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Prelamination of Radial Forearm Free Flap with Buccal Mucosa

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Keywords

buccal mucosa graft; oral reconstruction; prelamination; radial forearm free flap

Introduction

Reconstruction of extripative defects in the head and neck with vascularized free tissue transfer has become the standard of care. In order to overcome disadvantages of the traditional radial forearm free flap (RFFF), e.g., color and texture difference, bulk, and donor site morbidity, the concept of prelamination of the RFFF with mucosa was developed.

The term prelamination, introduced in 1994, is a process in which tissue is implanted into a vascular flap prior to transfer [1]. Prelamination with oral mucosa has been implemented in the reconstruction of a variety of intraoral and facial defects [2–4]. With their high cell renewal rate, morcelized buccal mucosal grafts can spread over a vascularized fascial bed and become functional in 3 weeks [2]. The resultant mucosa resembles the native oral mucosa both macroscopically and histologically [5], providing lubrication. Fasciomucosal flaps are thinner than fasciocutaneous flaps since no subcutaneous tissue is included. This allows for better tongue mobility and rehabilitation [2].

We studied patients who underwent reconstruction with a prelaminated radial forearm fasciomucosal flap (RFFMF) to describe surgical technique and report multi-institutional outcomes.

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Methods

Patients

Seventeen patients with oral defects reconstructed with prelaminated RFFMF were included in this retrospective IRB-approved case series conducted from February 1997 to August 2012. This study was conducted at the University of North Carolina (Chapel Hill, NC), the University of Texas Health Science Center (San Antonio, TX), and the University of Modena and Reggio Emilia (Modena, Italy).

Technique

Surgery is performed in 2 stages: prelamination of the fascia antibrachialis and delayed flap transfer.

In the first stage, a full-thickness mucosal graft is harvested from the oral mucosa. The contralateral healthy cheek is used in cancer patients. The mucosal graft is morcelized (approximately 5×10 mm pieces). The donor site is closed primarily with absorbable suture. Under tourniquet control, a longitudinal skin incision is made over the radial artery. A prefascial dissection is performed. The morcelized mucosal grafts are evenly spaced and secured to the fascia antibrachialis with absorbable suture (Figure 1). A silicone sheet is placed to prevent adhesion. The harvested site is closed in layers and the wrist is splinted.

In our experience, it takes 3 weeks for the morcelized grafts to coalesce, and therefore, flap transfer is performed at this time. The forearm incision is opened, fluid (i.e., salivary seroma) aspirated, and the silicone sheet removed. Next, the fasciomucosal flap is elevated similar to a RFFF. The donor site is closed primarily. The flap is inset and microanastomosis performed. Clinical assessment and Doppler signals are used to monitor flap viability.

Results

Reconstruction using the prelaminated RFFMF with buccal mucosa was performed in 17 patients (10 males; mean age 50 y; range 19–60 y). Diagnoses included cancer (n=13), fistula (n=2), trauma (n=1), and arteriovenous malformation (n=1). Defect location included the lip (n=1), floor of mouth (n=10), tonsil (n=1), and soft palate (n=5) (Table 1).

One patient developed partial necrosis of the volar skin after flap prelamination, but this did not jeopardize graft take. Delay to second surgery ranged from 2–5 weeks (Table 1). There were no postoperative hematomas or infections. One patient experienced venous congestion that spontaneously resolved (Table 1, Patient 7). Flap survival was 100%. No patients complained of decreased grip strength, sensation, or wrist movements.

Reconstruction was found to be satisfactory at a range of 2–60 months postoperative in the majority of patients (88.2%) (Table 1; Figures 2 and 3). Two patients had a postoperative complication that was surgically correctable. One patient experienced flap separation from the palate that was secondarily repaired (Table 1, Patient 1). Another patient had a cutaneous fistula that healed by secondary intention and required surgical revision of the scar (Table 1, Patient 8).

Discussion

The prelaminated RFFMF is particularly attractive for oral defects due to its thinness, preservation of the physiology of the oral mucosa, and minimized donor site morbidity. In one study, patients who underwent a prelaminated RFFMF with primary closure of the

donor site had lower incidence of decreased grip strength, sensation, and wrist extension when compared to a fasciocutaneous flap with skin grafting [4].

There are several technical considerations when utilizing the prelaminated RFFMF. Placement of a silicone sheet over the mucosal grafts is important to prevent adhesions and permit graft spread. All patients developed a salivary seroma following prelamination due to the preserved function of the buccal mucosa and were confirmed to contain amylase. Due to rapid growth of the oral mucosa, 3 weeks allows the graft to increase up to twice the size [4]. In one patient (Table 1, Patient 2), flap transfer occurred in 2 weeks and the mucosal graft had not coalesced. The optimal time for flap transfer, based on our clinical observation, is 3 weeks following prelamination; however, this will depend on the initial ratio of graft-to-fascia surface area. Postoperative contracture of the prelaminated flap can occur if the mucosal graft does not adequately grow prior to free tissue transfer which can lead to scar contracture and interfere with postoperative oral function [4]. We do not consider reconstruction with prelamination RFFMF for patients with aggressive and/or advanced cancers to avoid potential for delay in care. The effect of postoperative radiation on patients with prelaminated RFFMF is unknown and further longitudinal studies may be warranted.

Conclusions

Our multi-institutional case series demonstrates favorable outcomes and minimal donor site morbidity using the prelaminated RFFMF with morcelized buccal mucosa for intraoral lining defects.

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Figure 1.
Autologous morcelized buccal mucosa graft secured onto fascia antibrachialis

Figure 2.
Close view demonstrating cellular growth of morcelized buccal mucosa and flap integration

Figure 3.
Well-healed closure of the soft palate defect using prelaminate radial forearm fasciomucosalgraft shown in follow up visit

Table 1

Patient Demographics

Patient	Age (years)	Gender	Location of Defect	Etiology	Delay (weeks)	Follow up (months)
1	53	M	L tonsil	Cancer	3	8
2	49	M	Soft palate	Fistula	2	7
3	46	M	Lip	AVM resection	4	7
4	19	M	Soft palate	Trauma	5	3
5	38	F	Soft palate	Cancer	3	48
6	44	F	Soft palate	Cancer	3	48
7	55	F	Soft palate	Fistula	3	48
8	55	M	FOM	Cancer	3	60
9	52	F	FOM	Cancer	3	47
10	58	F	FOM	Cancer	3	48
11	49	M	FOM	Cancer	3	36
12	48	F	FOM	Cancer	3	42
13	61	M	FOM	Cancer	3	16
14	59	M	FOM	Cancer	3	14
15	53	M	FOM	Cancer	3	6
16	57	M	FOM	Cancer	3	8
17	59	F	FOM	Cancer	3	2

AVM = arteriovenous malformation; FOM = floor of mouth