

Reconstruction of Medial Lower Lip Defects After Tumour Surgery: Modified Staircase Technique

The most common cancer of the lower lip is squamous cell carcinoma (SCC). Micrographically controlled surgery (Mohs surgery) is the golden standard of therapy in localized SCC. Since the majority of lip cancer patients is >60 years of life, planning of surgery and reconstruction has to consider the age and co-morbidities. The staircase or step technique is a robust method to achieve a good functional reconstruction in a one-step procedure. We also describe a modified staircase technique when SCC is not infiltrating the orbicularis oris muscle.

KEYWORDS: Lip cancer, lower lip reconstruction, staircase technique, squamous cell carcinoma

INTRODUCTION

Squamous cell carcinoma (SCC) is one of the most common non-melanoma skin cancers. The annual rate of invasive SCC in Germany is almost 35,000. In Dresden, Saxony, the annual incidence is >130.^[1]

Lip cancer has a much lower incidence of $\leq 2\%$. Lower lip vermilion and adjacent skin is the preferential site for SCC of the lips [Figure 1]. The lip is considered one of the factors characterising a high-risk SCC.^[2] Nevertheless, as long as the tumour is localised, micrographically controlled surgery offers a high cure rate.^[3,4]

The resulting tissue defects, however, might be large and the reconstruction of the lower lip becomes a challenge. A variety of flaps has been created to combine radical surgery with a good functional and aesthetic outcome. Here, we want to illustrate our experience with the step technique (staircase technique) initially described by Johanson *et al.* and a modification of their technique for SCC not infiltrating the muscle and located in the other third of the vermilion.^[5,6]

ANATOMICAL CONSIDERATIONS

The lower lip region is composed of vermillion and cutaneous lower lip, which cover subcutaneous adipose tissue and the sphincter-type orbicularis oris muscle. On the oral site of the mouth the mucosal part of the lip is connected to the vermillion. At the angles of the mouth lip depressor and lip elevator muscles interact with the orbicularis muscle. Innervation is supplied branches of the trigeminal nerve (sensory) and the buccal and marginal mandibular branch of the facial nerve (motor). Vascular supply is derived from the inferior labial arteries in the upper part, whereas submental arteries supply blood to descend cutaneous lower lip and chin.^[7]

ANAESTHESIA

Most of the surgeries can be performed using either regional or local anaesthesia. For regional anaesthesia intraoral mental nerve block is preferred. Tumescence anaesthesia is less suitable, since the swelling of the tissue may cause a higher degree of distortion.

BILATERAL STAIRCASE TECHNIQUE

The bilateral staircase technique of Johanson *et al.* can be used to close medial defects of one third to up to two-thirds of the lower lip.^[5] Basically it represents a skin-muscle-mucosal flap for lower lip reconstruction. The lip cancer is removed in a rectangular fashion with appropriate free margins. The cut goes through all layers including orbicularis muscle and mucosa. The first step cut

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is performed parallel to the vermilion border and should have about 50% of the length of the defect. The vertical dimension is 8-10 mm. The following steps are created smaller until flap mobilization allows a low tension suture. Labiomental fold and commissures are preserved. The staircase technique provides a good sensory and motor innervation with satisfying functional outcome [Figure 2].^[5]

Meticulous haemostasis is necessary before any wound closure. For full-thickness defects a three-layer suture is performed with polybraided non-absorbable sutures for intraoral mucosa and vermilion and non-absorbable monofilamentous sutures for the cutaneous repair. The orbicularis muscle and submucosa are sutured by absorbable material like vicryl or poly-p-dioxanone.

MODIFIED STAIRCASE TECHNIQUE (KUTTENBERGER AND HARDT 1997)

Depending on the tumour infiltration the modified technique may be used. The major difference to Johanson *et al.* lies in the avoidance of full thickness cuts.^[5,6] The incisions including the staircase cuts are in a plane superficial to oral musculature. After complete excision of the tumour the step cuts are performed with preparation of subcutaneous layers from depressor labii inferioris muscle and orbicularis oris muscle to protect the sphincter-like function. Skin flaps are developed laterally.^[6] Haemostasis and suturing are the same as with the original technique [Figure 3]. The functional outcome seems to be faster, development of microstomia can be avoided. But in case of more advanced tumours, it might be not aggressive enough.

PATIENTS

During the last 12 years, 17 patients with SCC of the lower lip (T2, N0, M0) were treated by surgery and lip reconstruction was performed by staircase ($n = 12$) or modified staircase technique ($n = 5$). All but one patient were Caucasian male, a single female was included. The age range was 72-86 years, mean 82.1 ± 7.8 years. Patients had the following risk factors: Smoking ($n = 12$), outdoor work ($n = 9$), skin type I ($n = 6$).

Post-operative swelling was more pronounced after Johanson's technique^[5] compared to the modified technique of Kuttenger and Hardt.^[6] Two patients with the classical staircase technique had a post-operative partial wound dehiscence treated by secondary sutures. There was no case of wound infection. Neither speech difficulties nor oral leakage were encountered after the first post-operative week. There was no case of microstomia. Patient's satisfaction was high. Patients rated the aesthetic outcome good or satisfactory in 94.8%.

Follow-up was 6 months to 9 years. There were no local recurrences with micrographically controlled surgery.



Figure 1: Ulcerated squamous cell carcinoma of the midportion of lower lip

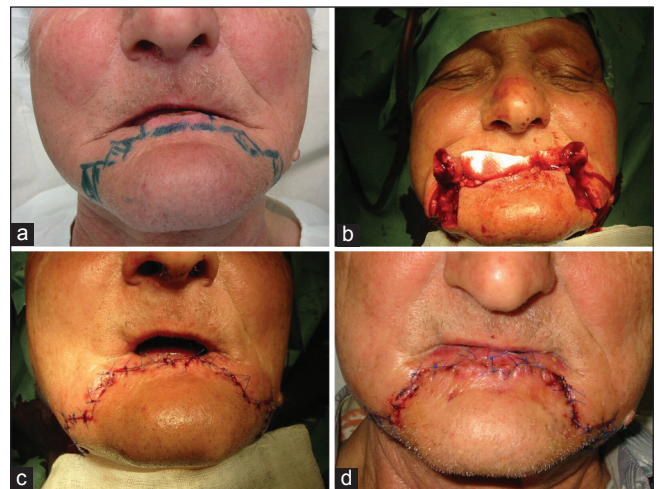


Figure 2: Staircase technique with full-thickness defect after squamous cell carcinoma surgery. (a) Pre-operative situation with skin marks for the staircase cuts. (b) Intraoperative situs. (c) After suturing. (d) 10 days after surgery

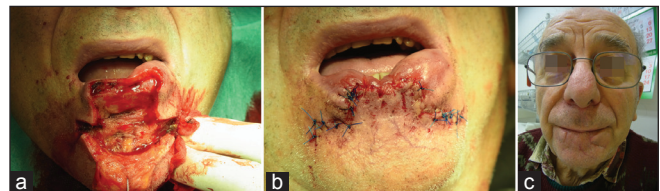


Figure 3: Modified staircase techniques. (a) After tumour excision the bilateral flap is prepared in a layer above the orbicularis oris muscle. (b) After suturing. (c) Outcome 8 weeks later

Overall survival was 82%, tumour specific survival was 100%. No secondary surgery was necessary during follow-up.

DISCUSSION

The primary aim in tumour surgery is a complete removal of the cancer. A second goal is the preservation

of function and aesthetics. While smaller tumour defects may be closed by W-shaped excision and primary closure, larger tumours leading to larger defects may be treated with loco-regional or distant flaps.

We have treated 17 patients with T2 SCC of the lower lip by bilateral staircase flaps. The bilateral staircase technique is a robust tool to close larger lower lip defects in one step and has gained wide acceptance.^[5,6] The functional and aesthetic outcome is acceptable. In our case series, patients were treated with either the technique by Johanson *et al.* or the modified procedure by Kuttner and Hardt protecting the orbicularis muscle, in cases this muscle has not been infiltrated by SCC.^[5,6] Both techniques do not interfere with necessary changes of dental prostheses. Post-operative drooling, vocalisation or chewing difficulties were seen only during the 1st week with a complete resolution thereafter. There were no infections. Patient satisfaction was high.

Other popular local flaps for larger lower lip defects include the Karapandzic flap and the Bernhard-Burrow-Webster flap. A later complication of the former is microstomy and distortion of the oral commissures. The latter often results in some incontinence of the orbicularis oris muscle.^[8] Meyer's flap preserves the orbicularis muscle and provides a very good mucosal lining. Here, mucosal flap preparation and commisuroplasty are more ambitious.^[9]

The majority of lip cancer patients are older than 60 years of age. Tumour-related factors and patient-related factors such as co-morbidities, medications or cardiovascular risks influence the selection of surgical procedures. For T2 SCC of the lower lip staircase technique combines a high rate of tumour curability with a relatively short

operation time and good functional and aesthetic outcome.^[5,10,11]

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