The Palatal Island Flap for Reconstruction of Palatal and Retromolar Trigone Defects Revisited

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**Background:** Although a host of local soft tissue flaps have been described for the reconstruction of postoperative palatal defects, tissue-borne palatal obturators remain the most common form of rehabilitation of these defects. The palatal island flap, first applied to the reconstruction of the retromolar trigone and palatal defects, was first described by Gullane and Arena in 1977. This single-staged mucoperiosteal flap offers a reliable source of regional vascularized soft tissue that obviates the need for prosthetic palatal rehabilitation.

**Objective:** To describe a series of 5 cases in which the palatal island flap was used as a primary palatal or retromolar reconstruction.

**Methods:** We have retrospectively reviewed 5 consecutive cases between March 1998 and August 1999 wherein palatal island flaps were used for the primary reconstruction of postablative palatal defects. Each case was reviewed for primary pathologic findings, postoperative wound complications, postoperative speech and swallowing, and donor site morbidity. Selection of this reconstructive technique was based on the size and location of the defect and the assessment by the surgeon that the arc of rotation and amount of residual palatal mucosa were appropriate.

**Results:** Six local palatal island flaps were performed on 5 patients who had not undergone irradiation (1 patient underwent bilateral flaps). The primary pathologic findings included T1 N0 squamous cell carcinoma, T4 N0 squamous cell carcinoma, T2 N0 low-grade mucoepidermoid carcinoma, pigmented neurofibroma, and T2 N0 low-grade clear cell carcinoma. All of the lesions were located on the hard or soft palate or the retromolar trigone, and the average defect size was 7.2 cm². All 5 patients began an oral diet between postoperative days 1 and 5 (mean, 2 days), and all patients were discharged home without postoperative donor site or recipient site complications between days 1 and 6 (mean, 3 days). Donor site reepithelialization was complete by 4 weeks in all 5 patients.

**Conclusions:** The palatal island flap offers a reliable method of primary reconstruction for limited lesions of the retromolar trigone and hard and soft palate. The mucoperiosteal tissue associated with this flap is ideal for partitioning the oral and nasal cavities and obviates the need for prosthetic palatal obturation.

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By DURING THE past several decades, the range of reconstructive techniques to restore oral cavity defects has increased significantly. Although tissue from distant sites can be transferred by microvascular techniques, one of the basic premises of reconstructive surgery is to use the simplest and safest technique that accomplishes the desired goal, which is to restore defects using “like tissue.” In addition, the surgeon must walk a fine line between borrowing the ideal tissue and incurring secondary morbidity associated with the donor site from which that tissue is harvested. The oral cavity remains the ideal site from which to obtain tissue to solve this reconstructive challenge, but it is also imperative to make certain that the secondary deformity does not cause additional functional problems for the patient.

Reconstruction of the palate or retromolar trigone after ablative surgery is a challenging problem. Although superficial defects may be closed primarily, allowed to heal by secondary intention, or resurfaced with a split-thickness skin graft, defects that involve the peristomeum or those that enter the sinonasal cavity usually cannot be optimally reconstructed in these manners. A variety of locoregional flaps have been described to resurface these areas; however, none has been as popular as the tongue flap. Guerrero-Santos and Altamirano described the central mucosal tongue flap
to reconstruct palatal defects. Despite its ease of rotation and apparent abundance as a source of reconstructive tissue, the tongue is clearly the most important organ in the oral cavity with respect to function, and borrowing from the tongue may cause significant functional deficits that might otherwise be avoided through selecting an alternative option.

Consequently, a host of alternative reconstructive options have been proposed for oral cavity reconstruction. Local and regional flaps, such as the buccal mucosal flap, the forehead flap, and the temporoparietal fascial flaps, have been successfully used for oral cavity reconstruction. Similarly, fasciocutaneous free flaps have also been used for retromolar trigone and palatal reconstruction. Although each of these reconstructive options offers its own distinct advantages, the goal of using “like tissue” for oral cavity reconstruction remains particularly appealing. Oral mucosa that is well vascularized, sensate, and similar in thickness is an ideal source of donor tissue. Although buccal mucosa flaps offer some of these characteristics, the limited mobility of these flaps often restricts their application.

In 1977, Gullane and Arena described the total palatal island flap as a versatile alternative for oral cavity reconstruction. Originally introduced by Millard in 1962 as a palatal lengthening technique for cleft palate restoration, high complication rates limited its popularity. An increased incidence of midface growth deformity and subsequent malocclusion was associated with this flap when applied to the pediatric population. Gullane and Arena, however, recognized a potential for the application of this flap for postablative oral cavity reconstruction in the adult population. Initially reported for the rehabilitation of defects of the palate, retromolar trigone, cheek, and tonsillar fossae, subsequent reports demonstrated an expanded utility of the palatal island flap by transferring nearly the entire hard palate mucosa based on a single neurovascular pedicle. The secondary defect of exposed palatal bone is resurfaced by new mucosa over several weeks, leaving little or no detectable deformity.

We report 5 cases in which the palatal island flap was used for the single-staged reconstruction of either a palatal or retromolar trigone defect. This report will include a review of the anatomy and technique for raising the palatal island flap.

The surgical anatomy and technique for raising the palatal island flap are as follows. The hard palate is covered by mucosa, which is densely adherent to the underlying periosteum. The periosteum, in turn, is firmly attached to the palatal bone through the fibrous pegs of Sharpey. The vascular supply to the palate is primarily derived from the paired greater palatine arteries that arise from the descending palatine artery, a branch of the internal maxillary artery. The neurovascular pedicle associated with the palatal island flap exits from the greater palatine foramen, which is located adjacent to the second molar along the lateral aspect of the transverse suture line, which separates the maxillary shelf from the palatine shelf posteriorly.

The midline longitudinal raphe divides the palate in half; however, a single vascular pedicle can supply the entire palatal flap. Innervation of the palatal mucosa is derived from branches of the second division of the trigeminal nerve. The sensate nature of the palatal island flap provides an added functional benefit to oral cavity reconstruction.

In raising the palatal island flap, incisions are made according to the amount of donor tissue required to resurface the oral defect. Incisions can be made at the junction of the hard and soft palate and within 5 mm of the dentition. This allows for harvesting a flap that can be rotated 180° without strangulation of the vascular pedicle. Like the paramedian forehead flap, the palatal island flap is unique because its vascular pedicle traverses a bony canal. Its mobility is, therefore, compromised by this anatomic restriction. However, further reach can be obtained by removing the hamulus of the pterygoid plate; however, this is seldom necessary. The donor site is allowed to heal by secondary intention, which occurs 3 to 4 weeks after harvest. The growth and coverage of the hard palate defect with new mucosa occurs rapidly. Because this takes place over the hard palate surface, contracture and, therefore, donor site deformity are limited. Healing by secondary intention over the hard palate is a different phenomenon than what occurs over the soft palate tissue bed. Postoperative discomfort can be alleviated by covering the denuded palate with a prefabricated prosthesis.

A total of 6 local palatal island flaps were performed on 5 patients (1 patient underwent bilateral flaps) during a 15-month period for primary reconstruction of postablative defects of the palatomaxillary complex and the retromolar trigone. None of the 5 patients had received preoperative radiation therapy. Final pathologic findings included T1 N0 (1 patient) and T4 N0 (1 patient) squamous cell carcinomas, T2 N0 low-grade mucoepidermoid carcinoma (1 patient), pigmented neurofibroma (1 patient), and T2 N0 low-grade clear cell carcinoma (1 patient) (Table). Three lesions were located on the hard palate, creating a defect that communicated with the maxillary antrum; 1 lesion was located on the soft palate; and 1 lesion was located on the retromolar trigone. The average defect size for all 5 sites was 7.2 cm² (range, 4-16 cm²). There were no intraoperative compli-
cations during the flap harvest nor was there any donor site morbidity associated with the 6 flaps. One patient underwent bilateral palatal island flaps for the rehabilitation of a soft palate defect. Four of the 5 patients began a liquid diet on postoperative day 1 and started a regular diet between postoperative days 1 and 5 (mean, 2 days). The oral nutrition in the patient with the retromolar trigone defect was delayed until the fifth postoperative day. All 5 patients were discharged home without postoperative donor site or recipient site complications between days 1 and 6 (mean, 3 days). Donor site reepithelialization was completed by 4 weeks in all 5 patients. Both flaps and the new mucosa that grew over the hard palate regained sensitivity. There were no flap dehiscences, flap necroses, postoperative infections, or associated long-term donor site morbidity.

### CASE PRESENTATIONS

#### Case 1

This patient was a 67-year-old woman with a medical history significant for radiation therapy for teenage acne who presented with complaints of persistent tenderness in the region of the posterior maxillary alveolus. A computed tomographic scan of the area revealed an osteolytic lesion involving the posterior alveolar ridge (Figure 1). A biopsy specimen of an exophytic lesion measuring 2.5 × 2.0 cm was positive for squamous cell carcinoma (T4 N0 M0). Intraoperatively, the resection of the maxillary tubercle and adjacent retromolar trigone mucosa left a 3 × 3-cm infra-structure maxillectomy defect that communicated with the maxillary cavity (Figure 2 and Figure 3).

The defect was reconstructed using a contralateral-based palatal island flap (Figure 4). The postoperative course was unremarkable. The patient was maintained on enteral nutrition via a nasogastric tube for 4 days and began a regular diet on day 5. The patient was discharged on postoperative day 6. At a 4-week follow-up evaluation, the donor site was well healed and the patient denied any donor site discomfort (Figure 5). Six months following surgery, the patient developed an ipsilateral neck lymph node for which a modified neck dissection and adjuvant radiotherapy were performed. The patient currently remains free of disease at both the primary site and the neck.

#### Case 2

This patient was a 61-year-old man with complaints of persistent oral pain at the site of a recent dental extraction who was referred to Mount Sinai Medical Center by a local dentist. Physical examination revealed a right-sided 2 × 1-cm soft palate mass with extension onto the superior margin of the ipsilateral tonsil. A biopsy specimen of the lesion revealed well-differentiated squamous cell carcinoma (T1 N0 M0). The lesion was excised in combination with an ipsilateral selective neck dissection. The intraoral defect measured 3.0 × 2.5 cm. A right-sided palatal island flap was raised and used to resurface the intraoral defect. Postoperatively, the patient began a clear liquid diet on day 1 and advanced to a regular diet by postoperative day 5.

Epithelialization of the palatal donor site defect was complete by postoperative week 4 (Figure 6). Currently, the patient tolerates a regular diet with no velopharyngeal insufficiency or discomfort at the donor site.

### COMMENT

Oral cavity reconstruction has evolved during the past several decades so that there is now a wide variety of tech-
techniques that are available to the head and neck surgeon. It is no longer necessary to create secondary aesthetic deformities such as those that occurred with the transfer of a forehead flap into the oral cavity. It is also not necessary to create a secondary functional deformity by borrowing portions of the tongue to resurface adjacent areas of the mouth. However, although microvascular surgery has expanded the range of available tissue, the goal of restorative surgery should be to use the simplest technique that causes the least amount of secondary morbidity and provides the optimal level of form and function to the reconstructed area. Local flaps are always preferable to more complex techniques, provided that the principles outlined herein are adhered to.

There are a wide variety of local flaps of the oral cavity that have been described. The palatal island flap is unique for the following reasons. It transfers a large area of tissue, which is well vascularized and sensate. In addition, there is very little donor site morbidity due to the very unique features of the donor site defect that overlies the hard palate. The “remucosalization” of the hard palate results in very little to no contracture and creates a near normal-appearing hard palate surface. The mucoperiosteal palatal island flap is easily harvested and provides a 1-stage reconstruction of suitable adjacent defects. In 1977, Gullane and Arena introduced this flap for the restoration of postablative defects. They reported a 95% success rate in a series of 53 cases. In addition, they discovered that up to 90% of the palatal mucosa could be harvested based on a single vascular pedicle. Anatomic studies by Maher supported the ability to transfer a subtotal palatal flap based on 1 greater palatine vascular pedicle. The “macronet” of submucosal ves-
sels identified by Maher formed the anatomic basis for transfer of the entire palatal island flap. Another anatomic feature of the vascular supply of the palate makes it unique among reconstructive techniques. The greater palatine neurovascular pedicle runs through its bony canal to emerge from the greater palatine foramen. Mobilization of the palatal island flap is therefore limited by this anatomic feature, which restricts its use to posterior palatal defects and adjacent mucosal defects of the lateral pharynx and retromolar trigone.

Mucosal defects of the hard palate do not require any form of reconstruction and can be permitted to heal by secondary intention. Defects that extend through the bone but do not violate the underlying antral or nasal mucosa likewise do not require reconstructive surgery. However, defects that extend through the nasal and/or maxillary cavities will require either a prosthesis or reconstructive surgery. Although prosthetic restoration often provides a very suitable functional result, this selection requires that the prosthesis be worn to prevent oronasal regurgitation and abnormal resonance qualities. Closure of such defects avoids this inconvenience for the patient and permits the patient to function in an unencumbered fashion. As demonstrated in this series, the use of the palatal island flap provides a superb reconstructive tool for select posterior palatal defects that are of suitable size that the residual palate can be mobilized to provide a complete closure. Basic reconstructive principles would suggest that a 2-layer closure was required, with an inner layer used to reline the oronasal defect and the second layer to resurface the palate. However, the very tough mucoperiosteal tissue of the palatal island flap provides an excellent composite flap that successfully restored all of the oral-nasal defects presented in this series. The surgeon must make a critical appraisal of the size of the defect and the amount of residual palate available for transfer to determine if an alternative technique is more suitable.

Limited defects of the lateral pharynx can also be allowed to heal by secondary intention, with the tonsillectomy defect being a prime example of this strategy. However, this approach is not suitable if the defect communicates with the neck or the tissues have been previously irradiated. Defects of the retromolar trigone are less suitable for healing by secondary intention because of the impact of scarring in this region, which produces limitations in the oral aperture. Trismus due to scarring in the retromolar trigone can be difficult to correct but readily avoided by resurfacing with thin pliable tissue such as the palatal island flap. To achieve an adequate arc of rotation to reach these defects, the flap must be based on the ipsilateral greater palatine pedicle.

Contraindications to the use of this flap include age younger than 5 years. Before this age the maxilla has not adequately matured. Disruption of the overlying periodontium was found to cause midface growth restriction and subsequent malocclusion. A second contraindication is a history of possible disruption to the vascular pedicle, ie, previous palatal surgery, irradiation, and internal maxillary or external carotid ligation.

Although reconstructive surgery of the oral cavity has made significant advances, it is imperative that older, established techniques not be forgotten. The palatal island flap is a technique that has proven to be very valuable for the indications presented in this series. Despite the paucity of published reports using this flap since its description in 1977, it remains a valuable reconstructive tool that should be selected as a first-line option for similar defects to those presented in this series.

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