

HEAD AND NECK

Versatility of the supraclavicular pedicle flap in head and neck reconstruction

Versatilità del lembo peduncolato sovraclaveare nelle ricostruzioni del distretto testa e collo

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SUMMARY

Head and neck surgery has witnessed an increase in microvascular reconstructive procedures with free flaps over the last 20 years as they offer efficient functional recovery. Nevertheless, under certain circumstances they may be contraindicated or cannot be used. We present the use of supraclavicular pedicled flap in three patients with different recipient sites. All patients had acceptable functional and aesthetic outcomes. Donor-site morbidity was satisfactory. Supraclavicular pedicled flap is not only an alternative to free flap reconstruction, but also a first-choice option in head and neck reconstructive surgery.

KEY WORDS: Supraclavicular • Head and neck surgery • Pedicled flap

RIASSUNTO

Nella chirurgia cervico-facciale si è assistito ad un aumento delle procedure ricostruttive con lembi liberi nel corso degli ultimi venti anni, in quanto offrono un efficiente recupero funzionale. Tuttavia, in alcune circostanze possono essere controindicati o non possono essere utilizzati. Vi presentiamo l'uso del lembo peduncolato sovraclaveare in tre pazienti con differente sito ricevente. Tutti i pazienti hanno avuto risultati funzionali ed estetici soddisfacenti. La morbilità del sito donatore è stata trascurabile. Il lembo sovraclaveare potrebbe non solo essere un'alternativa alla ricostruzione con lembi liberi, ma anche un'opzione di prima scelta nella chirurgia ricostruttiva cervico facciale.

PAROLE CHIAVE: *Sovraclaveare • Chirurgia testa e collo • Lembi peduncolati*

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Introduction

Head and neck surgery has witnessed an increase in microvascular reconstructive procedures with free flaps over the last 20 years as they offer efficient functional recovery and better quality of life. However, not all patients are eligible for microvascular reconstructive surgery, depending on previous treatments and comorbidities. In such cases, locoregional pedicle flaps offer an additional opportunity for reconstruction in patients with a high risk of failure of microvascular procedures. The supraclavicular flap is a fasciocutaneous pedicled flap first described by Lambert in 1979¹; it is easy to harvest and has a wide arch of rotation and a good colour match. In addition, donor site morbidity is low due to the natural redundancy of skin in the supraclavicular region. We present our experience with supraclavicular pedicled flap in three patients with different recipient sites.

Case series

Case 1

A 74-year-old woman was referred to our department for a painful mass in the left parotid region. She had previously undergone total parotidectomy with sacrifice of the temporo-facial branch of the seventh cranial nerve and left selective neck dissection followed by adjuvant radiotherapy for an undifferentiated carcinoma of the right parotid gland. On examination, the patient presented multiple nodules in the right parotid and submandibular areas, which were hard and fixed. The skin above the lesions did not present ulcerations, but was hyperaemic. PET-CT showed intense uptake in the left subretromandibular region. FNAB confirmed the recurrence of the undifferentiated parotid carcinoma. We performed surgical resection of the left parotid region, exposing the

masseter muscle and the mandibular periosteum, with sacrifice of the left facial nerve and the overlying skin. In choosing reconstructive options, we rejected the use of free flaps due to the age of the patient and evidence of bilateral carotid stenosis. The choice fell on a cutaneous flap pedicled on the supraclavicular artery due to the anatomical proximity and the ability to adapt it to the recipient site. The skin defect in the parotid region was therefore closed with a left supraclavicular pedicle cutaneous flap. In order to improve aesthetic outcomes, we proceeded to flap revision under local anaesthesia 20 days after surgery. (Fig. 1)

Case 2

A 52-year-old woman with a history of tongue squamous cell carcinoma underwent total body PET-CT evaluation for worsening dysphagia, which demonstrated cervical pathological uptake at the level of C6. She had undergone left hemiglossectomy and left radical neck dissection 20 years before, followed by chemotherapy and radiotherapy for a squamous cell carcinoma of the left side of the tongue. The tongue was reconstructed using a radial forearm free flap. Direct microlaryngoscopic examination under general anaesthesia revealed an ulcerated lesion of the posterior face of the right arytenoid cartilage. Histo-

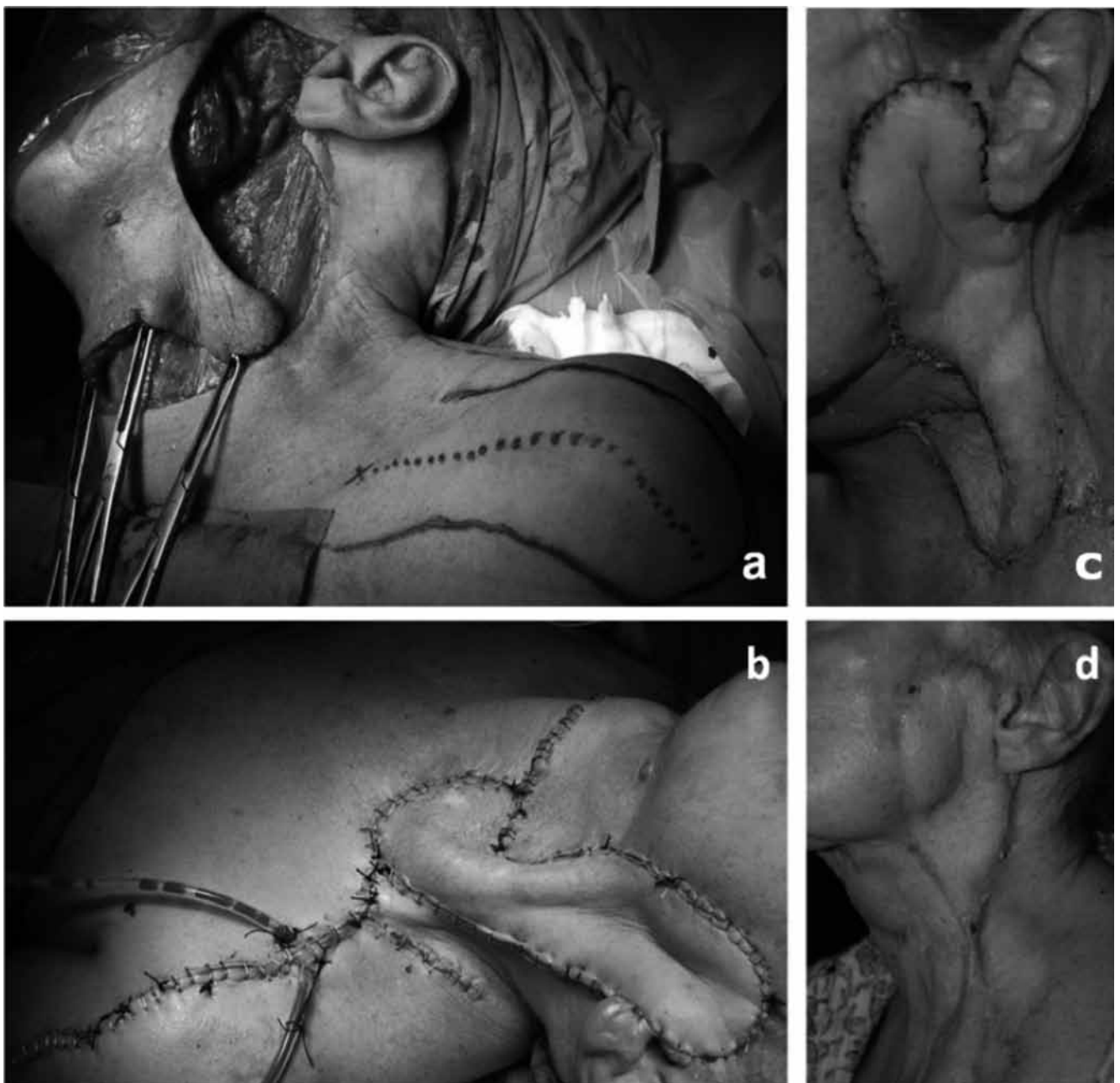


Fig. 1. a) Left revision parotidectomy and Doppler mapping of the SCF artery; b) supraclavicular flap harvesting and suturing to reconstruct the facial skin defect; c) post-operative result at 15 days; d) aesthetic result after 6 months.

logical examination demonstrated G1 squamous cell carcinoma. We performed total pharyngo-laryngectomy with right selective neck dissection with reconstruction of the pharynx. Free flap reconstruction was not recommended because of previous cervical radiotherapy and absence of the left internal jugular vein after past neck dissection. Moreover, reconstruction with a gastric pull-up could not be performed because of unfavourable anatomical conditions. We decided to reconstruct the pharynx with a cutaneous tubulised supraclavicular pedicle flap that was attached to the distal and proximal pharyngeal residuals. A Montgomery salivary stent and a nasogastric tube were also positioned in the neo-pharynx. On post-operative day 15 the patient resumed oral feeding. Definitive histological examination indicated a G1 squamous cell carcinoma pT2pN0.

Case 3

A 82-year-old woman with a painful ulcerated lesion involving the posterior two thirds of the right lingual body. She also suffered from type 2 diabetes, arterial hypertension and ischaemic heart disease. Biopsy revealed a G1 squamous cell carcinoma. MRI with contrast of the oral cavity and neck showed the presence of a lesion on the right side of the lingual body, which did not cross the median raphe, but infiltrated the ipsilateral sublingual gland and genioglossus muscle. No cervical adenopathies were detected. Chest CT with contrast completed the staging without evidence of metastases. The patient underwent conservative trans-mandibular right hemiglossectomy, tracheostomy and right selective neck dissection. Considering the patient's age and comorbidities, we decided to reconstruct the tongue using a cutaneous supraclavicular pedicle flap, which permits reduction of surgery time. A pedicled myocutaneous flap was not used because of its excessive thickness. Histological examination indicated a G1 squamous cell carcinoma pT4apN0. (Fig. 2)

Discussion

Free flaps allow reconstruction of different anatomic structures in the head and neck region with good morphological results and satisfying three-dimensional functional unit restoration. Their success rate is nearly 95%², and they represent the gold standard in head and neck reconstruction. In particular, radial forearm free flap (RFFF)³ and anterolateral thigh (ALT) free flap are widely used for reconstruction of oral cavity, oropharynx, hypopharynx and cervical oesophagus defects, while fibular flap is used when mandibular reconstruction is necessary^{4,5}. Free fasciocutaneous flaps require microsurgical expertise, availability of recipient vessels, postoperative intensive care unit monitoring and, most importantly, a patient who can tolerate major surgery^{6,7}. Moreover, previous radical neck dissection, history of neck radiotherapy and

comorbidities such as ischaemic heart disease can make free flap reconstruction challenging, and in these patients the benefit of a pedicle flap should not be overlooked^{8,9}. Among pedicle flaps, we underline the importance of the supraclavicular flap (SCF), a fasciocutaneous flap used extensively by plastic surgeons to resurface the neck and face in patients after severe burn injuries¹⁰. The history of shoulder flap started in 1842 with Mutter¹¹, but only in 1979 Lamberty¹ described the axial pattern of the shoulder flap based on the supraclavicular artery. In 1996, Pallua et al.^{10,11} identified the vascular pedicle of the SCF, described its angiosomes and demonstrated the versatility of the flap in head and neck reconstruction. Undoubtedly, SCF has several advantages: it is easy and quick to harvest, has excellent skin colour and tissue texture matching the face and the neck, and it has a consistent and wide arc of rotation with a long pedicle, which is well suited for oral, oropharyngeal, and apical facial defects. Use of the SCF eliminates the surgical time required for microvascular anastomosis. This flap requires simple postoperative surveillance and has a very little donor site morbidity. On the other hand, the main contraindication for SCF harvesting is concomitant radical or functional neck dissection requiring ligation of the vascular pedicle. The surgical technique for SCF is easy to learn and is based on the preservation of the pedicle. The supraclavicular artery is a perforator that arises from the transverse cervical artery in 93% of cases and from the suprascapular artery in 7% of cases¹¹. Pallua et al.^{10,11} have shown that in any case the origin of the artery is located in a triangle formed by the dorsal edge of the sternocleidomastoid muscle anteriorly, the external jugular vein posteriorly, and the medial part of the clavicle inferiorly. There are two veins draining the flap, one adjacent to the artery drains into the transverse cervical vein, while the second vein drains either into the external jugular vein or the subclavian vein. The flap is raised from a distal to proximal in a plane of dissection deep to the fascia and just superficial to the muscle until the triangular cone, where the supraclavicular artery originates.

Herein, we presented three different sites of reconstruction with SCF: the tongue, hypopharynx and parotid region, which were well reconstructed without major postoperative complications. All three patients underwent pre-operative Doppler ultrasound to map the course of the supraclavicular artery. This procedure avoids necrosis of the distal portion of the flap as long as the flap elevation does not extend further from the last Doppler ultrasound signal observed for more than 5 cm⁷.

Our results are comparable with those of other authors; in particular, Di Benedetto et al.¹² used this flap on the cutaneous and oral lining, considering it as the preferred method for medium to large defects of the cervicofacial area. Chiu et al.¹³ also reported several oncologic defect reconstructions with SCF in patients with comorbidities, including obesity, poor nutrition, diabetes and smoking.

This author had one patient (5%) with complete flap necrosis and four with minor recipient site complications that needed only local conservative treatment. Sandu et al.¹⁴ described the use of SCF in 50 patients for complex face, head and neck reconstructions after tumour resection: 44 of the 50 patients had total flap survival with excellent wound healing, four cases, after oral cavity tumour ablation, developed distal tip desquamation and needed only conservative treatment measures and two patients had complete flap necrosis. Granzow et al.⁷ compared the outcomes of head and neck reconstructions performed with SCF (18 cases) and free fasciocutaneous flaps (16 cases). Major complications were comparable between the two groups and there were no significant differences. The author concluded that SCF should be considered a

first-choice reconstructive option for complex head and neck defects, and the use of free flaps has been replaced with SCF over the past 5 year⁷.

Furthermore, SCF does not damage any reconstructive bridge and leaves all other free flap donor sites and recipient vessels intact, allowing for subsequent reconstruction with free flaps transfer if necessary. We started using this flap in high-risk patients with advanced age, advanced tumours, poor nutrition or medical comorbidities, who are not good candidates for potentially prolonged microsurgery. Considering all the advantages of SCF, we think that this flap will continue to play an increasing role in reconstruction of complex defects of the head and neck. We underline the importance of pre-operative Doppler ultrasound of the supraclavicular artery to avoid complications.

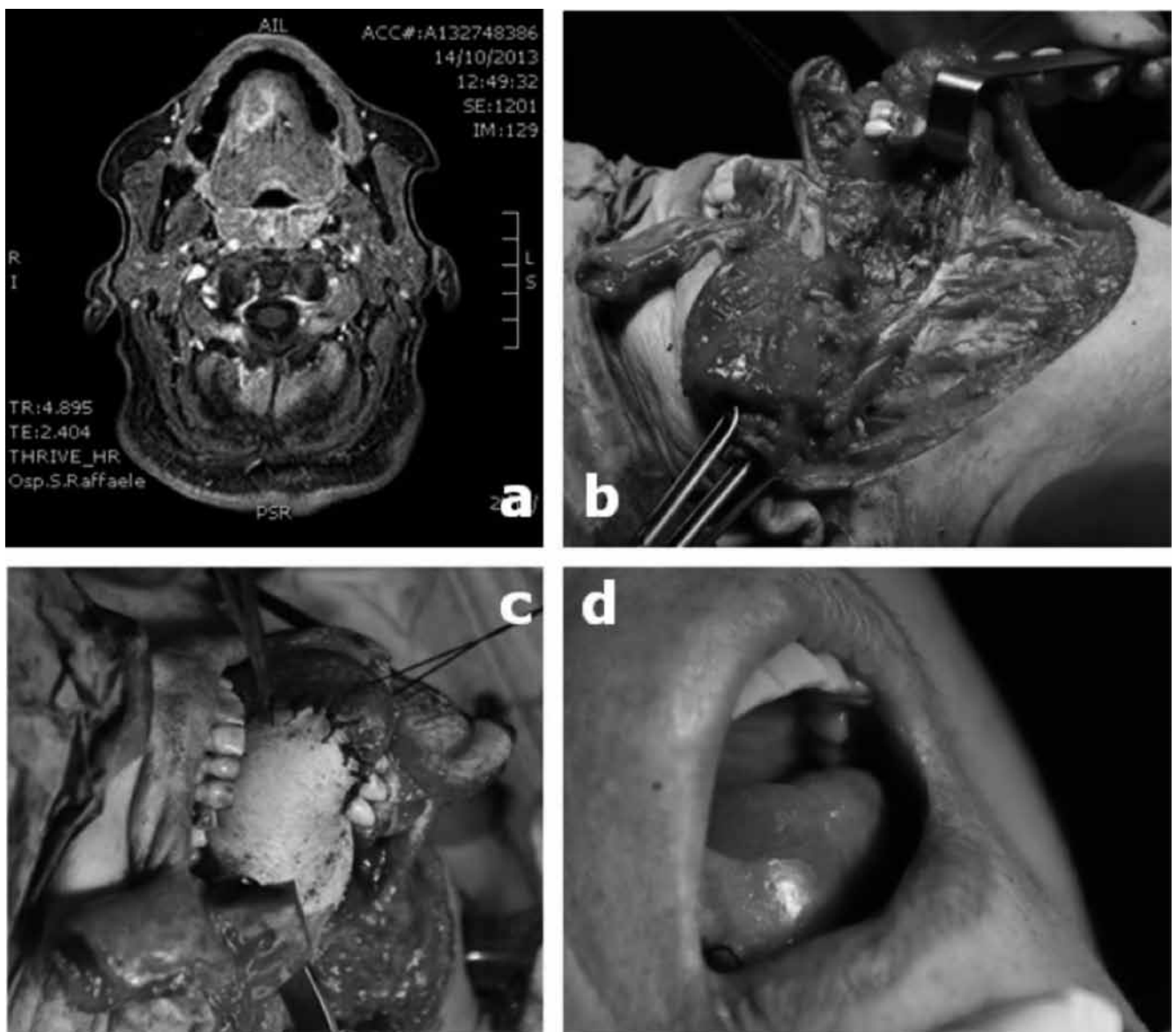


Fig. 2. a) MRI imaging showing the tongue lesion; b) right hemiglossectomy through a trans-mandibular approach; c) reconstruction of the tongue with the supraclavicular flap; d) final outcome.

Conclusions

SCF is not only an alternative to forearm free flaps in high-risk patients who are not good surgical candidates for potentially prolonged microsurgery or had previous radiotherapy, but can also be considered as a first-choice reconstructive option for head and neck defects. Oncological reconstructive teams need to have various options for flap reconstruction in their armamentarium to solve all difficult situations taking into account the overall status of patients. SCF will likely play an increasing role in reconstruction of complex defects of the head and neck.

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