

## **Chapter 61: Benign Neoplasms of the Salivary Glands**

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Problems of the salivary glands are uncommon; however, the spectrum is quite varied and challenging. The salivary glands consists of the major and minor salivary glands; the parotid, submandibular, and sublingual glands constitute the major salivary glands and the minor salivary glands are found essentially anywhere in the upper aerodigestive tract, including the trachea and paranasal sinuses. When functioning properly, the salivary glands are rarely noticed, but when affected by neoplastic disease, they can be a challenge in diagnosis and treatment.

Salivary gland enlargement is less often caused by neoplasia than by inflammatory or other nonneoplastic conditions. Less than 3% of all tumors of the head and neck are salivary gland neoplasms. Of all neoplasms of salivary gland origin, about 85% occur in the parotid gland. Of these, 80% are benign, whereas only about 50% of the submandibular tumors and approximately 25% of the minor salivary gland neoplasms are benign. Although extremely rare, tumors of the sublingual gland are almost always malignant.

### **Classification**

Tumors of the salivary glands have been classified in numerous ways. We have chosen to classify tumors as benign neoplasms, tumorlike conditions, and malignant neoplasms. Malignant neoplasms will be addressed in the next chapter. The following is a classification for benign neoplasms and tumorlike conditions. (These tumorlike conditions can be confused with benign tumors of the salivary glands.)

#### **A. Benign neoplasms**

##### **1. Adenomas**

###### **a. Pleomorphic adenoma (benign mixed tumor)**

###### **b. Monomorphic adenoma**

###### **1. Basal cell adenoma**

###### **2. Clear cell adenoma**

###### **3. Sebaceous lymphadenoma**

###### **c. Warthin's tumor**

###### **2. Oncocytoma**

###### **3. Oncocytic papillary cystadenoma**

###### **4. Myoepithelioma**

5. Sialadenoma papilliferum
  6. Inverted ductal papilloma
  7. Hemangioma
  8. Lymphangioma
- B. Tumorlike conditions
1. Necrotizing sialometaplasia
  2. Benign lymphoepithelial lesions
    - a. Mikulicz's syndrome
    - b. Sjögren's syndrome
  3. Chronic sialadenitis and sialolithiasis
  4. Sialoadenosis
  5. Hyperplasia of mucous salivary glands
  6. True cysts of major salivary glands
  7. Vascular malformations
    - a. Venous malformation
    - b. Arteriovenous malformations
    - c. Lymphatic malformations
  8. Granulomatous diseases
    - a. Sarcoidosis
    - b. Tuberculosis
    - c. Actinomycosis
    - d. Cat-scratch fever
  9. Miscellaneous
    - a. Lipoma

b. Heterotopic salivary glands

c. Masseter hypertrophy.

### **Pathogenesis**

Understanding the origins of benign salivary gland tumors requires knowledge of the embryology and ultrastructure of the normal salivary gland. The major salivary glands originate from ectoderm. All the salivary glands begin their development as solid ingrowths from the oral epithelium. The ingrowths continue to develop into tubules that later become the ductal system of the salivary glands. The tubules are lined with epithelial cells and become the intercalated, striated, or excretory ducts.

In the adult salivary gland both serous and mucous cells are drained by a series of ducts. The drainage pathways is very consistent. The acinar structure is lined with an intercalated duct that drains into a striated duct and finally empties into an excretory duct (Fig. 61-1). In each of these areas the cellular structure is unique and constitutes the histologic differences found in benign neoplasms of the salivary glands.

The ductal structure of the parotid is most complex; the ductal structure of the submandibular gland is similar although the secretions have a higher concentration of mucus. The structure of the minor salivary glands is much simpler, with singular secretory units draining individually.

In addition to understanding cellular morphology, embryology also plays an important role in tumor pathogenesis. During the late encapsulation of the parotid gland, for instance, lymph nodes are entrapped and provide the origin for a Warthin's tumor.

Other tumors also have specific cellular origins. For instance, pleomorphic adenomas arise from intercalated duct cells and myoepithelial cells. Oncocytomas arise from striated duct cells and mucoepidermoid tumors and squamous cell carcinomas develop in the excretory duct cells.

### **Clinical Features**

Classically, benign neoplasms of the salivary glands are painless, slow-growing masses. A sudden increase in size can usually be traced to infection, cystic degeneration, or hemorrhage inside the mass. When this occurs, a patient may complain that the previously painless mass is now quite tender. Gland mobility may become reduced with chronic inflammation and fibrosis. Although facial nerve dysfunction is rare with benign tumors, impairment may occur because of the pressure effect from large parotid tumors. When this happens, salivary flow is usually interrupted.

Most benign salivary gland tumors occur in the parotid gland. Their location should aid in the differential diagnosis. A mass occurring in the tail of the parotid may be mistaken for a neck mass. If a parotid tumor is not considered in the differential diagnosis, the case may be mismanaged. If the mass is treated with simple excision, complications of recurrent tumor and facial nerve injury are more common. That a mass is slow growing and that pain

is absent should point to the diagnosis.

Submandibular tumors are also slow growing and painless. Minor salivary gland tumors appear as smooth mucosa-covered masses and usually occur on the hard palate. The incidence of malignancy is higher in the minor salivary glands. The differential diagnosis for a mass in the minor salivary gland must also include granulomatous and infectious diseases.

### **Diagnostic Evaluation**

A careful history and physical examination is the first step in trying to differentiate between a benign and malignant lesion. As a rule, benign lesions are slow growing, freely movable, and have no nerve paralysis or overlying ulceration. Seventeen cases of facial nerve dysfunction have been reported in histologically benign, nonneurogenic masses of the parotid gland in the English literature (Sismanis, 1981). Since this condition is so rare, generally speaking a facial nerve paralysis will be associated with a malignant tumor.

When a patient presents with a nodule in the parotid glands, the physician must ask about previous skin cancers around the side of the head or ear to rule out the possibility of a metastasis to a lymph node. Also, what is frequently thought to be a subcutaneous lymph node can turn out to be a small pleomorphic adenoma in the parotid. The oropharynx must also be examined carefully to rule out deep-lobe parotid involvement. When the deep lobe is involved, frequently a mass is present, bulging the soft palate or tonsil (Fig. 61-2). These deep-lobe tumors are most often pleomorphic adenomas and must be approached externally.

Another tumor that can be diagnosed with clinical criteria is a hemangioma. These tumors are seen only in infants and are usually noticed a few days after birth. They have a rapid growth spurt around 1 to 6 months, then gradually regress over 1 to 12 years. As many as 50% of patients with parotid hemangiomas will also have other skin hemangiomas at the same time. Vascular lesions that may be seen at birth and gradually grow with the rest of the body are considered vascular malformations. They do not regress spontaneously.

Conventional radiography and sialography are rarely used because they provide little useful information. Nuclear imaging using technetium 99m pertechnetate is helpful only with oncocytic and Warthin's tumors (Higashi et al, 1989). Because a needle biopsy can provide better information, nuclear imaging is rarely obtained. The CT scan and MRI are very helpful in determining the extent of disease but do not differentiate between benign and malignant tumors. High-resolution ultrasound or sonography is useful in the hands of experienced radiologists and may detect calculi, abscesses, and cysts, and can even correctly assess up to 90% of benign versus malignant tumors (Gritzman, 1989).

A biopsy is always required to make a diagnosis of salivary gland disorders. Various types of biopsies are used and include fine-needle aspiration (FNA), core-needle biopsy, and incisional and excisional biopsies. Dr. John Conley refers to a superficial parotidectomy as a "grand biopsy". FNA biopsies are now an acceptable and commonly used method to evaluate salivary gland neoplasms. Of importance is obtaining a good sample of the tumor and having an experienced cytologist. One must correlate the FNA report with the clinical findings. The accuracy of the FNA for differentiating benign from malignant tumors should approach 90% (Sismanis et al, 1981).

An incisional biopsy is frequently used in larger intraoral lesions and is usually reliable. Sialometaplasia can be confirmed by an incisional biopsy in the palate, avoiding the need for further surgery. An excisional biopsy is common with small intraoral salivary gland tumors and with some tumors of the parotid and submaxillary gland when FNA is not used.

Immunohistochemical distribution of S-100 protein has been evaluated in tumors from major and minor salivary glands and does not appear to discriminate benign from malignant tumors (Zarbo et al, 1986).

## **Benign Tumors**

### **Adenomas**

#### ***Pleomorphic adenomas***

Pleomorphic adenomas (benign mixed tumors) are the most common tumors of the salivary gland. The great majority arise in the parotid gland (Fig. 61-3). The term *pleomorphic* describes the embryologic basis for these tumors with their origin of epithelial and connective tissue. Although the histogenesis of this tumor has been debated, the current theory is that pleomorphic adenomas arise from intercalated and myoepithelial cells.

This tumor usually presents in the fourth or fifth decades. It is painless, slow growing, and usually found as an incidental mass in the cheek or near the angle of the mandible. About 90% of these tumors arise superficial to the plane of the facial nerve. The 10% that arise in the deep lobe may extend through the space between the angle of the mandible and the styloid process and present as a parapharyngeal space mass. They may also present with intraoral swelling and medial displacement of the tonsil and lateral pharyngeal wall. In most cases, the masses are firm and mobile.

Pleomorphic adenomas of the submandibular and minor salivary glands present as swellings in those glands. When present in the minor salivary glands, most occur in the hard and soft palate. The second most common place is the upper lip. Unlike most mixed tumors, those in the palate and lip frequently lack a capsule.

Commonly pleomorphic adenomas of the parapharyngeal space present as asymptomatic masses. Although the parapharyngeal space contains the great vessels and cranial nerve IX to XII, involvement of these structures is rare. Many of the tumors arise from the deep lobe of the parotid, but they can also arise from separate islands of parotid and minor salivary gland tissue that naturally occur in the parapharyngeal space. The treatment is surgical excision.

On gross pathologic examination a pleomorphic adenoma is a solitary, firm, round tumor with a thin, delicate, incomplete capsule (Fig. 61-4). Commonly pseudopods of tumor extend through the capsule. Recurrent tumors are frequently multinodular. The cut surface is characteristically solid and is hard or rubbery to soft in consistency. The color varies from white to gray to pale yellow. Microscopically the tumors have islands of stellate and spindle cells that are interspersed with a mixoid background. Glandular areas of tubular epithelium have also been reported. Variations on this tumor are common and may include squamous

metaplasia, calcification, cartilage-like tissue, oxyphilic cells, and a palisading appearance of the underlying stroma. Malignant transformation may occur in these tumors, more often in longstanding tumors. Case reports of clinically metastatic disease with histologically benign tumors have also been reported.

These tumors should not recur after adequate surgical excision. Most recurrences can be traced to enucleation of the mass with no appreciation of the pseudopod extensions of tumor. Although encapsulated, if a cuff of normal tissue is not removed along with the tumor, recurrence may be an expected complication. Consequently, the treatment of choice for a pleomorphic adenoma of the parotid, submandibular gland, or minor salivary gland is excision of tumor with a surrounding cuff of normal tissue. In the parotid gland the treatment is usually a superficial or total parotidectomy with facial nerve preservation.

A recurrent pleomorphic adenoma changes the treatment plan. If a superficial parotidectomy has been previously performed, the deep lobe of the parotid must be removed. Obviously, great care must be taken to protect the facial nerve, which may be vulnerable because of the altered anatomy and scarring. With submandibular or minor salivary gland involvement the recurrent tumor and an extra cuff of normal tissue should be removed. Radiotherapy plays a questionable role in the recurrent pleomorphic adenoma when surgery is no longer a feasible option. Chemotherapy plays no role in the management of these tumors.

### *Monomorphic adenomas*

Monomorphic adenomas are benign tumors of the salivary glands that also arise from ductal epithelium. These tumors usually occur in the parotid gland and the minor salivary glands of the upper lip. They have also been described in other areas where minor salivary glands are found, like the hard and soft palate and buccal mucosa; these tumors only represent 1% to 3% of all salivary gland neoplasms (Batsakis, 1991). There is no sex predilection and the average patient is over 60 years of age. As with most benign tumors, monomorphic adenomas classically appear as asymptomatic, slow-growing masses. Facial nerve involvement is very rare. Histologically these tumors are distinguished from pleomorphic adenomas by the absence of chondromyxoid stroma and the presence of a uniform epithelial pattern.

*Basal cell adenomas.* Basal cell adenomas are the predominant tissue type of monomorphic adenomas. The average patient is 60 years of age. Most of these tumors also occur in the parotid gland or in the minor salivary glands of the upper lip. The tumors are solid and well circumscribed. The cut surface is gray-white, gray-red, or pink-brown. Tumors arising in the parotid gland usually have a capsule, whereas those arising in the lip do not.

Histologically, a solid growth pattern is more common in the parotid tumors, consisting of isomorphic cells with dark nuclei and rare mitoses. The epithelium is demarcated from surrounding stroma by a row of peripheral cells that demonstrate prominent nuclear palisading. This effect is due to the presence of an intact basement membrane and helps to differentiate this tumor from a pleomorphic adenoma. Adenomas arising in the upper lip usually have a tubular or canalicular pattern.

Clinically, basal cell adenomas may be confused with enlarged lymph nodes, sebaceous cysts, mucoceles, lipomas, nasolabial cysts, or pleomorphic adenomas. Histologically, these tumors must be differentiated from adenoid cystic carcinomas. Basal cell adenomas are not always encapsulated; instead of invading surrounding tissue, they usually show a pattern of circumscription. The stroma is also more vascular. Because basal cell adenomas are benign, treatment is excision with a cuff of normal surrounding tissue.

**Clear cell adenomas.** Clear cell adenomas also have a propensity to occur in the parotid gland. They are slow-growing, asymptomatic, solid, and well circumscribed. Their cut surface is gray-white or yellow. Histologically, these tumors are made up of two uniform cell types: a dark eosinophilic layer represents the epithelium of the intercalated duct and accompanies an outer layer of clear cells that are rich in glycogen.

These tumors must be differentiated from acinic cell carcinomas and mucoepidermoid carcinomas. Both of these malignancies may have large numbers of relatively benign-appearing clear cells, but they lack the orderly cytoplasmic architecture and the abundance of glycogen.

Reports have been conflicting as to the behavior of clear cell adenomas. Because of the accounts of isolated infiltration, recurrence, and possible metastases, some regard these tumors as low-grade carcinomas. Treatment is surgical excision.

**Sebaceous lymphadenomas.** Sebaceous lymphadenomas are rare benign tumors of the salivary glands. They originate in normal sebaceous glands that arise from the blind ends of intralobular ducts in otherwise normal salivary glands. Rarely, a sebaceous lymphadenoma arises from minor salivary gland tissue. No cases of malignant counterparts have been reported. These tumors are slow growing, asymptomatic, and usually occur in the parotid gland. Ectopic sebaceous glands in the lips and oropharynx are thought to be present in about 80% of the population. They are usually found in middle-aged and elderly people.

Microscopically these tumors are composed of cysts lined with squamous epithelium and sebaceous cells. The surrounding lymphoid stroma may or may not contain germinal centers. Surgical excision is the treatment of choice.

### ***Warthin's tumor***

Warthin's tumor is also known as *papillary cystadenoma lymphomatosum* or *adenolymphoma*. This tumor occurs almost exclusively in the parotid gland and accounts for 2% to 10% of all parotid tumors. The only salivary gland tumor that is more common is the benign mixed tumor. Warthin's tumor is unique in several ways. It contains lymphoid tissue, has a striking male predominance, is bilateral in 10% of cases, commonly has unilateral focal involvement, and is rare in blacks.

Presentation is usually during the sixth decade. Although the masses are classically asymptomatic, a small minority of patients complain of pain. A Warthin's tumor commonly is found in the superficial lobe of the parotid gland near the angle of the mandible. This tumor has also been reported in the parapharyngeal space and less commonly in the submandibular gland and the minor salivary glands of the lower lip and palate.

Embryologically the parotid gland is the first salivary gland to develop and the last to become encapsulated. During this late encapsulation, salivary ducts are trapped in lymph nodes and become the genesis for a Warthin's tumor. The identification of normal nodal structures such as subcapsular sinuses and the occurrence of these tumors in lymph nodes outside the parotid support this hypothesis. Further support lies with T- and B-cell markers that represent normal lymph nodes that have also been identified in Warthin's tumors. Also, the almost total confinement of this tumor to the parotid region may be explained by the fact that ductal elements are found only in parotid tissue.

Oncocytes are found in Warthin's tumors and oncocytomas, the only other tumor with frequent bilateral presentation. Oncocytes selectively incorporate technetium 99m and appear as hot spots on a scan. Most other neoplasms show either normal uptake or appear as cold nodules. The technetium is accumulated because of a functional abnormality in the oncocyte and its altered mitochondria.

Grossly, Warthin's tumors are encapsulated with a smooth or lobulated surface. Papillary cysts are commonly found on sectioning and may contain mucoid brown fluid (Fig. 61-5). Solid gray tissue encapsulates white nodules of lymphoid tissue. Lymph node architecture may be distorted by epithelial components compressing the sinuses. Electron microscopy shows a tremendous number of mitochondria in the epithelial cells. This in turn causes a granular-appearing eosinophilia.

Treatment is a superficial parotidectomy with preservation of the facial nerve. Inadequate excision or tumor multicentricity may explain tumor recurrence.

### **Oncocytomas**

Oncocytomas account for less than 1% of all salivary gland tumors. They are usually benign and arise from oncocytes. These cells are epithelial in origin and may be found individually or in groups in otherwise normal major or minor salivary glands. They are also found in the pancreas, thyroid, and respiratory tract, the parathyroid, pituitary, and adrenal glands, and the kidney. However, the majority of tumors occur in the superficial lobe of the parotid gland.

Most patients with oncocytomas are between 55 and 70 years of age at the time of diagnosis. The sexual distribution is almost equal. These tumors are painless, slow growing, and show a predilection for technetium 99m and appear as hot spots on a scan.

Grossly, oncocytomas of the major salivary glands are well circumscribed and encapsulated. Those arising from minor salivary glands have less well-defined borders and are not encapsulated. The surface is pink to rust color.

Microscopically, the distinctive oncocytes clump granular elements and have a high concentration of mitochondria. The concentration of mitochondria differentiates oncocytomas from other tumors. A true oncocytoma contains no lymphoid tissue. The extensive lymphoid component that is typical of a Warthin's tumor is never encountered. Histologically, these tumors must be differentiated from other salivary gland neoplasms that have an oncocytic component including adenoid cystic carcinoma, pleomorphic adenoma, mucoepidermoid



carcinoma, and adenocarcinoma. Even metastatic thyroid carcinoma or renal cell carcinoma with a large number of oncocytes must be differentiated from oncocytomas.

Oncocytomas arising from minor salivary glands tend to grow in an irregular and locally invasive pattern. They are less predictable than their parotid counterparts. When arising from minor salivary glands in the respiratory tract, they may invade surrounding cartilage or bone. Although histologically benign, they have a destructive potential that is exacerbated by their anatomic location. Very rarely do they demonstrate histologic criteria for malignancy.

Treatment involves surgical excision. These tumors are radioresistant. Even locally aggressive tumors of the nose, nasopharynx, paranasal sinuses, palate, and remainder of the tracheobronchial tree should be treated surgically.

### **Oncocytic papillary cystadenoma**

Oncocytic papillary cystadenoma is an uncommon tumor in the parotid gland. Most cases have been reported in the larynx although they have also been noted in the nasopharynx, palate, buccal mucosa, and the accessory tear ducts. These occur equally in both sexes and in people over 50 years of age.

Grossly, these tumors are smooth, round cysts and may be pedunculated. Microscopically, these tumors look like Warthin's tumors although the lymphoid stroma is absent.

These tumors present as painless masses. Laryngeal lesions may present as hoarseness or coughing. The minor salivary glands of the false cords and ventricles are common site of presentation, but this tumor may also originate from any site in the laryngeal framework. Although they are usually solitary, multiple tumors have been reported.

Whether or not these are true tumors has been debated. They may reflect metaplasia or hyperplasia of preexisting salivary gland ducts. Nonetheless, treatment is surgical excision.

### **Myoepithelioma**

Myoepithelioma tumors arise from ectoderm but function as mesodermal tissue. They arise from myoepithelial cells, which lie beneath the ductal and acinar epithelium in salivary glands. These cells have also been identified in sweat glands and mammary glands. They have the ability to contract and their pumping action helps to express secretions from the salivary glands.

Myoepitheliomas are well demarcated. Their external surface is smooth; their cut surface is homogenous and white. Microscopically, these tumors have a thin capsule except when they occur in the palate and no capsule is present. The cells are benign-appearing, spindle or polygonal shaped, and mitoses are rare.

Clinically, these tumors are difficult to distinguish from pleomorphic adenomas. They are painless, slow-growing masses occurring in both the major and minor salivary glands. No sexual predilection has been found. Histologically, they must be differentiated from plasmacytomas and any tumors with spindle cells including neurilemoma, fibroma, meningioma, and leiomyoma.

The majority of these tumors behave in a benign manner although there have been reports of local aggressiveness. Treatment is excision.

### **Sialoadenoma papilliferum**

Sialoadenoma papilliferum is a vary rare, benign salivary gland tumor that gets its name from syringocystadenoma papilliferum, the skin tumor that it resembles both grossly and microscopically. This tumor is painless with slow to moderate growth. It occurs in the major and minor salivary glands and occurs preferentially in men around 60 years of age.

Microscopically, the tumor arises from superficial extralobular salivary gland ducts. The cell of origin is thought to be the pluripotential myoepithelial cell.

Clinically, the differential diagnosis includes other papillary lesions like squamous papilloma, verrucous hyperplasia, or carcinoma. This tumor can usually be distinguished from other intraoral minor salivary gland tumors because it is exophytic and not a smooth, mucosa-covered mass. Treatment is surgical excision.

### **Inverted ductal papilloma**

Inverted ductal papilloma is an inverted papilloma that arises from the excretory ducts of the minor salivary glands. This is a different entity from inverted oral papilloma, which is endophytic and does not bear any clinical resemblance to inverted ductal papilloma.

The few cases that have been reported occur equally in men and women. The lesions are raised but not ulcerated. The preoperative differential diagnosis includes a salivary gland tumor, fibroma, and lipoma. Treatment should be conservative but complete excision.

### **Hemangiomas**

Hemangiomas are the most common salivary gland tumors in children and usually involve the parotid gland. Less often they are found in the submandibular gland or surrounding tissues. Because considerable confusion exists about vascular lesions, especially as regards terminology, Mulliken has made a major contribution by offering a classification that is rational and simple. He divides vascular lesions into two groups: hemangiomas and vascular malformations.

Hemangiomas are seen only in infants. They may be present at birth but usually appear several days to weeks later. A rapid growth phase occurs at around 1 to 6 months, then gradually involutes over 1 to 12 years. During the growth phase actual endothelial cells proliferate. Venous channels form during the involution phase. These lesions may become extremely large with complications, such as bleeding and even heart failure. Treatment

initially should consist of steroids at 2 to 3 mg per kg per day if the hemangiomas cause a problem. If the hemangioma is responsive to steroids, the result is immediate and often dramatic. Unfortunately, the response rate to steroids is only 40% to 60%. Surgical excision or various types of laser treatments can be performed for select circumstances (Waner and Suen, 1992). Hemangiomas will usually involute completely but may take years and can result in medical and psychologic problems for the child.

Hemangiomas of the parotid area are seen more often in females and are usually asymptomatic, unilateral, and compressible masses. The overlying skin may be normal or may be involved. It is not uncommon to see other skin lesions present (Fig. 61-6).

Grossly, this tumor is dark red, lobulated, and nonencapsulated. Growth may spread into surrounding tissues. Microscopically, these tumors are composed of capillaries lined by proliferative endothelial cells. Blood vessels are very uniform in size. Mitoses are frequent but are not an indicator of behavior.

### **Tumorlike Conditions**

Certain conditions affect the salivary glands and may be difficult to differentiate from neoplasms, both benign and malignant. It is important to understand these tumorlike conditions and be able to differentiate them from tumors of the salivary glands. The following must be considered in the differential diagnosis of salivary gland abnormalities.

### **Necrotizing sialometaplasia**

Necrotizing sialometaplasia is not a tumor but may be mistaken for one because it usually presents as a single unilateral, painless, or slightly painful ulcer on the hard palate. It normally involves the mucoserous glands of the hard palate and is a benign self-healing lesion of the salivary glands. First described by Abrams et al in 1973, it is usually seen in patients over 40 years of age and is two to three times more common in men than women. Clinically, the ulcer is usually round, sharply circumscribed with an erythematous halo and is usually between 1 to 3 cm in diameter. In a small number of cases necrotizing sialometaplasia presented as a nonulcerated swelling with the clinical appearance of an infectious process (Santis et al, 1982).

Microscopically, necrotizing sialometaplasia has several characteristics (Peel and Gnepp, 1985):

1. Lobular infarction with or without extravasation of mucus.
2. Pseudoepitheliomatous hyperplasia at the periphery of the ulcer.
3. Squamous metaplasia of ducts and acini.
4. Inflammation secondary to extravasated mucous.
5. Preservation of lobular architecture.

Because of the metaplasia, it is frequently misdiagnosed as squamous cell carcinoma or mucoepidermoid carcinoma.

The cause of necrotizing sialometaplasia is unknown although its histology and clinical course suggest that it may represent a reparative process that occurs in response to ischemic necrosis of salivary gland tissue (Arguelles et al, 1976). A biopsy is necessary to confirm this lesion. Necrotizing sialometaplasia will undergo spontaneous albeit slow healing over a period of 6 to 10 weeks. After it heals, recurrence is uncommon.

### **Benign lymphoepithelial lesions**

In 1952, Godwin proposed the term *benign lymphoepithelial lesion (BLL)* to cover a group of diseases known as *Mikulicz's syndrome*, *sicca complex*, *Sjögren's syndrome*, and *chronic punctate sialadenitis*. The term stresses the benign nature and the histologic features of this lesion. The etiology is unknown but is thought to be reactive rather than neoplastic. The histologic pattern of the lesion can be confused with malignant lymphoma, metastatic carcinoma, chronic sialoadenitis, or sarcoidosis.

Benign lymphoepithelial lesions usually present in women in the fifth and sixth decades, but may be seen in children and adults of either sex. It usually presents as either unilateral, bilateral, or even successive enlargement of the salivary and/or lacrimal glands. They are usually asymptomatic, but may present with mild pain. The glands may be diffusely enlarged or have circumscribed discrete nodules. Grossly, the capsule and the overall architecture of the glands remain intact. The cut surface is usually smooth, rubbery, homogeneous, and pink, tan, or white. Sialograms characteristically show sialectasia, which may be punctate, globular, or cavitary.

Patients with BLL may develop malignant lymphoma or anaplastic (Arthaud, 1972; Batsakis et al, 1975; Gravanis and Giansanti, 1970; Pinkus and Dekker, 1970; Wallace, 1963) carcinomas. For some unknown reason, anaplastic carcinomas are seen more commonly in Eskimos who have BLL (Kahn, 1979).

The treatment of BLL is primarily symptomatic unless there is a suspicion of lymphoma or anaplastic carcinoma, in which case they should be treated as such. BLL in children may resolve spontaneously around puberty (Kahn, 1979). BLL occurs in several clinical syndrome settings.

#### ***Mikulicz's syndrome***

The term *Mikulicz's syndrome* has been used for many years to describe asymptomatic enlargement of salivary and/or lacrimal glands without an underlying or associated disease. The term has been used in a clinical sense to describe enlargement of salivary and/or lacrimal glands secondary to a systemic disease.

#### ***Sjögren's syndrome***

Sjögren's syndrome is considered a chronic autoimmune disease and is characterized by a triad of conditions consisting of keratoconjunctivitis sicca, xerostomia, and a collagen

vascular disease, usually rheumatoid arthritis. In the absence of a connective tissue disease, the term *sicca complex* has been used. Sjögren's syndrome is seen primarily in women around the age of 50 years and rarely occurs in children. Salivary gland enlargement is seen in only 50% of the patients (Talal, 1979; Thackrey and Lucas, 1974). The enlargement is more commonly diffuse rather than nodular. Xerostomia is usually caused more by the involvement of minor rather than major salivary glands. Because the minor salivary glands are usually involved, a diagnosis can be made by performing a biopsy on the minor salivary glands on the inner aspect of the lip (Waldron, 1974).

Histologically, myoepithelial cells are integral components of this lesion. Periductal inflammation and progressive atrophy of acinar parenchyma accompany replacement by increased amounts of inflammatory tissue. As the ductal lumens disappear, the myoepithelial component becomes more prominent (Peel and Gnepp, 1985). Neoplastic transformation of epimyoeplithelial islands has been documented and is thought to be secondary to recurrent trauma to the salivary ductal system (Kahn, 1979). Whether this transformation progresses from recurrent infection or underlying collagen vascular disease is not known. Treatment is mainly symptomatic.

### **Chronic sialadenitis and sialolithiasis**

Chronic sialadenitis can occasionally be confused with a tumor because it is characterized by recurrent painful swelling of the salivary glands, seen primarily in the parotid gland (Fig. 61-7). It is usually unilateral, but may be bilateral. Frequently, purulent material can be noted coming from the ducts when the gland is massaged. Chronic sialadenitis may be associated with specific conditions such as granulomatous disease. Usually the entire gland is enlarged and tender, which can usually differentiate it from a tumor.

Sialolithiasis may be associated with chronic sialadenitis. Over 80% of the stones occur in the submandibular gland and the rest usually occur in the parotid gland. Most of the submandibular stones are radiopaque, whereas parotid stones are frequently radiolucent (Work and Hecht, 1973). The calculi or stones may be present within the parenchyma of the gland and within the ducts and are frequently found at the hilus.

Calculi may cause obstruction, which can cause swelling and pain. With chronic swelling, infection may occur. Most calculi need to be surgically removed and if chronic sialadenitis is also present, surgical removal of the gland may be indicated. Generally, it is not difficult to differentiate sialadenitis or sialolithiasis from tumor.

### **Sialoadenosis**

Sialoadenosis is a noninflammatory, nonneoplastic enlargement of salivary glands. Its etiology is unknown, but is thought to be associated primarily with malnutrition. It is also referred to as *sialosis* or "nutritional mumps" (Evans and Cruickshank, 1970; Shafer et al, 1974; Thackray and Lucas, 1974). Usually the parotid glands are affected and the enlargement is gradual and asymptomatic. Enlargement is usually bilateral, but not necessarily symmetric.

A number of conditions have been associated with sialoadenosis, primarily those that have to do with malnutrition or those that contribute to malnutrition. These conditions include alcoholism, malnutrition, diabetes, or kwashiorkor (Borsanyi and Blanchard, 1961; Evans and Cruickshank, 1970; Hemenway and Allen, 1959; Thackray and Lucas, 1974). Alcoholism, with or without cirrhosis, and malnutrition are most commonly associated with sialadenosis.

Histologically, the glands will show acinar cell hypertrophy, fatty infiltration, or a combination of the two. A chronic inflammatory infiltrate is rare. There can be mild to moderate fibrosis of the interlobularly septae (Peel and Gnepp, 1985).

The salivary gland function is usually functioning normally; however, the amylase in the saliva may be elevated (Borsanyi and Blanchard, 1961; Brick, 1958; Mandel and Baumash, 1971). Treatment is rarely necessary; only the malnutrition is treated. As nutrition improves, the enlargement of the gland usually recedes. Sialadenosis may be confused with a tumor but a careful history is frequently all that is necessary to diagnose it. Biopsy can also be diagnostic.

### **Hyperplasia of mucous salivary glands**

Hyperplasia of mucous salivary glands is a rare lesion. Only 13 cases have been reported in the literature, although it is probably more common than that (Arafat et al, 1981; Devildos and Langlois, 1976; Giansanti et al, 1971). It is usually seen in adults. The lesions arise from mucous glands, usually in the hard or soft palate. These nonulcerated tumorlike sessile masses are asymptomatic. They are usually about 1 cm in diameter and may be mistaken for salivary gland neoplasms or fibromas.

The etiology is unknown. Histologically, the lesions consist of hypertrophic lobules of mucinous acini that appear normal. The glands are covered by intact surface epithelium with no significant inflammatory infiltrates. Treatment is simple excision (Arafat et al, 1981; Devildos and Langlois, 1976; Giansanti et al, 1971).

### **True cysts of major salivary glands**

A pseudocyst is the result of extravasation of mucin into a gland. A true cyst can be distinguished from a pseudocyst by the presence of an epithelial lining. Neoplasms, especially Warthin's tumors, can also be cystic. True cysts involving the major salivary glands, arise primarily in the parotid gland (Batsakis, 1979; Thackray and Lucas, 1974; Work, 1977). There are two categories: congenital and acquired.

#### ***Congenital cysts***

Congenital cysts are also known as *branchial cleft cysts* and *lymphoepithelial cysts*. They are usually present at birth, but may not become obvious until adult life (Gaisford and Anderson, 1975; Sisson and Summers, 1972; Weitzner, 1973; Work and Hecht, 1968; Work and Proctor, 1963). They present as painless unilateral swelling and may become infected and cause pain related to the infection. There are two types of congenital cysts; the first type is usually just adjacent to the ear, either medial, inferior, or posterior. The second type is usually more intimately associated with the substance of the parotid gland. Sinuses and fistulas may

be present and can extend to the external auditory canal or to the skin surface (Olsen et al, 1980; Work, 1972, 1977). They may be as large as 7 cm. Histologically, they are filled with a fluid and have a lining of squamous epithelium or ciliated columnar epithelium. The wall may contain lymphoid tissue and even skin appendages or cartilage.

The cysts may be confused with benign tumors. Treatment is surgical excision, but must include the sinus and fistula tract. Recurrence is almost certain if the cyst is not removed completely.

### ***Acquired cysts***

These cysts are usually in the major salivary glands and are secondary to obstruction. They may occur from trauma, but usually trauma causes a pseudocyst (Olsen et al, 1980; Pieterse and Seymour, 1981; Work, 1977). They are also known as retention cysts and when associated with sublingual ducts form ranulas.

Microscopically the cyst lining consists of a layer of cuboidal, columnar, or squamous epithelium. Lymphoid tissue is not present in the acquired cysts. These may also be confused with benign neoplasms. The treatment is complete excision.

### **Vascular malformations**

Vascular malformations are different from hemangiomas of the parotid gland. A hemangioma actually represents a vascular lesion, which has cellular proliferation, appears within days or weeks after birth, and either gradually or rapidly increases in size up to the age of 1 year and then gradually regresses in size until it has completely resolved. This process may take up to 10 to 12 years (Mulliken and Young, 1988). The vascular malformations represent a different group of vascular lesions, which will be discussed briefly below.

#### ***Venous malformations***

Venous malformations are usually noted at the time of birth and grow with the patient. They may become extremely large in size by the time the child is fully grown. The enlargement of venous malformations is primarily by dilatation of the existing vessels and does not represent a cellular growth. These may or may not need treatment depending on the size and complications. These can be seen involving the parotid gland (Fig. 61-8) and may be very difficult to remove. If the venous malformations are small, they can be surgically removed with or without removing the adjacent salivary glands.

#### ***Arteriovenous malformations***

Arteriovenous malformations involve a shunting of blood from the arterial vessels directly into the venous system, causing significant enlargement of the vascular lesion. Generally these should be removed completely in order to stop the progress. They can involve the parotid gland and appear as a parotid mass. An arteriogram is essential to diagnose the presence and extent of these malformations. Surgical resection is desirable.

### ***Lymphatic malformations***

Lymphatic malformations are usually present at birth and gradually grow. They can involve the salivary glands causing enlargement. In some cases, the lymphatic aggregates can be nodular, simulating a mass. They are usually very diffuse, involving all of the adjacent tissues and are very difficult to resect. Treatment is symptomatic only.

### **Granulomatous diseases**

Granulomatous disease such as sarcoidosis, tuberculosis, actinomycosis, and cat-scratch fever may occur in the salivary glands but rarely without signs of systemic involvement. No specific signs of glandular dysfunction are present. Pain is rare and secretions are usually clear.

#### ***Sarcoidosis***

Sarcoidosis usually appears as bilateral diffuse enlargement of the parotid glands (Fig. 61-9). It may occur with or without uveroparotid fever (swelling of the parotid and lacrimal glands, choreoretinitis, and progressive cranial nerve involvement), also known as *Heerfordt's disease*. This form of sarcoidosis tends to resolve spontaneously, and uveroparotid fever is treated only for its complications. Radiographs are of no help in diagnosis, and biopsy should be performed only to rule out malignancy.

#### ***Tuberculosis***

Tuberculosis rarely affects the parotid gland directly but spreads to periparotid nodes. A search for the primary source of infection in the respiratory tract should be made. Treatment is with systemic antituberculosis drugs.

#### ***Actinomycosis***

Actinomycosis usually follows dental extraction or other oral trauma. Low-grade fever accompanies salivary gland enlargement. Sulfur granules seen on microscopic examination are pathognomonic. Treatment consists of penicillin and surgical drainage.

#### ***Cat-scratch fever***

Cat-scratch disease is an infection of the periglandular nodes caused by a gram-negative bacillus. Patients have fever, malaise, and adenopathy. The otolaryngologic manifestations may resemble parotitis and are self-limited. It is passed from wild or domestic animals to humans by a scratch. Treatment is supportive.



## Miscellaneous

### *Lipoma*

A lipoma can be found over the parotid gland and may simulate a benign tumor. Generally it is asymptomatic and causes a masslike appearance over the parotid gland (Figs. 61-10, A and B). They have a characteristic feel and can be identified by a CT scan and FNA biopsy. Surgical excision is indicated for esthetic reasons and to rule out other tumors.

### *Heterotopic salivary glands*

Normal salivary gland tissue has been identified in various areas of the head and neck, where they are normally not found (Curry et al, 1982; Ludmer et al, 1981; Miller and Winnick, 1971; Quaranta et al, 1981; Singer et al, 1979; Uemura et al, 1976; Youngs and Scofield, 1967). Such tissue may be referred to by a variety of names including *ectopic salivary glands* and *salivary gland choristoma*. Some common locations of heterotopic salivary glands are the middle ear, lower neck, mandible, pituitary gland, and even the cerebellopontine angle. Heterotopic salivary glands may be mistaken occasionally for metastatic tumors. This finding is very rare and only a few cases have been found in each of these locations. Occasionally, these glands may become tumors, either benign or malignant. They are surgically excised if they are causing problems and are accessible.

### *Masseter hypertrophy*

Enlargement of the masseter muscle for various reasons can simulate an enlarged parotid gland and can be confused with a tumor of the parotid. Generally, this condition is seen in people who chew excessively, such as in people who chew gum. It can be diagnosed by careful clinical examination and confirmed by a CT scan. Generally, it is bilateral, but may be asymmetric. No treatment is necessary. It is helpful to have patients decrease the chewing movements of their mouth.

## Principles of Management

The management of salivary gland tumors has not changed dramatically over the past 10 years. Even the grounds for clinical diagnosis have remained the same. What has been altered is our ability to image and speedily diagnose benign lesions of the salivary glands. MRI and fine-needle aspiration have broadened the surgeon's armamentarium.

Most benign salivary gland tumors should be excised completely but conservatively. For the parotid gland this usually requires a superficial parotidectomy with preservation of the facial nerve. With deep lobe involvement, the entire gland may be removed but preservation of facial nerve function should be attempted. A tumor of the submandibular gland requires submandibular gland resection. If the tumor arises from a minor salivary gland, the tumor and a cuff of normal tissue should be excised. Simple enucleation must be discouraged in all cases. It not only risks tumor recurrence but, in the case of the parotid gland, also puts the facial nerve at risk.

Granulomatous diseases or Sjögren's syndrome require symptomatic treatment directed to specific ailments. Surgery should be reserved for recurrent sialadenitis or for salivary glands that are refractory to conservative therapy. Pediatric hemangiomas usually involute. Vascular malformations of salivary glands in the older population may be excised or managed with laser therapy. Lymphangiomas may require surgical excision.

Radiation therapy and/or chemotherapy should be reserved for the management of malignant salivary gland neoplasms; they really have no role in the treatment of benign neoplasms of the salivary glands.