The Posterosuperiorly Based Platysmal Myocutaneous Flap: The Underutilized Reconstructive Option

Rahul K. Thakkur · Shrey R. Pandya

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Abstract The platysmal myocutaneous flap has shown promising results for the reconstruction of defects in the head and neck region. It has been successfully used for the reconstruction of the defects over the cheek, floor of the mouth, buccal mucosa, tongue, lower lip, mandibular alveolus, hypopharynx and supraglottic larynx. The posteriorly and the superiorly based platysmal flaps have a wide range of applicability in the reconstruction of intraoral defects. In the present series we have used a posterosuperiorly based platysmal flap which has shown encouraging results. It was also found that leaving the base of the mandible intact helps in maintaining the periosteal blood supply which further contributes to the survival of the flap. The thinness, arc of rotation, pliability and ease of availability of the platysmal myocutaneous flap gives the reconstructive surgeon an additional option, especially when a microvascular flap is not feasible.

Keywords Platysmal myocutaneous flap · Superiorly based · Survival rate · Reconstruction

Introduction

The platysma myocutaneous flap has been used with promising results for the reconstruction of intraoral post ablative defects. After its introduction in 1978 by Futrell

et al. for intraoral defects, it has been successfully used for reconstruction of defects over the cheek, floor of the mouth, lower lip, mandibular alveolus, hypopharynx and supraglottic larynx [1]. It has also been attempted in cases of mild facial asymmetry by providing bulk of tissue in the area [2]. To our experience for buccal mucosa and retro-molar trigone defect reconstructions the results have been quite propitious. Unlike the pectoralis major myocutaneous flap (PMMC) it proved to be quite advantageous in terms of being less bulkier and pliable in nature, along with good intraoperative manoeuvrability, good colour match with facial skin and avoidance of a secondary donor site defect. When compared to the radial forearm it had an added advantage of not requiring any specialized equipments and minimal harvesting time [3].

The platysma is a paired muscle which overlies the superficial layer of the deep cervical fascia in the neck. It originates from the superficial fascia of the pectoralis major and the deltoid muscle and inserts over the angle of the mouth and the inferior-most part of the cheek. The submental branch of facial artery is the major arterial supply of the platysma. It also receives secondary contributions from the transverse cervical, occipital, posterior auricular and thyroid vessels. The platysmal myocutaneous flap may be either superiorly, inferiorly or posteriorly based. The posteriorly and superiorly based flaps have a wider range of application in the oral cavity compared to the inferiorly based flap which efficiently covers defects over the floor of the mouth and the ventral tongue [3, 4]. However, the inferiorly based flap is not popular for the reconstruction of orofacial region [7]. The superiorly based flap is supplied by the facial and submental arteries and the posteriorly based flap derives its blood supply chiefly from the occipital and the posterior auricular arteries. The inferiorly based flap receives its supply from the transverse cervical

R. K. Thakkur (✉)
Department of Oral & Maxillofacial Surgery, Manubhai Patel
Dental College, Vadodara, Gujarat, India
e-mail: rkt@facialsurgery.in

R. K. Thakkur · S. R. Pandya
Shubhechha Multispeciality Hospital, Vadodara, Gujarat, India
e-mail: shrey25786@gmail.com

Fig. 1 Flap marking

arteries. Peng et al. reported 90 % success rate for superiorly based flap and 86 % for the posteriorly based flap [5]. In the present series we have used a posterosuperiorly based flap for the reconstruction of defects. The external jugular vein and submental vein contribute to the venous drainage of the platysma. A good venous drainage is also a key factor for flap survival [6]. The platysma is innervated by the cervical branch of the facial nerve (VII) and this branch can be preserved with the flap for facial reanimation. The sensory innervations are derived from the transverse cervical nerves (C2, C3, C4) that penetrate the subcutaneous fascia near the clavicle [4]. The platysmal flap is contraindicated in patients in whom there have been previous surgeries in the neck or even in post-radiation cases as the dominant blood supply has been compromised [2].

Surgical Technique

The patient was placed in a supine position with neck in hyperextension. The desired skin paddle was outlined almost lower in the neck with a pedicle long enough to be capable of being folded around the mandible. The flap design and the size depended on the anticipated defect created after excision of the lesion. The incision was first placed superiorly over the skin paddle and a sharp dissection was carried out with a 15 no. BP knife in the supra-platysmal plane up to the lower border of the mandible. A bipolar cautery was used wherever required for hemostasis. The marginal mandibular nerve was preserved in all the cases. The inferior incision was then placed and the platysma muscle was exposed inferior to the skin paddle. The platysmal fibres were then sharply transected and the dissection was then continued in the subplatysmal plane. The platysma once raised was transected both antero-posteriorly and superiorly to facilitate better mobilisation and inset.

Fig. 2 Flap elevation

Fig. 3 Buccal mucosa and RMT defect

The flap was left attached to the fascia of the sternocleidomastoid muscle posterosuperiorly to preserve its posterior blood supply. An ipsilateral selective neck dissection was then performed wherein the facial artery was ligated in five patients whereas the external carotid artery and the internal jugular vein were preserved in all patients of this series. The external jugular vein was sacrificed only in one case. After completion of the resection, the flap was folded around the mandible so as to facilitate intraoral lining of the defect (Figs. 1–7; Table 1).

Fig. 4 Flap inset

Fig. 5 Closure

Materials and Methods

This is a retrospective case series of six patients in whom the reconstruction of the oral cancer ablative defects was performed using the postero-superiorly based platysmal myocutaneous flap. The series included 3 females and 3 males with an age ranging from 43–62 years. The flap was used to reconstruct defects of the buccal mucosa, lower gingivo-buccal sulcus (GBS) and the retromolar trigone (RMT) region. All but one patient underwent an ipsilateral neck dissection of some kind and marginal mandibulectomy. One patient required only a wide local excision with marginal mandibulectomy. The patients were provided a

Fig. 6 2 months post-op

Fig. 7 2 months post-op intraoral

nasogastric tube to enteral feeding, which was continued for a period of 10–15 days. Out of the six patients, three had been diagnosed with verrucous carcinoma, whereas two patients had oral squamous cell carcinoma (SCC) and one was diagnosed with verrucous hyperplasia. Four patients had an associated oral submucous fibrosis. The flap was monitored for signs of ischemia, partial or total flap loss and skin sloughing. In our series, none of the patients received post-operative radiotherapy.

Results

Four patients encountered no problems during the healing phase of the flap. Two patients experienced minor complications of which 1 had total skin loss whereas the other

Table 1 Patient details

Patient no.	Diagnosis	Site	Stage		Surgery	External jugular vein status	Complications
			T	c N			
1.	Verrucous carcinoma	RMT	T2	N0	WE + MM + SOHND	Preserved	Nil
2.	SCC + OSMF	Buccal mucosa	T1	N0	WE + MM + SOHND	Preserved	Nil
3.	SCC	Buccal mucosa	T2	N1	WE + SOHND + MM	Preserved	Nil
4.	Verrucous carcinoma + OSMF	Mandibular GBS	T1	N0	WE + MM + SOHND	Preserved	Orocutaneous fistula
5.	Verrucous carcinoma + OSMF	Buccal mucosa	T2	N0	WE + MM + SOHND	Sacrificed	Total skin loss
6.	Verrucous hyperplasia + OSMF	Buccal mucosa + GBS	T1	N0	WE	Preserved	Nil

SCC squamous cell carcinoma, RMT retromolar triangle, WE wide excision, MM marginal mandibulectomy, SOHND supraomohyoid neck dissection, OSMF oral submucous fibrosis, GBS gingivo-buccal sulcus

developed an orocutaneous communication. None of them required a revision surgery to be performed. The external jugular vein had been ligated in one of the six patients. This patient later had total skin loss, which initially presented with dusky appearance of the skin on the 2nd post-operative day and subsequently the skin sloughed off. Eventually the flap underwent remucosalization as the underlying muscle was viable. One patient developed an orocutaneous communication in the submental region which healed spontaneously.

Discussion

A variety of techniques that include skin grafting, local flaps, pedicled flaps or free flaps have been used for the reconstruction of facial soft tissue defects. There are several factors like location and size of the defects, aesthetics, function, donor site availability and morbidity, experience of the surgeon and the general condition of the patients, that dictate the decision behind the type of flap to be used [7].

The platysmal myocutaneous flap is a very reliable flap and can be used for reconstruction of the intraoral and lower face defects created by ablative surgical procedures. It has been successfully used in the reconstruction of both intraoral and extraoral defects. The local availability during neck dissection, ease of elevation, primary closure at the donor site and less morbidity of the donor site are the few advantages of this flap [8]. The platysma is predominantly supplied by the submental branch of the facial artery with additional supply through the transverse cervical vessels inferiorly, thyroid vessels medially and laterally from the posterior auricular and occipital vessels. The platysmal flap is contraindicated in patients who have undergone preoperative radiotherapy, radical neck dissection or previously ligated facial artery. It is not advisable even in cases with

ipsilateral facial paralysis [9]. Conley et al. reported that, when there is violation of the facial artery supplying the platysma muscle, total or a partial flap loss is seen in 40 % of patients [6]. In the clinical paper presented by Su et al. [1] they stated that, for a better survival, the ratio of length to width of the platysmal flap should be no more than 2:1 in cases where the facial artery and vein have been sacrificed. In the present series the facial artery was ligated in all the cases but no major complications were encountered in any cases. The success behind this flap even after the facial artery ligation lies with its extensive anastomosis and retrograde filling through the ipsilateral external and internal carotid arteries through the labial arch [9]. In the current series the platysmal flap was raised with its posterior superior attachment to the fascia of the sternocleidomastoid muscle intact, thus maintaining the occipital and the posterior auricular vasculature. Moreover through our series we found out that leaving the base of the mandible intact preserved the insertion of the platysma thus protecting the periosteal blood supply to the platysma thus contributing to flap survival.

The venous drainage is a more important variable for the success of any flap. The platysma has demonstrated a vertical venous drainage pattern and any undue stretching or kinking can put the flap outcome at risk [9]. The external jugular and the submental vein have been proved to be primarily responsible for the venous drainage of the platysma [6]. It was found that ligation of the venous drainage of the neck can cause deleterious effects on the flap survival [9]. In our series we found that ligating the external jugular vein compromised the venous drainage to a significant extent. In one of the patients of buccal mucosal reconstruction, ligation of external jugular vein resulted in total skin loss. The flap survived as the underlying muscle was intact which eventually underwent remucosalization.

Uehara et al. [6] gave guidelines for the conditions where a posteriorly based flap could be used. According to

their experimental findings it was stated that the posteriorly based flap can be used only when the sternocleido-mastoid muscle, occipital artery and inferior aspect of the external jugular vein can be preserved.

The results of intraoral reconstruction with the platysmal flap are comparable to those with free flaps. However, the platysmal flap requires a bony or buccinator muscle support and is less reliable for soft tissue reconstruction in non-supported sites. The pedicled flaps are more likely to go into partial necrosis or development of fistulas compared to free flaps in regions without bony or muscular support [10]. In our series all the patients were provided enteral feeds by a nasogastric tube as it facilitates the healing process. Lazaridis et al. [4] substantiated this fact through their case series and stated that the nasogastric tube protected the flap and minimized the risk of oro-cutaneous fistula.

Puxeddu et al. [5] indicated that superiorly based platysmal myocutaneous flap can be successfully used for more complex reconstructive procedures in the auricular, cheek and the parotid regions.

In our experience the platysmal myocutaneous flap has encouraging results with rare or minimum complications. These complications are generally avoidable with a good surgical technique and patient selection. Reepithelialisation occurs rapidly over viable muscle in cases with skin loss within the oral cavity. The thinness, arc of rotation, pliability and ease of availability makes the platysmal myocutaneous flap an attractive viable option, especially when a microvascular flap is not feasible.

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