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# Hard Palate Resection

- Author: Christopher I Zoumalan, MD; Chief Editor: Arlen D Meyers, MD, MBA [more...](#)

Updated: Apr 19, 2012

## Overview

### Introduction

The oral cavity functions as the interface between the respiratory/digestive tracts and the outside world. It contributes to a complex array of functions that include speech, mastication, salivation, early digestion, and oral/oronasal competence. Tumors of the hard palate are uncommon. Resection of the hard palate may be necessary for the management of benign or malignant tumors or as a donor site for a mucosal graft.

### Key considerations

Although [squamous cell carcinoma](#) is the most common primary malignant tumor of the oral cavity, the most common tumors of the hard palate are of minor [salivary gland](#) origin. These include benign tumors such as pleomorphic adenomas, as shown below, and malignant tumors such as mucoepidermoid carcinoma, adenoid cystic carcinoma, and polymorphous low-grade adenocarcinoma. Other histologies less frequently encountered include verrucous carcinoma, sarcoma, melanoma, and lymphoma. The lung, kidney, breast, and skin are the most common sites of primary carcinoma that metastasize to the oral cavity.<sup>[1, 2, 3]</sup>



Pleomorphic adenoma of hard palate in Asian woman.

The American Joint Committee on Cancer (AJCC) stages oral cavity tumors, including those of the hard palate, as T1 if they are  $\leq 2$  cm in greatest dimension, T2 if they are  $>2$  cm but  $\leq 4$  cm, T3 if  $>4$  cm, and T4 if invading through cortical bone.<sup>[4]</sup>

When used as donor grafts, hard palate tissue offers the advantages of an epithelial lining, minimal postoperative graft shrinkage, and ready availability compared to other donor sites/materials. Although it is a stiff graft, it is moist

and flexible, thus allowing appropriate functioning as a tectonic support in facial reconstruction such as in the lower eyelids, lower lip, nasal ala, and in mucosal defects in oral surgery.<sup>[5, 6, 7, 8, 9]</sup> The hard palate mucosa exists as a keratinizing squamous epithelium on a dense, collagenous lamina propria, very similar in structure to native tarsus in the eyelid.

## Indications

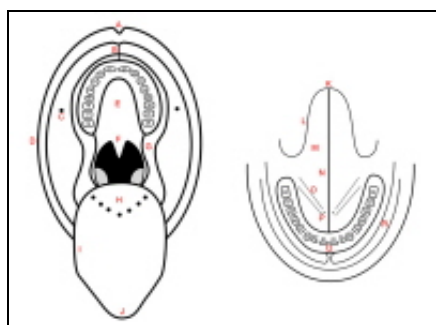
The indications to perform hard palate resection include excision of malignant and benign tumors, to alleviate complications from tumor burden that compromise the function of the oral cavity, and for facial reconstruction such as in cases of eyelid, lip, and nasal ala deformities.

## Contraindications

Contraindications to hard palate resection include inability to tolerate [general anesthesia](#), extensive lesions that may require more radical surgical intervention, and tumors that may be more appropriately treated with local irradiation and/or chemotherapy.

## Relevant Anatomy

The oral cavity (see the image below) is oval shaped and is separated into the oral vestibule and the oral cavity proper. It is bound by the lips anteriorly, the cheeks laterally, the floor of the mouth inferiorly, the oropharynx posteriorly, and the palate superiorly. The oropharynx begins superiorly at the junction between the hard palate and the soft palate, and inferiorly behind the circumvallate papillae of the tongue. The bony base of the oral cavity is represented by the maxillary and mandibular bones.



Schematic representation of oral cavity and floor of mouth. A: philtrum; B: upper labial frenulum; C: opening of Stensen's duct; D: labial commissure; E: hard palate; F: soft palate; G: intermaxillary commissure; H: base of tongue; I: lateral border of tongue, dorsal view; J: tip of tongue, dorsal view; K: tip of tongue, ventral view; L: lateral border of tongue, ventral view; M: ventral surface of tongue; N: lingual frenulum; O: floor of mouth; P: opening of Wharton's duct; Q: vestibular gingiva; R: vestibule. Teeth are numbered according to international classification.

The palate is the horseshoe-shaped, domed roof of the oral cavity. It is divided into a hard portion and a soft portion. The hard palate belongs to the oral cavity and separates it from the nasal cavities. The soft palate belongs to the oropharynx and separates it from the nasopharynx.

The hard palate is concave, and this concavity is occupied mostly by the tongue when it is at rest. The hard palate is subdivided into the primary and secondary palates. The primary palate is separated from the secondary palate by a small depression behind the central incisors termed the incisive fossa, where the incisive foramen opens.

For more information about the relevant anatomy, see [Mouth Anatomy](#).

## Preparation

### Anesthesia

Examination under [general anesthesia](#) is usually necessary for tumor mapping and surgical planning. Consultation with an experienced anesthesiologist is useful to ensure safe intubation that allows appropriate exposure of the surgical field while not compromising the patient's respiratory status during the case. Paralytic agents may help to improve oral cavity exposure during the case. Local anesthetic with vasoconstriction is often used around the resection site to improve hemostasis.

### Equipment

- Headlight
- Mouth Gag
- Cheek Retractors
- Oscillating Bone Saw
- Chisels
- Electrocautery
- Saline irrigation
- Periosteal Elevators

## Positioning

The patient is placed in the supine position with the head stabilized in a doughnut holder.

## Technique

Prophylactic antibiotics (to cover gram-positive and anaerobic organisms) are often given during the induction of [general anesthesia](#) and continued for at least 48 hours postoperatively. Anticoagulation is stopped or bridged when medically appropriate. A mouth gag is inserted to retract the tongue and endotracheal tube away from the surgical field and to provide optimal visualization of the mouth. If necessary, malleable cheek retractors can be used to improve the view. The periphery of the lesion is noted visually or marked graphically. Local anesthetic with vasoconstriction is injected along the surgical plane to promote hemostasis.

An incision down to the periosteum with wide margins away from the peripheral extent of the lesion is performed to allow for tumor-free surgical margins. Periosteal elevators are used to lift the tissue and allow bone-cutting instruments to be introduced in such a way to avoid nearby soft tissues. If bone resection is needed, the area to be resected can be isolated with an oscillating saw or high-speed Midas Rex drill. After the lesion has been circumscribed by bony cuts, the specimen can be rocked free and excised. Frozen section examination of the surgical specimen is often necessary to ensure complete surgical removal.

After resection, electrocautery is used to achieve hemostasis, and the wound is irrigated with copious amounts of saline. Small defects can be closed primarily by the advancement of adjacent mucosa or by reconstruction using a local palatal island mucoperiosteal flap based upon the descending palatine artery pedicle, which exits from the greater palatine foramen.<sup>[9]</sup> Alternatively, small defects may be packed with Xeroform and left to allow healing by secondary intention.<sup>[10]</sup>

Larger palatal or palatomaxillary defects can be categorized using the Mount Sinai classification system. In this system, Class Ia defects include hard palate but not tooth-bearing maxillary alveolus. Class Ib defects extend to include premaxilla or any portion of the maxillary alveolus posterior to the canines. Class II defects involve hard palate and one canine, and Class III defects include both canines. These classifications may help to determine the reconstructive modality. Class I defects can be reconstructed with either a prosthodontic obturator or a soft-tissue microvascular free flap. Class II and III defects can be reconstructed with either an obturator or a vascularized bone-containing free flap.<sup>[11]</sup>

For squamous cell carcinomas of the hard palate, the regional lymph nodes must be carefully inspected. Although the rate of occult metastases in hard palate cancer is lower than in most other oral cavity subsites, advanced-stage (T3 and T4) tumors do have a significant risk of occult metastases and elective neck dissection should be considered.

For hard palate mucosal grafting, the prospective donor site is marked and injected with local anesthetic with epinephrine. The nasopalatine neurovascular bundle and the greater palatine vascular bundle may be anesthetized for further post operative pain control. The hard palate mucosal donor site is infiltrated with local anesthesia. The graft is harvested by outlining the mucosal site, staying lateral to the median raphe with a cutting Bovie on a sharp pointed tip such as a Colorado needle. The graft is harvested using a right-angle sharp blade such as a super blade or crescent knife or #57 beaver blade. The graft is undermined, but an attempt is made to keep it thin. Hemostasis is obtained with cautery or a pressure dressing.

## Post-Procedure

### Complications

As with other surgical procedures, excessive bleeding and postoperative infection remain the most commonly feared complications. Surgical planning to avoid damage to local structures, potentiate missed tumor margins, and ensure oronasal competence is necessary for optimal recovery.

When used for facial reconstruction, hard palate grafts may not completely reapproximate native tissues. Proper handling of grafts is necessary to prevent tissue extrusion and compromise of the graft's integrity.

## Long-term monitoring

Patients are followed closely during the postoperative period to avoid the previously mentioned complications and/or to treat them aggressively when they occur. In the case of tumor resection, direct inspection of the resected site is necessary following surgery, along with palpation of lymph nodes of the head and neck during the period of surveillance. In this respect, a potential advantage of prosthetic obturator reconstruction is the ability to carefully inspect the surgical site for local recurrence.

When grafted, the reconstructed area is examined for areas of tissue necrosis that may indicate failure and/or rejection.

## Contributor Information and Disclosures

Author

**Christopher I Zoumalan, MD** Clinical Instructor, Ophthalmic Plastic and Reconstructive Surgery, Department of Ophthalmology, Keck School of Medicine of the University of Southern California

Christopher I Zoumalan, MD is a member of the following medical societies: [Alpha Omega Alpha](#), [American Academy of Ophthalmology](#), [American Medical Association](#), [American Society of Ophthalmic Plastic and Reconstructive Surgery](#), and [Association for Research in Vision and Ophthalmology](#)

Disclosure: Nothing to disclose.

Coauthor(s)

**Samuel Baharestani, MD** Chief Resident Physician, Department of Ophthalmology, NYU Langone Medical Center and Manhattan Eye, Ear, and Throat Hospital

Disclosure: Nothing to disclose.

**from Memorial Sloan-Kettering - Luc GT Morris, MD, MSc** Assistant Attending Surgeon, Head and Neck Service, Department of Surgery, Memorial Sloan-Kettering Cancer Center

from Memorial Sloan-Kettering - Luc GT Morris, MD, MSc is a member of the following medical societies: [American Academy of Facial Plastic and Reconstructive Surgery](#), [American Academy of Otolaryngology-Head and Neck Surgery](#), [American Association for Cancer Research](#), [American College of Surgeons](#), [American Rhinologic Society](#), [Medical Society of the State of New York](#), [Society for Epidemiologic Research](#), and [Triological Society](#)

Disclosure: Nothing to disclose.

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Disclosure: WebMD Salary Employment

Chief Editor

**Arlen D Meyers, MD, MBA** Professor of Otolaryngology, Dentistry, and Engineering, University of Colorado School of Medicine

Arlen D Meyers, MD, MBA is a member of the following medical societies: [American Academy of Facial Plastic and Reconstructive Surgery](#), [American Academy of Otolaryngology-Head and Neck Surgery](#), and [American Head and Neck Society](#)

Disclosure: Covidien Corp Consulting fee Consulting; US Tobacco Corporation Unrestricted gift Unknown; Axis Three Corporation Ownership interest Consulting; Omni Biosciences Ownership interest Consulting; Sentegra

Ownership interest Board membership; Medvoy Ownership interest Management position; Cerescan Imaging Consulting; Headwatersmb Consulting fee Consulting; Venturequest Royalty Consulting

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