Reconstruction of the palate using a vascularized bare muscle flap following total maxillectomy: A case report

Naho Fujiia, Hisashi Motomura and Hiroyoshi Iguchib

aDepartment of Plastic and Reconstructive Surgery, Osaka City University Graduate School of Medicine, Osaka City, Japan; bDepartment of Otolaryngology and Head & Neck Surgery, Osaka City University Graduate School of Medicine, Osaka City, Japan

ABSTRACT

Reconstruction following total or subtotal maxillectomy requires specialized techniques, and it is still a challenge for surgeons. This case report describes a 55-year-old male patient with maxillary cancer. He underwent right total maxillectomy and left partial maxillectomy. He underwent reconstruction using a latissimus dorsi free flap combined with a vascularized scapula angle. For palatal reconstruction, we used a bare muscle flap following rigid bony reconstruction. The reconstructed palate became contracted and covered with mucosa gradually and resulted in a physiologically satisfying contour. The histological features of the reconstructed site revealed normal stratified squamous epithelium. The bare muscle flap is considered the preferred method for palatal reconstruction following total or subtotal maxillectomy.

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Introduction

Reconstruction after a total or a subtotal maxillectomy requires consideration of aesthetic and functional outcomes; thus, specialized techniques are required. In the treatment of large defects, reconstructions with free flaps such as a rectus abdominis muscle flap [1], latissimus dorsi muscle flap [2], anterolateral thigh flap [3], iliac crest flap [4], and fibula flap [5] are most commonly reported. In the treatment of small defects, artificial materials produce results similar to those seen with flaps. The treatment of wide palatal defects remains controversial, and non-epithelized flaps have been recently used for oral defects. There are few reports that describe this method in detail.

Here, we describe the use of vascularized bare muscle with bone for palatal reconstruction resulting in a biologically better contour compared to the use of skin paddles; histological analysis of the reconstructed site revealed organized stratified squamous epithelium covering the bare muscle flap surface.

Case report

A 55-year-old male patient who presented with maxillary cancer of the right nasal cavity underwent right total maxillectomy, left subtotal maxillectomy, and nasal septum resection through a Weber–Ferguson incision. Two-thirds of the right hard palate was removed (Figure 1). The reconstruction was performed with a latissimus dorsi free bare muscle flap combined with a vascularized scapula. The recipient vessels were the right facial artery and vein.

The scapula angle was screwed to the right zygomatic bone and left maxilla to reconstruct the right zygomaticomaxillary buttress (Figure 2). After reconstruction of the rigid, bony part of the maxilla, the nasal cavities and the palate were reconstructed with bare muscle. The right nasal maxillary sinus was filled with the muscle. Then, a stent tube made of silicone was placed to recreate the left nasal cavity. The flap was sutured with an absorbable suture to the remaining mucosa (Figure 3(a)). When we attempted to determine the size of the bare muscle flap, we put as much muscle as possible within the range that can be sutured to the peripheral remaining mucosa.

The flap survived completely. The silicone tube placed in the left nasal cavity as a stent was removed 4 months after surgery because the left nasal cavity was totally epithelized.

After surgery, the intraoral muscle part of the flap was initially bulky and sagging into the oral cavity, but gradually contracted beginning at 3 weeks postoperatively.

CONTACT Naho Fujii takayamanaho@gmail.com Department of Plastic and Reconstructive Surgery, Osaka City University Graduate School of Medicine, Osaka City, Japan

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Because of treatment with gargling and oral steroid ointment, the muscles of the palate were almost flat against the remaining palate 2 months after surgery. Epithelization was gradually observed from the surrounding mucosa (Figure 3(b)). Because of postoperative radiotherapy (total of 71.4 Gy) beginning 1 month after surgery, there was a delay in epithelization, although complete epithelization of the palate was observed ~14 months after the operation. Seventeen months after the operation, a biologically satisfied palatal contour was reconstructed (Figure 3(c)). Although the flap contracted, velopharyngeal insufficiency (VPI) did not occur. After complete epithelization, we made a denture for this patient. Before making the denture, we wanted to know the quality of the reconstructed palate. With the patient's consent, we biopsied the reconstructed palate. Then, histologic evaluation of the epithelialized site showed stratified squamous epithelium completely covering the bare muscle flap surface (Figure 4).

**Discussion**

This case demonstrates two key features. Reconstruction using a bare muscle free flap with vascularized bone for palatal reconstruction resulted in ideal contour of the palate. Secondly, the histologic findings of the reconstructed site showed normal stratified squamous epithelium.

First, we can reconstruct an almost physically normal palate with a bare muscle flap. After reconstruction of the palate by a skin paddle, the volume becomes large and it tends to sag and droop into the oral cavity. In addition, these flaps often cause malodor and crusts due to dead skin. We thought it was important to reconstruct the rigid bony palate first. Next, we placed a bare muscle flap to provide an epithelialized surface to create stability and a physiologically satisfying contour. There was the possibility of inducing VPI. In this case, we did not observe VPI. We thought this was because the soft palate was retained and the amount of muscle was sufficient. The muscle flap contracted toward the graft bone, not anteriorly to cause VPI. When we determined the size of the muscle flap, we placed as much of the flap as possible within the range that could be sutured to the remaining peripheral mucosa. The indication of sufficient muscle was that the lowest surface of the flap just touched the dorsum of the tongue.

There are some reports of palatal reconstruction using non-epithelized flaps that are caused to epithelize; however, there are few detailed follow-up reports of these techniques [4,6,7]. Damir et al. [8] reported that the flap was completely epithelized 3–4 weeks after the operation. Cordeiro et al. [9] said that epithelization occurred 3 weeks after the operation, and Kemal et al. [10] reported epithelization at 4–6 weeks. Our case required 14 months for complete epithelization. This longer duration is thought to be a result of postoperative radiation therapy.
A second feature of this report is the histological analysis demonstrating epithelization with no pathological scar tissue, instead showing mucosal tissue with highly organized stratified squamous epithelium. Therefore, reconstruction with this method made it possible to reconstruct the quality of the palate more ideally.

In conclusion, reconstruction of the palate using a bare muscle flap was useful, and the reconstructed palatal surface was created of normal mucosal tissue.

Figure 3. The process of oral mucosal contraction: (a) Intraoperative finding: the muscle was drooping into the oral cavity. (b) Eight months after surgery: the muscle had atrophied and gradually been covered from the surrounding mucosa. (c) Fourteen months after surgery: the palate was completely covered with mucosa.

Figure 4. Histological features of the reconstructed palate. Stratified squamous epithelium covering the bare muscle flap surface: (a) ×20; (b) ×60.
This method has the disadvantage of a longer duration required to epithelize completely. However, it can create a physiologically satisfying contour of the palatal arch and a better-quality reconstruction of the palate.

Disclosure statement
No potential conflict of interest was reported by the authors.

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