The Management of Minor Salivary Gland Tumors of the Oral Cavity

Eric R. Carlson, DMD and Steven R. Schimmele, DDS

In head and neck neoplasia, there is probably no arena so intellectually stimulating as that of salivary gland pathology. No doubt this stems from a relative paucity of these lesions, even in high volume oral pathology services and hospital-based general pathology practices. Regezi et al. retrieved only 238 oral minor salivary gland tumors from a pool of 72,282 oral biopsy specimens submitted to the University of Michigan Oral Pathology Biopsy service between 1964 and 1983. Rivera-Bastidas et al. similarly reviewed 9,000 oral biopsy specimens submitted to the Central University of Venezuela Oral Histopathology laboratory between the years 1968 and 1992. Only 62 (0.7%) minor salivary gland tumors were diagnosed, of which 34 were benign and 28 were malignant. Clearly, the infrequent occurrence of minor salivary gland tumors creates a challenge for the surgeon and pathologist in microscopic diagnosis and planning for surgical therapy. Minor salivary gland tumors have been estimated to account for only 2% to 5% of all head and neck tumors, and malignant variants comprise only 2% to 4% of all head and neck cancers. Waldron et al. have performed a demographic and histologic study of 426 oral minor salivary gland tumors. The slides were reviewed by each of the authors of this study, and then diagnoses were compared with those of the pathologists who originally signed out the cases. Complete concurrence of diagnosis by the authors of this paper was reached in 346 cases (83.3%). Minor disagreements were noted in 49 cases (11.5%), resulting mainly from problems in distinguishing and subclassifying benign entities from one another and malignant tumors from one another. Significant disagreements occurred in 21 cases (5%) and were primarily related to the classification of benign as opposed to malignant entities. The authors’ diagnoses after review were compared with the diagnoses of the contributing pathologists. Complete agreement was noted in 90% of cases, and significant disagreement was seen in 2.8% of cases. These statistics exemplify the controversies associated with microscopic diagnosis of salivary gland tumors in general.
Salivary gland tumors occur not only as benign and malignant entities, but also as a spectrum of cell types throughout the major and minor glands. Minor salivary gland tumors are most demanding with regard to the development of a differential diagnosis, and determination of the most effective means of therapy. Tumors of the minor salivary glands are clearly the most accessible to diagnosis via incisional biopsy, which does not compromise accepted principles of tumor surgery. This technique is generally contraindicated in formulating the diagnosis of neoplasms of the parotid and sub-mandibular glands, unless sacrifice of skin is planned as part of the exclusion. Fine-needle aspiration biopsies and CT scans may assist in the classification of parotid and submandibular tumors, yet many of these tumors are not diagnosed until the tumor has been removed and examined microscopically.

Of historical note is the frequency of benign versus malignant tumors occurring throughout the minor salivary glands, figures that serve to distinguish minor and major salivary gland tumors. As many as 90% of major salivary gland neoplasms are reported benign in specific series, while at least 50%, and as many as 80%, of minor salivary gland tumors are malignant. These statistics are most likely biased according to their origin: A referral specialty surgical service will likely report a higher percentage of malignant tumors than an oral pathology biopsy service that reviews a more representative and therefore unbiased distribution of tumors (Table 1).

Table 1. REPRESENTATIVE SERIES OF MINOR SALIVARY GLAND TUMORS OF THE ORAL CAVITY

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Number of cases</th>
<th>Histology</th>
<th>Site</th>
<th>Pate</th>
<th>Lip</th>
<th>Cheek</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFIR²</td>
<td>1991</td>
<td>2875</td>
<td>Benign, 51% Malignant, 49%</td>
<td></td>
<td>n = 1478</td>
<td>n = 716</td>
<td>n = 416</td>
</tr>
<tr>
<td>Chau⁷</td>
<td>1986</td>
<td>98</td>
<td>Benign, 62% Malignant, 38%</td>
<td></td>
<td>n = 60</td>
<td>n = 12</td>
<td>n = 14</td>
</tr>
<tr>
<td>Eveson¹¹</td>
<td>1985</td>
<td>336</td>
<td>Benign, 54% Malignant, 46%</td>
<td></td>
<td>n = 163</td>
<td>n = 71</td>
<td>n = 38</td>
</tr>
<tr>
<td>Isacsson¹²</td>
<td>1983</td>
<td>201</td>
<td>Benign, 73% Malignant, 27%</td>
<td></td>
<td>n = 150</td>
<td>n = 7</td>
<td>n = 9</td>
</tr>
<tr>
<td>Potdar¹⁶</td>
<td>1969</td>
<td>110</td>
<td>Benign, 49% Malignant, 51%</td>
<td></td>
<td>n = 59</td>
<td>n = 3</td>
<td>n = 9</td>
</tr>
<tr>
<td>Regezi¹⁷</td>
<td>1985</td>
<td>238</td>
<td>Benign, 65% Malignant, 35%</td>
<td></td>
<td>n = 109</td>
<td>n = 69</td>
<td>n = 37</td>
</tr>
<tr>
<td>River⁵-Bastidas¹⁸</td>
<td>1996</td>
<td>62</td>
<td>Benign, 55% Malignant, 45%</td>
<td></td>
<td>n = 34</td>
<td>n = 8</td>
<td>n = 6</td>
</tr>
<tr>
<td>Spiro²⁰</td>
<td>1960</td>
<td>607</td>
<td>Benign, 13% Malignant, 87%</td>
<td></td>
<td>n = 228</td>
<td>n = 8</td>
<td>n = 6</td>
</tr>
<tr>
<td>Stutenville²¹</td>
<td>1967</td>
<td>80</td>
<td>Benign, 10% Malignant, 90%</td>
<td></td>
<td>n = 51</td>
<td>n = 6</td>
<td>n = 11</td>
</tr>
<tr>
<td>Waldron²²</td>
<td>1988</td>
<td>426</td>
<td>Benign, 58% Malignant, 42%</td>
<td></td>
<td>n = 181</td>
<td>n = 93</td>
<td>n = 65</td>
</tr>
</tbody>
</table>

n = number of cases
The treatment of minor salivary gland tumors of the oral cavity begins with a history and physical examination, which enables the clinician to establish a differential diagnosis. Following the development of the histopathologic diagnosis, treatment is planned with consideration of how best to access the tumor as well as make determinations for adjuvant therapy, as necessary, and clinical postoperative follow-up.

DIFFERENTIAL DIAGNOSIS

The evaluation and surgical management of patients with head and neck pathology should begin by establishing an all-inclusive differential diagnosis that is classified categorically and in order of decreasing likelihood. One should look toward including inflammatory, nonneoplastic, and neoplastic entities whenever possible with enumeration of benign, malignant, and metastatic lesions in order of their statistical likelihood. The establishment of a differential diagnosis is based on the history and physical examination, the anatomic location of the lesion under consideration, and the clinician’s previous experience.\(^4\) We generally recommend that CT scans not be done until after an incisional biopsy is performed, at which point ablative surgery is planned based on a histopathologic diagnosis, if this sequence of therapy is warranted. Although the lesion’s CT appearance may serve to assist in its diagnosis, such scans should not substitute for the performance of differential diagnosis. The CT scans should mainly serve to establish the anatomic delineation of the pathologic entity, rather than bide time for the clinician confused by the lesion’s existence and differential diagnosis. For example, a small nonulcerated palatal mass might represent an odontogenic abscess, obstruction of a minor gland resulting in a mucous escape reaction, and a benign or malignant neoplasm (Fig. 1).

![Figure 1](image) Odontogenic abscess resulted in development of a palatal mass in which differential diagnosis should also include salivary gland tumors. Location of this mass is not typical of salivary gland tumors, which generally originates at the junction of the hard and soft palates.
The pleomorphic adenoma is the most common benign salivary gland tumor of the plate, accounting for 90% of all benign tumors in this site according to one large study. Malignant tumors take a prominent place in this differential diagnosis and should include the mucoepidermoid carcinoma, adenoid cystic carcinoma, and polymorphous low-grade adenocarcinoma. Extranodal lymphomas are probably the most common nonneoplastic malignancies of the palate and should be included in the differential diagnosis. Finally, although rare, the possibility of a metastatic tumor to the palate originating from a primary malignancy situated below the clavicles requires some consideration to be given to these masses as well.23

A large indurated mass with or without ulceration originating at the junction of the hard and soft palates should involve a similar differential diagnosis, yet with a different emphasis (Fig. 2).

![Figure 2. A large palatal pleomorphic adenoma has been present for several years in this elderly patient. Prior to biopsy, the tumor’s surface was nonulcerated and uniform. This tumor notably involves the hard and soft palate junctions.](image)

Most notably, salivary gland tumors must earn strong consideration, almost at the exclusion of nonneoplastic lesions, because of their location, size, and consistency. The appearance of a blue color to the surface of the mass lends credence to this possibility.25 Other clinical, laboratory, and radiographic signs such as the presence or absence of pain, elevated temperature, leukocytosis, fluctuance, and radiographic loculations may classify the mass under consideration more effectively. Clinical signs of encapsulation as opposed to fixation to surrounding tissues must be assessed during physical examination to establish a meaningful differential diagnosis.

Some clinicians might question the value of engaging in the academic exercise of establishing a differential diagnosis of an oral mass. After all, such a mass may be readily biopsied, which could “cut to the chase.” An astute differential diagnostician may, under favorable circumstances, however, avoid an incisional biopsy and proceed directly to excision. A well-encapsulated, freely moveable indurated mass of the upper lip
is statistically a canalicular adenoma and may, therefore, be excised without previous performance of an incisional biopsy. This thought process obviates otherwise having to perform two minor surgeries. In essence, an incisional biopsy may be avoided when all of the lesions on the differential diagnosis would warrant the same treatment, and when a benign diagnosis is favored. We do not recommend this approach when a malignant diagnosis is likely, however. Malignant palatal salivary gland tumors involve diverse approaches to their treatment, even when treating the same cell type. The mucopidermoid carcinoma is a case in point, whose specific treatment is dictated by the tumor's grade. Low-grade mucopidermoid carcinomas invariably may be treated by periosteal-sacrificing, bone-sparing wide local excisions, whereas the high-grade variant generally requires the oncologically well-accepted, traditional maxillectomy, which sacrifices bone. The polymorphous low-grade adenocarcinoma has varying forms of treatment in and of itself, however, despite a uniformly low-grade designation. In fact, computed tomograms are of great value to this end, whereby the polymorphous low-grade adenocarcinoma that does not display bony erosion may be managed in a way similar to the management of the low-grade mucopidermoid carcinoma with a wide local excision including periosteum. The polymorphous low-grade adenocarcinoma that is long standing usually exhibits bony erosion by CT scans, and must be managed by maxillectomy with the appropriate soft and hard tissue margin. It is not uncommon for patients to present with a 10-year history of a palatal mass that proves to be polymorphous low-grade adenocarcinoma by incisional biopsy. Progressive, albeit slow, growth permits infiltration into the maxilla, yet the lack of cervical and distant metastases as well as the mere survival of these patients is a testimony to the low-grade nature of this malignant tumor. The clinician can plainly see why incisional biopsy of suspected minor salivary gland malignancies is important. The diverse number of diagnoses, as well as the varied biologic behavior within one specific tumor type and grade dictates the search for a firm histopathologic diagnosis, as well as an assessment of anatomic barrier invasion by the tumor prior to planning ablative surgery.

SITE-SPECIFIC MINOR SALIVARY GLAND TUMOR SURGERY

The specific surgery indicated for minor salivary gland tumors is a function of the histopathologic diagnosis, the site of the tumor, and its invasion of surrounding anatomic barriers as frequently determined by special imaging studies (Table 2). With regard to palatal tumors, experience shows the periosteum to be a very competent, first-eclonal anatomic barrier. As such, all benign tumors and most low-grade malignancies at this site may be managed by wide local excisions, which sacrifice periosteum and spare the underlying palatal cortex. High-grade and otherwise aggressive malignant tumors almost invariably invade bone, thereby requiring its sacrifice.

<table>
<thead>
<tr>
<th>Table 2. GUIDELINES FOR MINOR SALIVARY GLAND TUMOR SURGERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Lip</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Malignant</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Minor salivary gland tumors of the lip involve a similar approach to the principles of anatomic barrier management. In this site, most benign neoplasms profit by distinct encapsulation, which allows for preservation of both mucosa and underlying orbicularis oris musculature. Malignant lip tumors generally show fixation to mucosa as well as underlying muscle, thereby requiring their sacrifice. A pinch test of the lip skin must be performed when planning surgery for malignant lip tumors to determine whether or not skin and dermis may be preserved with oncologic safety. In the pinch test, the skin overlying the mass is grasped with a pinching action and if it is mobile over the mass then the dermis is uninvolved and can be spared.

**Palatal Tumors**

Perhaps one of the most important technical decisions to consider when managing a benign or malignant salivary gland tumor of the palate is how access can be optimized to allow for precision tumor surgery. Any one of the number of cleft gags (Fig. 3) can be used, which serve to depress the tongue, open the mouth, and retract the bilateral buccal mucosa simultaneously. In our experiences, this instrument makes the surgical site more accessible and increases the opportunity to obtain tumor-free margins in the specimen.

![Figure 3. The Dingman mouth gag provides excellent access for extirpation of palatal tumors. By depressing and retracting the tongue base, the posterior margin of the tumor excision may be directly visualized without additional surgical retractors.](image-url)
Wide Local Excision

The benign palatal tumors and low-grade malignancies may be most commonly managed by wide local excision (Fig. 4). For most diagnoses, a 1- to 1.5-cm mucosal margin is observed. Following incision of the mucosa to bone, a sharp periosteal elevator is used to elevate the specimen off the tissue bed deep to the periosteum.

Figure 4. A, This biopsy-proven, low-grade mucoepidermoid carcinoma may be effectively managed with a bone-sparing wide local excision including 1-cm margins (B) without creating a full-thickness defect of the soft palate which would otherwise necessitate obturation. B, With the Dingman mouth gag fully activated, excellent access to the tumor ablation is appreciated.

Illustration continued on following page
Figure 4 (Continued). C, A periosteal elevator is used to create a plane between the periosteum on the deep surface of the specimen and the underlying bone of the palate. D, The specimen is oriented with sutures which assist the pathologist in generating an accurate report. E, The resultant defect includes a split-thickness defect of the soft palate. The final histopathologic sections should be evaluated by the surgeon and pathologist together. The deep periosteal surface should be examined closely to ensure that no invasion of the periosteum has occurred that would necessitate bone sacrifice.

Illustration continued on opposite page
When managing benign palatal tumors, a split-thickness excision of the soft palate musculature can be accomplished, thereby avoiding creation of an oral–nasal communication, which requires obturation. This approach is also appropriate with the low-grade mucoepidermoid carcinoma. The resultant defect merely granulates to create soft tissue coverage of the exposed palatal bone. The polymorphous low-grade adenocarcinoma, however, is characteristically deeply infiltrative and a full-thickness sacrifice of soft palate is necessary, even when bone-sparing surgery is being performed. Of paramount importance when performing a bone-sparing wide local excision is that the surgeon direct the pathologist to inking and paying particular attention to the periosteal surface. If the periosteum is positive for tumor infiltration, bony resection is incicated.
This determination may be made by frozen section, in which case the resection can be performed immediately without having to subject the patient to a second surgery (if the determination were otherwise made on permanent sections). It is acceptable to preserve bone if the periosteum is negative for tumor even if the supraperiosteal tissues contain tumor. This decision is scientifically sound owing to the competent nature of the anatomic barrier of periosteum.

**The Attia Double Osteotomy for Access to Parapharyngeal Space Tumors**

Tumors of the soft palate may occasionally develop to such a large size that they inscribe their path in the parapharyngeal space (Fig. 5). We have observed that large pleomorphic adenomas that originate at the junction of the hard and soft palates become large oral masses as a result of the presence of the palatal bone.

*Figure 5. A.* This soft palate mass has scribed its path of enlargement in the parapharyngeal space as seen by CT scans (*B, C, [arrow]*). A generous, combined transoral and transcutaneous approach to tumor ablation is beneficial.
When a pleomorphic adenoma originates entirely within the soft palate, it may enlarge by occupying the parapharyngeal space. Under such circumstances, the surgeon must provide special means to access the tumor for complete and well-controlled excision. A completely transoral excision is blind at best, and the carotid sheath contents may become traumatized as a result. In our experience, a combined transtemporal and transcervical approach to the excision of large soft palate tumors is indicated, especially when they involve the parapharyngeal space. The Attia approach to the parapharyngeal space provides direct access to this anatomic region and allows unimpeded visualization of tumors occupying this space (Fig. 6).

Figure 6. A, The Attia double osteotomy provides excellent access to removal of parapharyngeal space tumors. The basis of this approach is to osteotomize the inferior two-thirds of the ramus and mandibular body that covers the tumor. B, A generous lingual mucoperiosteal stripping is performed which allows for elevation of this mandibular segment, and C, unimpeded access to the parapharyngeal space and tumor extirpation.
A double osteotomy of the mandible is performed, which allows that portion of the mandible that is lateral to the tumor to be reflected laterally and superiorly along with the attached masseter muscle. A horizontal osteotomy superior to the ant lingula and a vertical osteotomy anterior to the mental foramen affords reflection of this segment, with blood supply originating from the buccal soft tissues with a minor contribution from the neurovascular bundle, which remains intact within the osteotomized segment. Elevation of the medial pterygoid muscle results in unparalleled access into the parapharyngeal space. When Attia originally proposed his procedure in 1984, he recommended a lower lip split and fixation with wire osteosynthesis, necessitating a course of maxillomandibular fixation. In our experience, lower lip splitting is not necessary, which eliminates the occasional cosmetically unfavorable result seen in some patients when using this extended access. One additional modification of this technique is the use of rigid fixation, which obviates the need for maxillomandibular fixation. Specifically, plates may be secured to the mandible prior to the osteotomy, removed, and placed on the back table (Fig. 7). The double osteotomy is performed, followed by removal of the tumor (Fig. 8).

Figure 7. As part of the Attia approach, plates are applied to the mandible prior to performing the osteotomies.
Figure 8. The mandible is ostentomized in a vertical fashion anterior to the mental foramen and in a horizontal fashion superior to the mandibular foramen. A. This allows for superior retraction of the osteotomized segment. B. With similar retraction of the medial pterygoid muscle, the tumor's inferior extent is appreciated, which allows for its excision (C).
At this point the segments can be repositioned and the plates are then resecured to the mandibular segments without requiring the application of maxillomandibular fixation (Fig. 9). This sequence permits anatomic realignment of the mandible and recapitulation of the occlusion, as well. Patients are encouraged to maintain a soft diet for the first 8 weeks postoperatively. Bony healing is most commonly uneventful in the compliant patient, and tumor recurrence is rare in our experience.

Figure 9. A. Following tumor ablation, bone plates are simply replaced. Maxillomandibular fixation is not necessary. B. While osseous healing occurs postoperatively, panoramic radiographs should be obtained periodically.
The Weber-Fergusson Incision and Approach to the Maxilla for Maxillary Resection

The Weber-Fergusson incision represents a technique of midfacial degloving that is valuable in managing many extensive salivary gland malignancies of the maxilla and soft palate. It is never indicated when performing a wide local excision of a tumor of this region, and therefore rarely if ever required when managing benign salivary gland neoplasms. Realistically, most malignant salivary gland tumors of the palate requiring maxillary resection may be approached entirely transorally. We believe that tumors extending beyond the superior one-half of the maxillary sinus require a Weber-Fergusson incision with or without the infraorbital extension (Fig. 10).

Figure 10. A and B. This patient has a large mucoepidermoid carcinoma of the entire maxilla and soft palate.

Illustration continued on following page
Figure 10 (Continued). C and D. Computed tomograms document its extent, including proximity to the skull base.
The upper portion of the Weber-Fergusson incision is placed in the subciliary region or the infraorbital crease (Fig. 11). The incision extends into the lateral nasal region in a curvilinear fashion at the medial canthal region. We have found that this incision should be relieved by 1 mm from the nose and ala, which assists in the closure and minimizes alar retraction postoperatively.

Figure 11. Extensive transcutaneous access in the form of a Weber-Fergusson incision is essential when excirpating very large tumors of the maxilla. This allows for cosmetic degloving of mid-facial skin by virtue of its incision design.
In the infranasal area, the incision meets the superior aspect of the philtrum at a right angle, proceeds inferiorly along the lateral philtrum until joining the vermilion, at which point the incision proceeds medially to cupid’s bow at the level of the vermilion border. The lip is finally split directly through cupid’s bow. As the dissection proceeds intraorally, and the appropriate soft tissue margin is maintained on the specimen, direct access to the tumor resection is appreciated. Moreover, the nose may be reflected contralaterally, which allow for intranasal dissection when larger, more extensive tumors so dictate. This exposure permits excellent access for the resection of very large tumors (Fig. 12).

Figure 12. A, Unimpeded access to the resection of this large tumor occurs when using the Weber-Ferguson incision. B, This procedure permits precision tumor surgery without violating the specimen.
When managing smaller, unilateral tumors, the term hemimaxillectomy is often taken too literally. That is, the resection proceeds through the maxillary midline, thereby preserving one central incisor and sacrificing one central incisor in the specimen. Such a resection jeopardizes the reconstruction by not maintaining a ledge of bone to adapt to the graft. Furthermore, the ultimate prosthetic care is difficult to obtain by virtue of the prosthodontist having to match the color of the prosthetic tooth with that of the remaining natural central incisor. A good rule of thumb, therefore, is to maintain either both or neither of the central incisors while maintaining half of an extraction socket at the distal resection margin. Often, the palatal incision can be to one side of the midline of the palate posteriorly and either be brought out laterally through a cuspid or first bicuspid socket on the side of the tumor to achieve a more functional and cosmetic prosthodontic reconstruction while still achieving sound surgical margins.

Once the specimen has been removed, an oral–antral/oral–nasal communication exists. Our preference for reconstruction includes an immediate obturator that was fabricated preoperatively. For malignant defects, such obturators allow for periodic clinical examinations that would only be possible with CT scans if these defects were immediately biologically reconstructed. These defects do, however, become candidates for soft and hard tissue grafting once the patient has been statistically assigned the label of cure.

Lip Tumors

The surgical management of lip tumors involves a thought process similar to that used for palatal salivary gland tumors, with one major exception. The development of a differential diagnosis of a lip mass often permits the surgeon to proceed directly to excision without first obtaining an incisional biopsy. This process is a reflection of the clinical examination, frequently allowing for classification of benign and malignant tumors with confidence. While benign and malignant palatal salivary gland tumors may also be differentiated on clinical grounds, the varying forms of therapy for the malignant tumors mandates that an incisional biopsy be performed in order to arrive at a definitive diagnosis prior to planning surgical treatment.

When an upper lip mass is freely movable and submucosal, a mucosal-sparing, pericapsular excision of the mass may be performed from the onset (Fig. 13).

Figure 13. A. This freely movable and therefore encapsulated mass of the upper lip is typical of the canalic-ular adenoma. B. The excision involves a simple pericapsular ablation along with associated minor salivary gland tissue, without the need for incisional biopsy.
An incisional biopsy is not necessary prior to the excision because of the high likelihood of a benign lesion, and specifically either a pleomorophic adenoma or a canalicular adenoma. On the other hand, a multilobulated mass that is fixed to mucosa is more likely to be malignant, thereby requiring an incisional biopsy for diagnosis prior to planning the tumor surgery (Fig. 14).

Figure 14. This intermediate-grade mucoepidermoid carcinoma is fixed to the surrounding tissues and multilobular. An incisional biopsy was performed in the center of the mass to establish diagnosis prior to performing the excision.

Of equal concern is the plan for immediate reconstruction of the lip at the time of tumor excision. Most commonly, the orbicularis oris muscle is sacrificed on the specimen when managing a malignant tumor. While a split-thickness skin graft could certainly successfully heal to the remaining tissue bed, a full-thickness graft is indicated to provide for a quantitatively adequate soft tissue reconstruction of the lip. These grafts provide excellent bulk, which holds up well in the face of future radiation therapy, and are more cosmetically favorable because they contract less than split-thickness skin grafts.
Cheek Tumors

The evaluation of salivary gland tumors of the buccal mucosa or cheek involves an algorithm and approach to treatment identical to that used for the lip. In most series, this anatomic region is rarely the site of such tumors (see Table 1). Nonetheless, clinical features including ulceration of the mucosal surface, fixation to surrounding structures, and nonuniformity of the mass may assist the clinician in classifying these tumors as benign or malignant. An incisional biopsy should be performed when the differential diagnosis includes malignant entities. As with lip tumors, however, when a benign diagnosis is likely, we proceed directly to a pericapsular excision (Fig. 15).

Figure 15. A. This well-encapsulated buccal mucosal tumor favors benign diagnosis. As such, an excision may be performed without first establishing the microscopic diagnosis. B. A submucosal pericapsular dissection was performed; frozen sections showed a canaliculard adenoma.
The excision of benign salivary gland tumors of the buccal mucosa is a mucosal-sparing surgery that permits a primary mucosal closure following tumor removal, thereby obviating the need for soft tissue reconstruction. Blunt dissection will decrease the risk for damage to the buccal branch of the facial nerve and, if the parotid duct is in the vicinity, it can be cannulated to aid identification and preservation. With malignant lesions, however, mucosa and other structures may need to be sacrificed. Because most malignant tumor excisions of the buccal mucosa are mucosal-sacrificing surgeries, some form of soft tissue reconstruction must be considered in preparation for surgery. When the skin of the cheek is able to be preserved, as occurs in nearly all instances except where the tumor is eroding through the skin, skin grafting the residual intraoral defect is acceptable. This grafting may occur in the form of full-thickness skin, particularly when the buccinator is sacrificed, or split-thickness skin when this muscle remains in the tissue bed (Fig. 16).

Figure 16. A, This polymorphous low-grade adenocarcinoma of the buccal mucosa is fixed to mucosa and possesses other characteristics indicative of malignancy. B, At the time of the surgery, mucosa is sacrificed, requiring immediate reconstruction in the form of a split-thickness skin graft.
TREATMENT OF THE NECK

Treatment of the neck in association with malignant minor salivary gland tumors of the oral cavity is a controversial issue. A review of our experience and that of the literature reveals two important revelations insofar as this issue is concerned. First and foremost, occult neck disease, that is, microscopic cervical metastases that exist but cannot be palpated, are rare compared with other primary carcinomas, most notably squamous cell carcinomas of the oral cavity. Second, it is rare for patients with minor salivary gland malignancies of the oral cavity to present with palpable cervical metastases. In Sadeghi et al's review of 117 malignant tumors of the minor salivary glands, only 9 patients (7.7%) presented with an N1 neck. Of the remaining 108 patients, only 4 patients (3.7%) subsequently developed neck node metastases after treatment of the primary site exclusively. Chung et al9 reported on 18 of 20 patients presenting with an N0 neck and indicated that 3 patients had recurrences in the neck. It is not stated, however, whether these recurrences occurred solely in the original N0 patients who underwent local resection, or in a combination of the original N0 and N1 patients. Chidzonga et al9 reported only 2% of their patients with malignant salivary gland tumors presenting with neck metastases, whereas Beckhardt et al10 reported 3% of their patients with clinically evident regional disease. In the final analysis, there is no evidence to justify prophylactic neck dissection in patients with minor salivary gland malignancies. Candidates for surgical management of the neck should be those patients presenting with N1 necks, those whose imaging studies show lymph node changes suggestive of metastatic deposits, and all patients with high-grade malignancies, regardless of whether or not cervical metastases may be palpated preoperatively.

RADIATION THERAPY IN THE MANAGEMENT OF MINOR SALIVARY GLAND TUMORS

The previously widely stated misconception that salivary gland malignancies are radioresistant and that radiation therapy is only of palliative benefit can no longer be considered valid. A review of the literature over the past 20 years clearly shows that radioresistance of salivary gland malignancies is not a valid argument.10 Adjuvant, postoperative radiation therapy is indicated in all high-grade malignancies, advanced stage tumors, positive surgical margins, positive regional nodes, and recurrent tumor.10 We emphasize that the management of salivary gland tumors is primarily surgical, and that the use of radiation therapy should be of an adjuvant nature, rather than as a primary mode of therapy. The combination of well-executed surgery and postoperative radiation therapy optimizes the opportunity for long disease-free intervals and, possibly, cure of patients with intermediate- and high-grade malignant tumors of the minor salivary glands.

REFERENCES

4. Carlson ER: Salivary gland pathology: Clinical perspectives and differential diagnosis. In Carl-
8. Chidzonga MM, Lopez-Perez VM, Portilla-Alvarez AL: Salivary gland tumors in Zim-

Address reprint requests to
Dr. Carlson
University of Miami School of Medicine
Division of Oral and Maxillofacial Surgery
Doctors’ Hospital
5000 University Drive
Coral Gables, Florida 33146