрящевой лоскут Хьюза. Донорские участки для получения полнослойных кожных трансплантатов включали верхнее веко, преаурикулярную

область и внутреннюю плечевую зону. Мы оценивали жизнеспособность трансплантатов через одну неделю после операции и эстетические результаты - через 6 месяцев после операции по цвету трансплантата и положению века.

Результаты: В 95% случаев кожные трансплантаты были жизнеспособны. Полнослойный кожный трансплантат оказался неуспешным у двух пациентов из-за подкожной гематомы. Имелось несколько ранних послеоперационных осложнений, включая гипертрофию трансплантата, контрактуру трансплантата и частичного отторжения трансплантата, для которых не потребовалось дополнительной операции. Все 39 пациентов имели нормальную послеоперационную функцию века, также у всех 39 пациентов отмечались или хорошие (14) или отличные (25) косметические результаты.

Заключение: Наши данные свидетельствуют о том, что полнослойные кожные трансплантаты представляют собой хороший выбор в периокулярной реконструктивной хирургии после иссечения раковой опухоли. Хирургическая техника легко позволяет получить соответствующие функциональные и эстетические результаты.

Ключевые слова: полнослойные кожные трансплантаты, реконструкция глазного века, опухоль глазного века