Reconstruction of facial soft tissue: comparison between conventional procedures and the face-lift technique

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Abstract

We compared the result of replacement using a modified face-lift technique with those of other commonly used surgical techniques for the treatment of defects of the soft tissue of the infraorbital and cheek region. We made a retrospective observational study of 86 patients who had defects of the facial soft tissue after excision of malignant tumours. Procedures used for reconstructions included non-vascularised skin grafts, local flaps, facelift technique, and microvascular free flaps, and we evaluated morbidity; duration of hospital stay; the need for, and duration of stay in, the intensive care unit (ICU); and functional and aesthetic outcomes.

We studied 46 men and 40 women (mean [range] age 71 [8-99] years). We found no significant difference between the methods apart from shorter duration of hospital stay and lower incidence of ectropion in the facelift group. The facelift technique also gave the best aesthetic outcome. However, in defects larger than 60 cm\(^2\), microvascular free tissue transfer was the only choice. The facelift technique is reliable and safe, and gives excellent aesthetic and functional outcomes, but its use is limited to defects smaller than 60 cm\(^2\).

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Introduction

Skin cancers are the most common malignant tumours among white-skinned people, and the incidence is increasing.\textsuperscript{1} Treatment consists mainly of complete excision together with a safety margin of 3-30 mm, which can subsequently cause a large tissue defect.\textsuperscript{2,3} Regardless of aetiology and type of facial skin cancer, reconstruction of the soft tissue defect remains challenging even for experienced surgeons.

It requires that function should be regained, together with a good aesthetic outcome.\textsuperscript{3} In particular, the infraorbital and cheek regions play a crucial part because of the potential for damage to the facial nerve, formation of ectropion, and the impact on the aesthetic outcome.

Several surgical techniques have been used including free non-vascularised skin grafts (full-thickness or split-thickness skin grafts), local flaps (rotation or transposition), or free vascularised flaps,\textsuperscript{3} each of which has its own advantages, indications, and limitations. Small facial skin defects can be adequately closed with local flaps. For larger defects, free skin grafts can be used with minimal operative effort but with poor functional and aesthetic outcomes. However, they carry high risks of necrosis, mismatch in colour and texture,
contracture, and the need for a donor site. For reconstruction of large composite facial defects, vascularised free tissue flaps offer the best option with regards to volume, vascularity, and pliability of tissue. However, the operation takes a long time, involves prolonged duration of stay in hospital, and requires suitable infrastructure. It also requires an additional donor site with its own associated morbidity. Other complications include failure of flaps with associated complications. The aesthetic outcome is generally sub-optimal because colour and texture differ.

We have developed a modified facelift technique that involves incision, deep dissection, and composite lifting. Here we present a comparison of the outcome after reconstruction of defect using the modified facelift technique and other techniques used in the infraorbital region and cheek. We consider the morbidity, duration of stay in hospital and in the intensive care unit (ICU), and the aesthetic outcome.

**Patients and methods**

The study was a retrospective cohort study and included patients who were operated on from 2008–14 for defects of the facial soft tissue in the infraorbital and in the cheek region. In case of a large defect affecting both areas, major expansion was considered. Patients with a history of multiple operations in the same region were excluded so there was no possible influence on the surgical outcome.

The following variables were recorded: size of defect, haematoma, necrosis, damage to the sensory or motor nerves, duration of stay in hospital or the need for ICU, deformity of neighbouring structures (eyebrows, commissure of the mouth, nasal ala, or eyelids), skin wrinkles (paranasal, jowl, latero-orbital), and the incidence of lateral sweep and visibility of the scar (Table 1).

Complications of wound healing that might lead to necrosis were monitored, and cases were divided into minor and major necrosis. Major necrosis required surgical revision, but minor necrosis needed no revision and primary wound healing was sufficient.

Damage to sensory nerves was subdivided in hypoaesthesia and anaesthesia. Damage to facial motor function was recorded as mild (no appreciable disability) or subtotal nerve damage with subsequent functional impairment (such as a lagging eye lid, or problems with speaking, eating, or drinking). Severity of lid deformities (ectropion) was divided into mild and severe: “mild” included patients with only the inner lining of the eyelid visible, whereas in “severe” the conjunctiva was visible as well.

To evaluate aesthetic outcome, postoperative tissue integration was rated according to differences in colour alone (1 point), texture alone (2 points), and colour and texture (3 points) with the surrounding tissue, meaning that the lower the score, the better the aesthetic outcome. Differences in soft tissue structure were analysed by using Fitzpatrick’s Wrinkle Scale to evaluate the nasolabial, jowl, and latero-orbital...
wrinkles at each site. The matching points were subsequently subtracted, resulting in a value between 0 and 3. The less the difference the more symmetrical the facial soft tissue. For adequate statistical analysis, the five largest defects for each surgical technique were also compared.

The significance of differences was assessed with the aid of IBM SPSS Statistics for Windows (version 23, IBM Corp, Armonk, NY, USA) and we used the t test and Fisher’s exact test as appropriate.

Surgical technique

We make an incision starting from the lateral border of the defect and continuing to the preauricular region, following the preauricular crease to the base of the auricle and continuing round the ear to the retroauricular area. It can be extended into the occipital region if needed, which decreases skin tension and increases tissue mobilisation (Figs. 1–3). In the preauricular region we make the incision deep to the

Fig. 1. Diagram of the facelift technique. The incision starts from the lateral border of the defect. The flap includes skin and the superficial musculoaponeurotic system (SMAS). The fascia of the parotid gland and masseter muscle serve as surgical landmarks to find the right plane and avoid damage to the facial nerve.
parotid fascia, and dissect superficially to the anterior part of the lateral parotid gland. The flap includes skin and the superficial musculoaponeurotic system (SMAS). The masseteric fascia is prepared anterior to the lateral parotid gland. Dissection of the flap can be continued cranially, medially, caudally, or laterally, as needed.

The fascia of the parotid gland and masseter muscle serve as surgical landmarks to find the correct layer and avoid damage to the facial nerve. The skin may be mobilised from the submental and contralateral neck region to release the excess tissue of the submental region. The SMAS is then partly separated from the skin and each layer can be moved in a different direction according to the size, depth, and site of the defect (Figs. 1 and 2). The cheek fat pad, or SMAS is used to fill the region of the defect and avoid buckle formation as required. The excess skin is excised and wound closed without tension (Figs. 1 and 2).

The patient returned after four months postoperatively so that we could assess visibility of the scar, the aesthetic outcome, and the presence of ectropion (Figs. 4 and 5).

**Results**

The study included 86 patients (46 men and 40 women, mean (range) age 71 (8-99) years) who had cutaneous malignancies of the facial region excised. The sizes and sites of the defect, and duration of hospital stay in each group, are shown in Table 1.

When we compared the five patients with the largest defects from each group, patients in the local flap group were in hospital for eight days and in the facelift group for six days. None of them needed postoperative monitoring in ICU. Details of complications, aesthetic outcome, and facial symmetry are also shown in Table 1.
Discussion

The aim of the study was to evaluate the outcome of soft tissue replacement in the facial region, and we compared our modified facelift technique with other commonly used techniques. Optimal replacement of the lost tissue should consider the functional and aesthetic outcome, operative and donor site morbidity, and duration of hospital stay. Because the range of sizes of defects was so wide, the mean duration of hospital stay varied considerably. We calculated the mean duration of stay for the patients with the five largest defects in each group (Table 1), and the mean (SD) size of the largest defects treated with local flaps was 22 (±2.3) cm², leading to a mean duration of hospital stay of eight (range 0-18) days but no need for ICU. This is comparable to the results published by Lotter et al., who found a mean (range) stay in hospital of nine (3–18) days in their local flap group.

Patients whose defects were closed by microvascular free tissue transfer (mean (SD) size of defect 50 (±31.07) cm²) spent a mean of 11 (range 9-13) days in hospital, out of which a day was spent in the ICU. Other studies have reported hospital stays of 13–15 days with 1-7 days in ICU. In their study of 121 patients Myers and Ahn found no significant differences in duration of stay in hospital or ICU depending on the size of the defect. The mean duration of hospital stay in our facelift group (mean (SD) size of defect 40 (±9.67) cm²) was 6 (2-16) days and none of the patients had to go to the ICU.

Disturbed wound healing, necrosis, or haematoma are important immediate postoperative complications (Table 1). In a group of 208 patients with defects <1.5 cm², Woodard et al. described 4.8% incidence of necrosis and haematoma, whereas Wornom et al. reported that patients with 76 large combined defects show complications in up to 90% of them. A second operation for revision of necrosis was necessary in six patients in the local flap group (12%) but none in the facelift group. There was some evidence that patients with local flaps had more episodes of major necrosis, but this was not significant (p = 0.08). Revision after formation of a haematoma was necessary in four cases in the local flap group (8%) and in two cases in the facelift group. The results of the two methods did not differ significantly (p = 0.91) and are comparable with other reported outcomes.

Nerve damage is a clinically important complication that has an impact on the patient’s quality of life. Inconvenience and distress caused by hypoaesthesia or anaesthesia, or loss of motor function, may lead to severe injury to the eye (dryness of the cornea) or compromised speaking, eating, and drinking. Sensation was affected in six patients with local flaps (12%) and one patient who was treated by the facelift technique (p = 0.31). Motor damage was developed in one patient in each of the local flap and facelift groups (p = 0.55). Both patients complained of a mild reduction in function of the facial nerve.

Ectropion of the lower eyelid is a common postoperative complication and occurs in 0%-30% of all closures of infraorbital defects. We recorded it in its minor form in 22 patients (36%), and in its severe form (defined by visible conjunctiva) in 10 patients. This result is within the normal range when compared with the incidence reported elsewhere with similar-sized defects. Three patients who had had the facelift technique developed mild ectropion, but the severe form was significantly higher in local flap group (p = 0.032).

A good aesthetic outcome is an important aim in facial reconstructive surgery. In large tissue defects, the facelift group had the best aesthetic outcome with a rating of 1.25 compared with the local flap group with a rating of 2, and the free vascularised flap group with a rating of 3, and one explanation could be differences in the texture and colour of distant free flaps compared with local tissue. In the facelift technique the lifting of the affected side leads to a rejuvenated appearance, which can cause some facial asymmetry. However, it can be improved by facelifting the opposite side. Because scars do not form on the central areas of the face, the aesthetic appearance was significantly better (p = 0.032) than for patients with local flaps.

The Mustardé flap, which was first described in 1970, is similar, but based on rotation of the soft tissue of the cheek to close the infraorbital defects, and this can cause tissue to gather around the mouth and chin and increase the formation of wrinkles. The modified facelift technique, however, is based on pulling the tissue cranially, laterally, or medially as needed, and consequently it avoids these problems.

One limitation of the study was the small number of patients that did not allow matching by age, sex, or size and side of defect. In other words a prospective, randomised study would shed more light on this issue.

Conflict of Interest

We have no conflicts of interest.

Ethics statement/confirmation of patients’ permission

The patients agreed to the publication of the photographs.

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