



Modified Interpolated Pancake Deltopectoral Flap: A Surgical Technique for Closure of an Orocutaneous Fistula in a Compromised Patient

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Abstract

Management of a therapy-resistant oropharyngeal fistula, which developed in a patient with significant perioperative risk factors after combined treatment for a carcinoma of the oral cavity, is presented in this manuscript. A tubed pancake deltopectoral flap was used to successfully close this serious late complication in a three-stage procedure, with satisfactory functional and aesthetic results. Pedicled and/or tubed pancake flaps can be used as an alternative salvage method for reconstruction defects in the head and neck region in patients in a high-risk situation. They are easy to carry out, avoid uncontrollable surgical trauma, and can provide adequate aesthetic and functional results in selected patients. The case is discussed along with a literature review.

Keywords: Head and neck carcinoma; Orocutaneous fistula; Late complication; Head and neck defect reconstruction; Deltopectoral flap; Pancake flap; Salvage surgery

Introduction

Standard treatment of carcinoma of the head and neck region consists of surgery and postoperative radiation. Development of an orocutaneous fistula after radiotherapy represents a serious early or late complication demanding surgical reconstruction to prevent a possible fatal outcome and to restore seriously reduced quality of life. These salvage situations can be associated with various high-risk factors in the patients, in particular in the case of significantly impaired tissue quality, which may result in a “frozen neck”. Any surgery can lead to delayed and impaired wound healing, resulting in devastating complications such as a carotid blowout. Free flaps are an established and standardized method for reconstructing defects in the head and neck region. If broad opening in a frozen neck is to be avoided and/or a vessel-depleted neck is to be expected, alternative reconstruction methods should be considered. The deltopectoral flap is a pedicled fasciocutaneous flap, which was used as a medially-based flap before the introduction of free flaps [1]. It provides a reliable blood supply in three angiosomes [2,3]. Flap failure rates of 10% to 25% have been reported, especially after prior adjuvant treatment involving the flap region [2,3]. Due to this, an additional delaying procedure is recommended, in particular if a remote defect is reconstructed after surgery and radiotherapy [3]. The delaying procedure can be combined with the construction of a tubed pancake flap [3]. In view of these characteristics, the deltopectoral flap is suitable for use as a salvage flap for reconstructing defects in high-risk situations [4].

Case Presentation

A 76-year-old patient developed an orocutaneous fistula in the left submental region more than 20 years after surgical resection of a G2 Squamous Cell Carcinoma (SCC) of the tongue and floor of the mouth on the left side. The resection involved bilateral neck dissection with submandibulectomy on the left side. The postoperative tumor stage was pT3 pN0 cM0. Brachytherapy of the floor of the mouth (24 Gy) and percutaneous adjuvant radiotherapy of bilateral neck area (50 Gy) resulting in a total dosage of 74 Gy to the primary tumor region. Tumor recurrence was excluded by repeated biopsies of the fistula, and there was no clinical or radiological evidence of osteomyelitis.

Despite conservative treatment, the fistula progressed and the patient presented with a frozen neck (Figure 1). The size and location of the tissue defect were an indication for flap reconstruction. The frozen and vessel-depleted neck made the use of a microvascular free flap inappropriate for reconstruction. It was therefore decided to reconstruct the defect by using a tubed pancake

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Figure 1 (Preoperative situation): The view from submental shows a progressive and therapy-resistant orocutaneous fistula.



Figure 2 (Step one): A delaying procedure was necessary to prepare the definitive closure of the orocutaneous fistula. Figure 2 shows the situation after raising a tubed pancake deltopectoral flap and after covering the donor defect with a split-thickness skin graft from the left thigh region.



Figure 3a: The tubed pancake deltopectoral flap was raised from the acromial region, partly de-epithelialized distally and made ready for rotation into the oral defect.

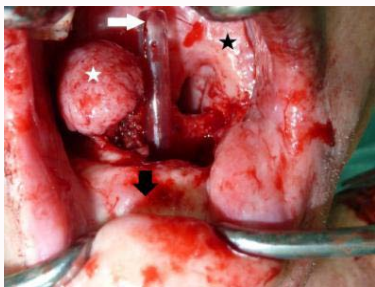


Figure 3b: Intraoperative intraoral view showing the orocutaneous fistula after preparation for insertion of the modified pancake flap (white arrow: A suction device inserted through the fistula; black arrow: Mandibular alveolar process; white asterisk: Tongue; black asterisk: Soft palate).

deltopectoral flap in a multiple-step procedure.

In step one, the size of the defect and the length of the pedicle required were measured. The pedicle was then raised and tubed. The resulting defect on the musculature of the upper left thoracic region was covered with a split-thickness skin graft (Figure 2). Step two was performed 4 weeks later. The size of the intraoral defect, the length of the pedicle, and the dimensions of the smooth tissue channel down to the opening in the submental skin were measured. The size of the



Figure 3c: The pedicle is pulled through the channel of the orocutaneous fistula into the intraoral space; the lower border of the de-epithelialized area is visible at the submental opening.



Figure 3d: The skin flap after being sutured into the defect of the floor of the mouth.
Figures 3a-3d (Step two): Main procedure to cover the defect.

flap was marked on the acromion and superior upper arm region. To promote in growth along the channel of the fistula, debridement of the fistula (Figure 3a) and de-epithelialization of the pedicle proximal to the skin island were carried out in accordance with the calculated length and size of the fistula channel (Figure 3b). After separation, the flap was pulled through the channel into the intraoral defect and the skin island was then sutured to the oral mucosa (Figure 3c,3d). The proximal skin of the pedicle was sutured to the submental skin. The defect in the deltoid, acromial, and upper arm region was covered with a split-thickness skin graft from. Step three was performed 3 months later, after in growth of the flap into its bed had proven to be adequate and the skin island had proven to be vital after temporary strangulation of the pedicle. The skin of the pedicle was tightly connected to the cervical skin and there was no sign of a fistula (Figure 4a). The pedicle was then divided, leaving a small area of skin from the pedicle in the submental region, which was used to achieve an aesthetically acceptable wound closure (Figure 4b). The residual pedicle was trimmed and repositioned to the upper thoracic area, and the abandoned split skin was removed.

Wound healing was uneventful without evidence of any complication 4 months after the final stage of reconstruction (Figure 5a, 5b). The patient had no signs of tumor recurrence and was very satisfied with the functional state. Speech and oral intake were possible again without any significant problems being reported. The aesthetic result was very well accepted by the patient, who reported being able to take part in all of his social activities. He died 61 months after closure of the fistula due to a non-tumor related cause.

Discussion

Oropharyngocutaneous fistulas are rarely observed late complications of treatment for carcinomas in the head and neck region. The situation after radical surgery and radiotherapy may result



Figures 4 a-b (Step three): Separation of the pedicle of the pancake flap and closure of the submental skin. View of the pedicle before (**Figure 4a**) and after (**Figure 4b**) transection. The residual skin of the pedicle was trimmed to close the skin of the submental region (**Figure 4b**).



Figure 5a: The view of the submental region shows a completely healed skin area.



Figure 5b: The view of the floor of the mouth shows complete healing of the tubed pancake deltopectoral flap in the former orocutaneous fistula (white asterisk: Tongue; black asterisk: Skin island).

Figures 5a,5b: The postoperative result 4 months later.

in unfavorable tissue conditions and in a lack of blood vessels suitable for vascular anastomosis. Due to inadequate tissue conditions, defect closure is often difficult to achieve. This specific situation requires individualized treatment planning, taking into account all prognostic and risk factors, comorbidities, and also functional and aesthetic aspects.

Although microvascular free flaps are the first choice for reconstructing defects in the head and neck region, pedicled flaps such as the deltopectoral flap have proven to be a useful tool even in the era of microsurgery, in patients who are considered not suitable for free flap reconstruction [2-10]. The procedure's versatility makes it possible to harvest flaps of various sizes without major functional or aesthetic deficits [3]. It possesses multiple unique advantages such as technical simplicity, a reliable axial blood supply, a large size, thinness and pliability. Chan et al. reported an overall flap survival rate of 96.3% after use of this flap [6]. Limitations of the method include

a limited rotational arc and a significant risk of distal flap necrosis in particularly long flaps, including the posterior and lateral deltoid regions [7]. A few measures are available to optimize the chances of successful reconstruction in a frozen neck that was previously irradiated and that is expected to have an inadequate vascular supply. One of these involves constructing a large pedicled, interpolated flap which facilitates the reconstruction of remote defects in the head and neck region without opening the severely damaged skin on the neck. A long-tubed pedicle enables flap rising with the skin island positioned over the third angiosome of the deltopectoral flap region. To obtain this long pedicle and improve the survival of the remote skin island, a delaying procedure has to be performed to achieve "autonomization" of the flap tissue. According to Tsuchida et al. the definitive surgery should be planned at least 1 to 2 weeks after such a delaying procedure in cases in which a tubed deltopectoral flap was used [8]. In a seriously compromised patient, as is described here, the next surgical step may be postponed further to achieve successful defect closure. In the present case, the tubed pedicle allowed almost free movement of the head until the final step of reconstruction was performed, without exposing the flap to risks such as shrinking or infection. In addition, a better in growth of the flap into the channel of the fistula was promoted by the de-epithelialization of the pedicle according to the length of the channel.

A technique similar to the one described here has been published only in one report. Balakrishnan et al. described the successful closure of an orocutaneous fistula in the floor of the mouth after irradiation. Using a tissue expander, the authors were able to primarily close the donor site [5].

Conclusion

In selected patients with a compromising risk profile including high-risk salvage situations, a modified tubed pancake deltopectoral flap can represent a suitable alternative for reconstructing defects in the head and neck region. This technique avoids the opening of a frozen and vessel-depleted neck that is prone to develop severely impaired and prolonged wound healing and life-threatening postoperative complications.

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