Long-term outcome of the cheek advancement flap, a report of 41 cases

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ABSTRACT

Background: Due to incidental occurrence of ectropion as a late complication of cheek advancement flaps, this study investigated the long-term effects of these flaps for post-Mohs’ reconstruction of the cheek aesthetic.

Methods: All the patients who underwent a cheek advancement flap in the Catharina Hospital Eindhoven between January 2006 and January 2013 were included and assessed by means of a retrospective chart review and a survey about the long-term outcome and patient satisfaction.

Results: A retrospective chart review was performed on all 54 eligible patients, and 41 (76%) of these patients participated in the study. The mean follow-up was 3.5 years (SD = 2.0, range = 1–7 years). Early complications were ectropion (6%), infection (2%), dog-ears (1%), haematoma (4%), and distal tip necrosis (2%). Late outcome and complications were sensory neuropathies (41%), late ectropion (7%), hypopigmentation of scars (29%), contractures (27%), and abnormal hair distribution (17%). Patients rated their reconstruction as good or excellent in 87% of cases.

Conclusions: The cheek advancement flap is a suitable technique for reconstruction of large cheek skin defects after excision of skin malignancies. However, patients should be informed that long-term complications, including ectropion, can occur. Additional follow-up might lead to an early detection of these late effects.

Introduction

As the incidence of cutaneous malignant neoplasms of the face is rising, so is the demand for reconstructions [1]. One of the facial areas that can require reconstruction is the cheek area. While smaller defects can often be closed primarily, larger defects often require a local flap [2,3]. The cheek advancement flap is one of the workhorses in the reconstruction of larger defects in the cheek area. It was first described by Beare [4] in 1969 and later fine-tuned and popularized by Mustardé [5,6] and Schrudde [7,8].

At the Catharina Hospital, Eindhoven, the Netherlands, ~100–150 facial reconstructions are performed per year following Mohs’ micrographic surgery, including cheek advancement techniques. The occurrence of ectropion as a late complication after cheek advancement was an incentive to review the literature on long-term outcomes of this technique. We found, however, that most studies only focus on early complications and short-term outcome measures such as ectropion, wound infections, haematoma, dog ears, and necrosis of the flap or the distal tip, rather than mentioning long-term results [2,9–11]. The aim of our study is to present an overview of long-term outcome of cheek advancement flaps in our unit.

Methods

A retrospective chart review was performed of all the patients who underwent cheek reconstruction using a cheek advancement flap after Mohs’ micrographic excision of skin cancer between January 2006 and January 2013.

Surgical technique

Cervico-facial-rotation-advancement in a forward fashion was used in which incision lines were placed along borders of the cheek aesthetic unit, using the nasolabial fold, the infraorbital line, as well as relaxed skin tension lines. To prevent nerve damage, dissection was performed in the supra-SMAS plane. Undermining of the flap was performed to within the neck region. Patients were treated under general anaesthesia. In cases of less elaborate reconstructions or if patients were found to be medically unsuitable for general anaesthesia, the procedure was performed under local anaesthesia. Diathermic haemostasis was applied in every case. After haemostasis a decision was made whether to anchor or not to anchor the flap to the periosteum. A commonly used technique to prevent ectropion is anchoring of the flap to the periosteum.
Anchoring the flap reduces tension on the wound and the semimobile eyelid and is, therefore, likely to reduce the risk of ectropion occurrence. Anchoring was pre-formed with the help of a mini Mitek anchor system (Ethicon, Inc., Somerville, NJ), as proposed by Okazaki et al. [12], or with non-absorbable sutures to the periosteum. Anchoring was applied in cases of a large flap and when there was a considerable likelihood of occurrence of ectropion due to the weight of the flap, lack of skin laxity, and high skin tension [12,13]. After this part of the surgery the flap was sutured into place with a few stitches in the subcutaneous plane using braided, absorbable 4–0 sutures followed by closure of the skin with transcutaneous sutures with a 5–0 non-absorbable monofilament thread.

Patients were discharged on the day of surgery or on the first postoperative day.

Study design

We reviewed charts for demographics, medical history, smoking history, tumour histology, tumour size, cheek defect size, type of reconstruction, and early complications.

We defined early complications as those occurring within the first 8 weeks after surgery. We followed patients routinely in an outpatient setting 1 week and 6–8 weeks after surgery to evaluate these complications. Late complications were defined as complications occurring in the additional study follow-up period, i.e. at least 1 year after surgery.

Patients who participated in our follow-up study underwent physical examination and were asked to fill in a questionnaire at least 1 year after reconstruction in order to identify any additional complications and to evaluate patient satisfaction. The questionnaire consisted of four sections. The first section aimed to retrieve additional or missing information on medical history and drug use. Section 2 confirmed the early complications in the initial phase after surgery, as already retrieved by means of retrospective chart review. We evaluated occurrence of haematoma, postoperative infection, wound healing disorders, or necrosis and ectropion. The occurrence of ectropion was denoted in patients with scleral or conjunctival show. Patients were also asked for symptoms of ectropion such as watering of dry eyes and/or recurring conjunctivitis. In section 3 the patients were asked about late complications of the procedure such as sensory deficits, scar contractures, colour mismatch, and abnormal hair distribution. Section 4 evaluated the overall patient satisfaction after cheek advancement and any dysfunction in daily activities due to the effects of the reconstruction. Patient satisfaction was scored using a five-point Likert-type scale, in which 1 reflected very poor satisfaction, 3 fair, and 5 an excellent satisfaction.

Data were analysed using SPSS, and comparisons were made using Wilcoxon signed-rank tests.

Results

Patient demographics

From January 2006 to January 2013, we performed 167 reconstructions with involvement of the cheek aesthetic unit. Of these 167 cases, 54 underwent cheek reconstruction using cheek advancement flaps (Figure 1). Patients undergoing a cheek advancement had their defects located in the infraorbital or zygomatic subunit of the cheek, or in a combination of these two. Defects in the mandibular subunit were in most cases resolved by primary closure (Figure 2).

Of the 54 patients who underwent cheek reconstruction using a cheek advancement flap, 41 (76%) participated in our follow-up study. Thirteen patients were lost in follow-up: five patients were deceased of other causes than skin malignancies, four were unwilling to participate, and the remaining four could not be contacted due to outdated contact details. The mean follow-up was 3.5 years (SD = 2.0, range = 1–7 years).

Patient demographics are shown in Table 1. The mean age of patients was 67.7 years (range = 32–90 years). The mean defect size was 32 × 25 mm (range = 10 × 10 to 60 × 58 mm).
In 53 patients (98%) tumour histology showed basal cell carcinoma, of which 20 (37%) were of the nodular sub-type, 12 (22%) of the infiltrative sub-type, and two (4%) of the micronodular sub-type. In 19 cases (35%), we found combined basal cell carcinoma sub-types. In one case, microscopic evaluation of the resected tumour showed melanoma.

Eleven patients (20%) were active smokers, five (9%) were diabetic. None of the patients received pre-operative or adjuvant radiotherapy.

Early complications

We identified eight patients (15%) who experienced early complications. Ectropion was observed three times, haematoma twice, excessive scarring, infection, and distal tip necrosis all once. None of the patients showed symptoms of facial nerve injury (Table 2). The patient who developed postoperative wound infection had a history of chronic use of methotrexate.

Late complications and outcomes

Late complications are shown in Table 3. In the follow-up period, we found three additional cases of ectropion. In 17 (41%) patients we found some form of neuropathy; 11 patients (27%) complained of numbness, five (12%) described cold allodynia when encountering cold temperatures or wind, and three (7%) experienced regular paresthesia in the reconstructed area. Furthermore, 12 patients (29%) reported colour mismatch; in most cases, however, this consisted of hypopigmentation or hyperpigmentation in scars rather than colour mismatch between flap and surrounding skin. Seven patients (17%) reported an abnormal hair distribution, which was aesthetically displeasing. All of these cases were female patients in whom a medialisation of the side-burn had occurred after reconstruction. One patient (2%) complained of pain in the reconstructed area, which caused daily dysfunction. An overview is shown in Table 3.

Patient satisfactory survey

In total, 45 patients scored the final result; 41 study participants and four patients who communicated their scores by telephone. Twenty-six patients (58%) scored the final result as excellent, 13 (29%) as good, four (9%) as fair, and two (4%) scored the cosmetic result of the reconstruction as poor (Table 4).

There was a trend toward higher satisfaction in patients who had seen the defect after tumour excision and before reconstruction vs patients who had not seen the defect, although statistical significance was not reached (mean aesthetic score = 4.5 vs 4.2, respectively).

Discussion

As Menick described in 1987 [14], the cheek, together with the forehead, are considered as peripheral units of the face. The cheek is bordered by structures forming the central units of the face, which play an important role in facial expression and function. Since there is a narrow margin between these structures, any change in form and symmetry of the cheek can alter the appearance of the central units and, thus, of the facial expression and function. This is why reconstruction of the cheek is a challenging task and needs thorough consideration in order to achieve the best functional and aesthetic restoration possible with minimal complications and distortion of the surrounding structures. In cases of large defects the local advancement flap is to be considered as one of the pliable reconstruction options [3,8–10,15].

### Table 1. Patient demographics.

| Characteristics          | (n = 54) |
|--------------------------|----------|
| Age at surgery           |          |
| Mean (SD)                | 67.7 (13.3) |
| Range                    | 32–90    |
| Sex                      |          |
| Male                     | 29 (54%) |
| Female                   | 25 (46%) |
| Smoking                  | 11 (20%) |
| Diabetic                 | 5 (9%)   |
| Defect size              |          |
| Mean                     | 32 × 25 mm |
| Range                    | 10 × 10–60 × 58 mm |
| Size                     | 9.6 cm² (1.0–34.8 cm², SD = 8.9, median = 6.2) |

### Table 2. Early complications occurring after cheek advancement flap.

| Early complications | (n = 54) |
|---------------------|----------|
| Ectropion           | 3 (6%)   |
| Dog-ear/excessive scarring | 1 (2%) |
| Infection           | 1 (2%)   |
| Haematoma           | 2 (4%)   |
| Necrosis            | 1 (2%)   |
| Facial nerve injury | 1 (2%)   |
| Total               | 8 (15%)  |

### Table 3. Notable late effects and complications of cheek advancement flap.

| Late complications and effects | (n = 41) |
|-------------------------------|----------|
| Late ectropion                | 3 (7%)   |
| Sensory neuropathy            | 17 (41%)* |
| Numbness                      | 11 (27%) |
| Cold allodynia                | 5 (12%)  |
| Paresthesia                   | 3 (7%)   |
| Colour mismatch               | 12 (29%) |
| Contractures/tension          | 11 (27%) |
| Abnormal hair distribution    | 7 (17%)  |
| Social restraints             | 5 (12%)  |
| Pain                          | 1 (2%)   |

*Some patients experienced mixed sensory neuropathies.

### Table 4. Patient satisfactory level about cosmetic result after cheek advancement flap using Likert-type scale.

| Patient satisfaction         | (n = 45) |
|------------------------------|----------|
| Cosmetic result              |          |
| Very poor                    | —        |
| Poor                         | 2 (4%)   |
| Neutral                      | 4 (9%)   |
| Nice                         | 13 (29%) |
| Very nice                    | 26 (58%) |

*Some patients experienced mixed sensory neuropathies.*
Most studies focus on early complications and other short-term outcome measures, with a wide range in follow-up [10,11,15]. The most common reported complications include ectropion (0–46%), wound infection (0–5%), necrosis (0–9%), facial nerve injury (0–8%), and haematoma (0–6%) [2,9–11]. In our study we obtained long-term results by reviewing the included cases at least 1 year postoperatively. By these means additional complications were found such as distinct sensory neuropathies and occurrence of late ectropion.

Postoperatively the occurrence rate of ectropion was comparable to those of other authors [10,15].

Ectropion can lead to significant discomfort and ocular morbidity. Visual loss may occur due to keratopathy secondary to exposure or trichiasis [16]. Evaluation of lower lid ectropion can be performed by determination of horizontal laxity and vertical laxity. Horizontal laxity is established by the distraction test. If the lid margin can be pulled more than 8 mm away from the globe, significant canthal tendon laxity is present. A positive snap-back test, in which the lid does not return to its normal position after distraction without a blink, is a sign of poor orbicularis tone. Close attention should be paid to the anterior lamella, looking for signs of vertical shortening or scarring which would cause a cicatricial component [16]. Horizontal laxity is best corrected by tightening of the lateral canthal tendon [16,17]. Ectropion in our case series usually had a mechanical or cicatricial cause.

A common used technique to prevent ectropion is anchoring of the flap to the periosteum. Anchoring the flap reduces tension on the wound and the semimobile eyelid and is, therefore, likely to reduce the risk of ectropion occurrence. In literature, different kinds of anchoring techniques are described, and there are no adequate comparisons between anchored and non-anchored flaps. In our series, ectropion occurred in both anchored and non-anchored flaps. Therefore, we cannot conclude that anchoring plays a significant role in reduction or prevention of ectropion. Literature on this topic is sparsely available and solely states that anchoring the flap avoids eyelid distortion, no long-term effects are available [13].

An additional three cases of ectropion were found in our patients who were discharged from initial follow-up. This suggests that the actual rates of occurrence of ectropion are probably higher than recorded in the literature. After observing and examining these patients, we determined that in these cases ectropion occurred due to the maturation and contracture of scars, even though these patients did not experience significantly more tension or discomfort than patients without ectropion. The occurrence of ectropion was especially notable in patients in whom the defect included a portion of the lower eyelid. When late occurrence of ectropion is expected, adequate follow-up and treatment is required.

In all patients who developed either an early or late ectropion, we proposed secondary surgery, and three patients agreed to additional procedures. In two cases, we performed a lateral canthal sling procedure as first described by Tenzel et al. [17], and in the other case we performed a medial canthopexy.

The questionnaire also evaluated overall aesthetic outcome. Despite a slight difference in mean aesthetic score, there was no significant difference in perceived aesthetic outcome between patients with or without complications, nor was there a significant difference between the group of patients who had seen the extent of the skin defect before reconstruction and patients who had not seen it.

Based on the results of our study, we would recommend adequate information before cheek advancement surgery. Patients do not always realise that some symptoms such as ‘watering eyes’ and ‘cold intolerance’ could occur due to such a reconstructive surgery. Hence, it is of importance to inform patients before surgery about the effects, short- and long-term complications after this procedure. Furthermore, additional outpatient follow-up for at least 1 year after surgery might help to detect these complications.

Strengths of this study are the long follow-up, a relatively large patient population, and the extensive evaluation of complications and effects. The retrospective character, as well as the heterogeneity of defects in the cheek aesthetic unit can be noted as weaknesses of this review.

Conclusions

The cheek advancement flap is a suitable technique for the reconstruction of large cheek skin defects after excision of skin malignancies. Late complications, including ectropion and neuropathies, can, however, occur. Informing the patient of the possible occurrence of these complications is necessary. Additional follow-up until the first postoperative year might help to detect these complications.

Disclosure statement

There are no potential or actual, personal, political, or financial interests by any of the authors in the material, information, or techniques described in this paper.

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