

Paparella: Volume III: Head and Neck

Section 2: Disorders of the Head and Neck

Part 3: Salivary Glands

Chapter 19: Non-neoplastic Diseases of the Salivary Glands

Acute Suppurative Sialadenitis

The first report of acute suppurative sialadenitis appeared in 1928. The disease may involve either the parotid or the submandibular gland, but the majority of cases occur in the parotid gland. The increased parotid susceptibility is felt to be due to the lessened bacteriostatic activity of parotid gland saliva when compared with submandibular saliva. It is felt that the high molecular weight glycoprotein content in the mucinous saliva has a greater bacterial aggregating ability than does the serous saliva. Acute suppurative sialadenitis accounts for approximately 0.03 per cent of hospital admissions in the USA, with 30 to 40 per cent of them occurring in the postoperative patient. The disease usually begins on the third to fifth postoperative day, with the highest incidence following gastrointestinal procedures. Acute suppurative sialadenitis occurs in approximately 1 in 1000 to 2000 operative procedures. It most frequently involves patients in the sixth and seventh decades of life, although all ages have been reported to be affected. The sex distribution is equal.

The significant pathogenic event is thought to be salivary stasis, which can result from obstruction or decreased production. Predisposing conditions include calculi, duct stricture, dehydration, and poor oral hygiene, conditions that often exist in a patient with reduced resistance who is in a hospital environment receiving multiple medications and has altered oral flora. Added to this is the problem that many medications reduce salivary flow. If, in addition, the patient is not eating, the stimulatory effect of mastication on the salivary glands is lost, as is the detergent action of food itself.

There is diffuse enlargement of the involved gland with associated induration and tenderness. Purulent saliva can be expressed from the duct orifice, which should be cultured for aerobic and anaerobic bacteria, and a specimen for Gram staining should be obtained. The offending organism is usually coagulase-positive *Staphylococcus aureus*, with other aerobic organisms occasionally implicated, including *Streptococcus pneumoniae*, *Escherichia coli*, and *Hemophilus influenzae*. Anaerobic organisms include *Bacteroides melaninogenicus* and *Streptococcus micros*. The microscopic picture is that of glandular destruction with abscess formation. There is erosion of the ducts with penetration of the exudate into the parenchyma. Approximately 20 per cent of cases will be bilateral.

The initial treatment consists of adequate hydration, good oral hygiene, repeated massage of the gland, and intravenous administration of the appropriate antibiotic. While awaiting culture results, empiric administration of a penicillinase-resistant antistaphylococcal antibiotic is advisable

if the Gram stain shows gram-positive cocci. Quoted mortality rates approach 20 per cent, although much of this is probably because it occurs in the already seriously ill patient. If the response to the appropriate treatment regimen does not occur quickly, incision and drainage should be performed. This is done by raising a parotid flap as for a parotidectomy and then using a hemostat to make multiple openings into the gland, spreading in the general direction of the facial nerve. Following this, a drain is placed over the gland and the wound is closed. We have had recent success with parotid abscesses using needle aspiration drainage guided by ultrasonography or computed tomography (CT) scan evaluation. If this fails, the more classic incision and drainage is necessary.

Chronic Recurrent Sialadenitis

The primary pathogenic event in chronic sialadenitis is believed to be a decreased secretion rate with subsequent stasis. This disease, too, is more common in the parotid gland. Some cases seem to progress from the recurrent parotitis of childhood. Occasional patients subsequently get Sjögren's syndrome. Over time, the disease leads to sialectasis, ductal ectasia, and progressive acinar destruction combined with a lymphocytic infiltrate. Histologically, it is impossible to differentiate the various types of chronic salivary inflammation, as the salivary glands have a similar tissue response to all of them. In general, the sialographic appearance parallels the degree of histologic change.

The progressive glandular destruction causes changes in the chemistry of saliva. Rausch was the first to note increased salivary sodium and protein in chronic sialadenitis, while noting these values remain normal in noninflammatory enlargements. During acute exacerbations, the sodium and chloride values approach those in serum. There is also a decrease in the phosphate content concentration. This is particularly marked, since phosphate is normally inversely related to flow rate. Glucose is also considerably elevated but rapidly returns to normal. Also increased are IgA, IgG, IgM, albumen, and transferrin, which leak from plasma, and myeloperoxidase, lactoferrin, and lysozyme, which are produced by the inflammatory infiltrate or the acini. In this setting, the IgG dominates the immunoglobulins, reflecting the serum pattern rather than the usual salivary pattern in which IgA dominates.

Clinically, the patient gives a history of recurrent, mildly painful parotid enlargement usually associated with eating. The physical examination confirms this, and massage of the gland often produces scanty saliva at the duct orifice. A permanent xerostomia develops in 80 per cent of the patients. Treatable predisposing factors, such as a calculus or a stricture, should be investigated and, if found, treated appropriately. If none is found, treatment should be conservative. This includes the use of sialogogues, massage, and antibiotics during acute exacerbations. If conservative measures fail, and this is unusual, other treatment options include periodic ductal dilatation, ligation of the duct, total gland irradiation, tympanic neurectomy, and excision of the gland. All of these options, except the last, work occasionally but not uniformly. Ligation of the duct may successfully cause atrophy of the gland, but occasionally it results in an acute infection or a sialocele. Irradiation procedures an initial acute inflammatory reaction, but continued treatment results in destruction of the gland. This should be considered only in the

older patient in whom the risk of radiation-induced carcinoma is reduced. If all else fails, excision of the gland is curative. Retinger and colleagues have recently reported accomplishing parotid atrophy by occlusion of the ductal system with a protein solution.

Recurrent parotitis may also involve children from infancy to age 12 years and is a somewhat different entity. Unlike the adult form, this disease affects more males than females. The underlying cause is unproved, but the disease begins with a sudden onset of either unilateral or bilateral parotid swelling. Attacks may be single or recurrent, with varying degrees of enlargement during and between acute episodes. The saliva may be clear or flocculent with decreased flow. Salivary chemistries are altered as in the adult form. Clinically, the child is usually not ill, although there may be a mild elevation in the temperature or the white blood cell count. Mild pain may be present, but the child does not complain of xerostomia. The disease may disappear at puberty or continue into adulthood.

Benign Lymphoepithelial Lesion

The benign lymphoepithelial lesion belongs in the spectrum of diseases involving a lymphoreticular infiltrate combined with acinar atrophy and ductal metaplasia, with the ductal metaplasia ending in the epimyoe-epithelial island. Batsakis and Sylvest regard this lesion as the end stage chronic recurrent parotitis.

The benign lymphoepithelial lesion usually affects only a single salivary gland and has a small female predominance. It begins as an asymptomatic enlargement unless there is associated infection. Conservative treatment is usually adequate unless there are complications. If intermittent infections occur, they should be treated as acute sialadenitis with massage, sialogogues, hydration, and a penicillinase-resistant antibiotic. If the lesion is enlarged so that it becomes cosmetically unacceptable, excision may be necessary.

An occasional benign lymphoepithelial lesion will evolve into a more aggressive disease. As of 1985, there have been reports of the evolving into 84 cases of a lymphoproliferative disease, 29 cases of carcinoma, and 12 cases of pseudolymphoma. The lymphoproliferative disorders are usually histiocytic or lymphocytic lymphomas involving extrasalivary sites. The development of a lymphoma may be heralded by the onset of hypogammaglobulinemia or leukopenia. The carcinomas are usually salivary and generally undifferentiated. Many of the patients have been of Indian or Eskimo extraction, but this may merely represent a reporting artifact. The possibility of these entities should be appreciated and aggressive therapy initiated if they develop.

Sjögren's syndrome

Sjögren's syndrome is characterized by lymphocyte-mediated destruction of the exocrine glands leading to xerostomia and conjunctivitis sicca. It is the second most common autoimmune disease after rheumatoid arthritis. Ninety per cent of the cases occur in women. It occurs, but is less common, in children. The average age of onset is 50 years. The clinical manifestations were

first described by Hadden in 1883. Four years later, Mikulicz published a single case report of a patient with bilateral lacrimal, parotid, and submandibular gland swelling. In 1933, Sjögren, a Swedish ophthalmologist, published a classic monograph on the disease and emphasized its systemic nature. Sjögren's syndrome is currently felt to occur in two forms: primary, which involves the exocrine glands only, and secondary, which is associated with a definable autoimmune disease, usually rheumatoid arthritis.

Sjögren's syndrome is usually relatively benign, affecting primarily exocrine gland function. Symptoms include burning oral discomfort and a "sandy" sensation in the eye. In 80 per cent of primary and 30 to 40 per cent of secondary cases, unilateral or bilateral salivary gland swelling will occur, usually involving the parotid gland. This swelling may be intermittent or permanent. Arthritis is the most frequent complaint in secondary Sjögren's syndrome. Recent studies have shown that there are genetic differences between patients with primary Sjögren's syndrome and those with secondary Sjögren's syndrome. Associated symptoms are numerous and include interstitial pneumonitis, dryness of the skin, Raynaud's phenomenon, achlorhydria, hepatosplenomegaly, genital dryness, hyposthenuria, myositis, and pancreatitis. Neuropsychiatric dysfunction is common. Patients with primary Sjögren's syndrome have a greater instance of recurrent parotitis, Raynaud's phenomenon, purpura, lymphadenopathy, myositis, and renal involvement than do those with secondary Sjögren's syndrome. In primary Sjögren's, 75 per cent show evidence of respiratory involvement, usually diffuse interstitial disease or small airway disease.

A number of laboratory findings suggest that one of the underlying defects of Sjögren's syndrome is B-cell hyperreactivity with or without abnormalities of immunoregulation. This is manifested by polyclonal hyperglobulinemia, numerous autoimmune antibodies (both organ and non-organ specific), as well as circulating IgG immune complexes. The following substances are detectable in patients with Sjögren's syndrome: rheumatoid factor, 70 to 90 per cent; antinuclear antibody, 55 to 70 per cent; salivary duct antibody, 65 per cent; parietal cell antibody, 27 per cent; thyroglobulin antibody, 18 per cent; thyroid microsomal antibody, 21 per cent. Elevated levels of antibody to secretory IgA have been reported.

The sialographic abnormalities parallel the clinical and histologic severity of the disease, but they characteristically show varying degrees of sialectasis. Histologically, the individual salivary gland resembles the gland involved with chronic inflammation. There is ductal ectasia, with a lymphoreticular infiltration, acinar destruction, and the formation of emimyoepithelial islands. The lymphoreticular infiltrate appears to consist of small or medium-sized lymphocytes and plasma cells on electron microscopy. Sjögren's syndrome involves the minor salivary glands in 70 per cent of patients, and the diagnosis can be made by labial, nasal mucosal, or palatal biopsy. One study has shown parotid biopsy to be 100 per cent accurate with little morbidity.

Salivary flow is greatly decreased, which reduces the amount of antibacterial material delivered to the oral cavity. Thus, dental caries are significantly increased. Sialochemical studies have demonstrated several abnormalities. Sodium and chloride concentrations are approximately three times normal, whereas the phosphate level is one half of normal. The potassium level is

usually normal, as in chronic inflammatory disorders. The amylase and total protein concentrations are normal. Sjögren's syndrome, like the benign lymphoepithelial lesion, is associated with an increased incidence of lymphoma. The incidence is increased 44 times over normal and is usually of the histiocytic or mixed histiocytic-lymphocytic type. The risks seem to be much higher in those patients who have parotid swelling than in those who do not. Approximately 50 per cent of patients in whom a lymphoma develops have had prior irradiation to the parotid gland. Pseudolymphoma may also occur, and like the lymphoma has been shown to be of B-cell origin. Sjögren's syndrome has also been associated with biliary cirrhosis, other liver abnormalities, involvement of the larynx, the development of membranous glomerulonephritis, autoimmune liver disease, and secondary amyloidosis.

The treatment is symptomatic. The xerostomia leads to a burning oral discomfort, difficulty in eating dry foods, and decreased taste sensitivity. There may be mucosal ulcerations, and there will be increased dental caries. The simplest treatment is with artificial saliva swirled in the mouth and swallowed every 3 to 4 hours. The salivary glands can be stimulated with sialogogues to produce what saliva they can. This is best done by eating three or four raw apples/day. Sugar-free sour candy may also be helpful. Dental hygiene must be impeccable, and acute infection should be treated vigorously and promptly.

Xerophthalmia is best treated with artificial tears as needed. Taping the lids closed at bedtime is an extra precaution, but occasionally tarsorrhaphy may be necessary. Care must be taken to prevent corneal ulcerations and perforations, which have been reported. Some have recommended the use of immunosuppressant agents in the hope of avoiding the development of a subsequent malignancy. Lymphocytic infiltration has been reversed with this regimen.

Granulomatous Diseases

Primary *tuberculosis* of the salivary glands is uncommon. Most commonly it involves the parotid gland and is usually unilateral. It is felt to arise from a focus in the tonsils or teeth. It may occur in one of two forms - an acute, inflammatory lesion or a chronic tumorous lesion. The former presents a difficult diagnostic problem, and often the diagnosis is not made until an acid-fast salivary stain and a purified protein derivative (PPD) skin test are performed. The latter may be unreliable, as infections caused by the atypical mycobacteria are increasing in relation to *Mycobacterium tuberculosis hominis*. Treatment is the same as for any acute tuberculous infection. In the past, the tumorous presentation was usually diagnosed after excision of the gland for a suspected tumor. With the current increasing use of fine needle aspiration cytologic procedures, however, this may change. Excision is curative. Secondary tuberculosis can occur, but it tends to involve the submandibular or sublingual glands more frequently than the parotid gland.

Animal scratch disease may involve the salivary glands but only by contiguous spread from an adjacent lymph node. This is a self-limiting disease and treatment is symptomatic. *Actinomycosis* may also occur in the salivary glands. Treatment involves incision and drainage combined with long-term penicillin therapy, as with actinomycosis elsewhere in the head and

neck.

Sarcoidosis is a granulomatous disease of unknown cause and is a diagnosis of exclusion. Clinically manifested salivary gland involvement occurs in only 6 per cent of cases, but in histologic studies, involvement can be demonstrated in up to 33 per cent of cases.

Uveoparotid fever (Heerfordt's syndrome) is a particular form of sarcoidosis that becomes manifested as uveitis, parotid swelling, and facial paralysis. It usually occurs in the third or fourth decade of life and begins with a prodrome of fever, malaise, weakness, nausea, and night sweats lasting several days to several weeks. It may occur with or without the other systemic manifestations of sarcoidosis. Usually the parotid involvement occurs simultaneously, and submandibular, sublingual, and lacrimal involvement may appear. The swelling lasts months to years without suppuration and with eventual resolution. Involvement of the minor salivary glands may occur, and labial biopsy may establish the diagnosis.

Treatment is symptomatic, with corticosteroids being most useful in the acute phase, particularly for facial paralysis. Even without treatment, the facial paralysis is usually transient. The uveitis should be followed closely, as it can lead to glaucoma.

Viral Infections

Mumps is the most common cause of parotid swelling and is the most common viral agent known to involve the salivary glands. It is most commonly recognized in the 4- to 6-year-old age group. The incubation period is 2 to 3 weeks, with a clinical onset characterized by pain and swelling in one or both parotid glands. Systemic symptoms include fever, malaise, myalgias, and headache, which generally resolve before the parotid swelling appears. Many cases are subclinical, and studies have shown that greater than 95 per cent of adults have neutralizing antibodies. The diagnosis is made by demonstrating antibodies to the mumps S and V antigens and to the hemagglutination antigen. The virus may also be isolated from the urine from 6 days before and until 13 days after the salivary gland symptoms appear. Major complications include sudden deafness, pancreatitis, meningitis, and orchitis. Islet cell antibodies have been reported, and a recent epidemiologic study has shown a significant association between mumps and the subsequent rapid onset of childhood diabetes.

Salivary gland inclusion disease is a rare form of cytomegalovirus inclusion disease. It involves newborns and may cause mental and physical retardation as well as hepatosplenomegaly, jaundice, and thrombocytic purpura. Other viral agents that may infect the salivary glands include Coxsackie A, Echo viruses, influenza A, and the virus of lymphocytic choriomeningitis. The treatment in all cases is symptomatic.

Sialolithiasis

The submandibular gland accounts for 80 per cent of salivary calculi, whereas less than 20 per cent occur in the parotid gland and 1 per cent occur in the sublingual gland. Calculi

involving the minor salivary glands are uncommon but have a predilection for the upper lip and the buccal mucosa. The latter are usually asymptomatic, freely mobile, and less than 0.5 cm in diameter. For the major glands, in 75 per cent of cases there is a single calculus, with multiple gland involvement occurring in only 3 per cent. There is a slight male predominance and they most commonly occur in middle age. Calculi occur in two thirds of cases of chronic sialadenitis, but they may be unassociated with other diseases. The only systemic disease associated with salivary calculi is gout and these calculi are composed of uric acid. Otherwise, the majority of calculi are composed of calcium phosphate with small amounts of magnesium, carbonate, and ammonium. The organic matrix is composed of various carbohydrates and amino acids. Ninety per cent of submandibular calculi are radiopaque, whereas 90 per cent of parotid calculi are radiolucent. It is felt that the prerequisite for calculus formation is a nidus of material for the precipitation of salivary salts in the face of stasis. The submandibular gland is believed to be more susceptible to calculus formation, because its saliva is more alkaline, has a greater concentration of calcium and phosphate, and has a higher mucus content. In addition, the duct is longer and it has an antigravity flow.

The most common presenting symptom is a history of recurrent swelling and pain in the involved gland usually associated with eating. With repeated episodes, infection may occur. Occasionally, calculi are asymptomatic or appear as acute suppurative sialadenitis. Physical examination reveals diffuse enlargement and tenderness of the involved gland. The calculus may be palpable. Massage of the gland demonstrates decreased flow of cloudy or mucopurulent saliva. If plain x-ray films fail to reveal the presence of the calculus, sialography is essentially 100 per cent effective. Ultrasound may also be used diagnostically.

Complications of sialolithiasis include acute suppurative sialadenitis, ductal ectasia, and stricture. Treatment depends on the location of the calculus. Stones near the duct's orifice may be removed transorally, whereas those within the hilum of the gland often require complete excision of the gland. For the parotid gland, an attempt at conservative therapy is prudent, but if recurrent infections occur, a parotidectomy should be performed. The recurrent rate may be as high as 18 per cent, since the underlying cause, which is unknown, has not been corrected.

Occasionally, a calcified phlebolith may be mistaken radiographically for an asymptomatic salivary calculus. Several differences will help to separate them. Phleboliths are usually circular, laminated, and multiple. On sialography, they are outside the ductal system.

Cystic Lesions

True cysts of salivary tissue generally occur in the parotid gland in which they account for 2 to 5 per cent of all parotid lesions. These cysts may be acquired or congenital. The congenital cysts include the dermoid cyst, which consists of keratinizing squamous epithelium with associated skin appendages and is treated by complete removal with preservation of the facial nerve; the congenital ductal cyst, which is generally manifested in infancy, requires sialography for diagnosis, and requires no therapy unless repeated infections occur; and first-arch branchial groove cysts, which account for less than 1 per cent of all branchial arch anomalies.

The latter are classified as type I and type II. Type I is ectodermal and is a lesion of the first arch only. Type II is ectodermal and mesodermal and is a lesion of the first and second arches. The former is a duplication anomaly of the membranous external auditory canal, whereas the latter is a duplication anomaly of the membranous and cartilaginous external auditory canal. Regardless of the type and location of the cyst, the tract will be intimately associated with the facial nerve. Frequent prior infections may obscure the true nature of the lesion. Excision during a quiescent period with preservation of the facial nerve is curative.

Acquired cysts may be associated with neoplasms, the benign lymphoepithelial lesion, trauma, parotitis, calculi, duct obstruction, and mucus extravasation. The neoplasms most commonly associated with cysts are the pleomorphic adenoma, adenoid cystic carcinoma, mucoepidermoid carcinoma, and Warthin's tumor. If non-neoplastic cysts become repeatedly infected, excision should be performed.

Mucoceles and mucus retention cysts usually involve the minor salivary glands, most commonly on the lips, buccal mucosa, and ventral portion of the tongue. Mucus retention cysts are true cysts with an epithelial lining and result from partial duct obstruction. Mucoceles do not possess an epithelial lining and are not true cysts but represent mucus extravasation into the surrounding soft tissues. Treatment is by excision or marsupialization, if required. The ranula is a mucus retention cyst of the sublingual gland. The so-called plunging ranula is a mucocele that extends from the floor of the mouth into the neck. The treatment is excision.

Trauma

Direct injuries of note usually involve a penetrating injury that lacerates the duct. Any penetrating injury to the cheek, posterior to the anterior border of the masseter muscle, should be suspected of causing a ductal injury. Inspection of the wound often reveals the status of the duct. If the duct cannot be identified, a probe may be passed into the duct transorally and located in the wound. This should confirm the status of the duct. If the duct has been transected, the optimum treatment is immediate end-to-end anastomosis over a polyethylene catheter with 9-0 sutures. The catheter is then sutured in place to the buccal mucosa and is removed in 2 weeks. If the proximal end of the duct cannot be readily identified, compression of the gland will often produce enough saliva from the cut end to allow its identification. Alternately, if the primary duct is long enough, it may be sutured directly into the oral cavity through a puncture wound. If this is not possible, the duct may be ligated, or a new duct may be created from buccal mucosa. In all these situations, repeated dilatation with lacrimal probes may be necessary to achieve a satisfactory final result.

Simple laceration of the parenchyma can usually be managed conservatively. Merely closing the parenchyma and capsule with a few interrupted sutures will suffice. If a salivary-cutaneous fistula develops, healing can generally be assured by repeated aspirations and the application of a pressure dressing. Resolution may take 7 to 14 days, by which time the traumatized ductal system will have reopened. Persistence of a fistula strongly suggests duct obstruction rather than parenchymal injury alone. Sialography should be performed. If duct

obstruction is found, repair should be performed if possible. If repair is impossible, a tympanic neurectomy may be helpful. Occasionally, a cutaneous fistula can be diverted into the oral cavity. The entire fistulous track is excised, turned into the oral cavity through the buccal mucosa, and sutured. If that fails, excision of the gland or radiation to destroy the gland is curative. Radiation is probably ill-advised in the younger patient.

Penetrating injuries may also transect one or more branches of the facial nerve (Fig. 5). A thorough evaluation of facial nerve function should be performed on any patient suffering a penetrating injury to the face. If the wound is anterior to a vertical line from the lateral canthus to the mental foramen, repair is probably unnecessary, as recovery is likely. Posterior to this line, repair should be performed immediately.

Blunt trauma may also injure the gland, resulting in contusions, edema, or hemorrhage. Contusions and edema usually resolve without treatment, although temporary duct obstruction may occur. A hematoma, if significant, should be drained before it becomes organized, as subsequent fibrosis and scarring may lead to duct obstruction as well as cosmetic deformity.

The submandibular and sublingual glands are managed similarly to the parotid gland, but ductal injuries are much less common because of the protection afforded by the mandible.

Radiation Injury

Low-dose radiation to a salivary gland causes an acute, tender, and painful swelling. In particular, the serous cells and acini are exquisitely sensitive and inhibit marked degranulation and disruption, which causes pools of zymogen granules to appear in the acini. Simultaneously, an acute inflammatory reaction causes a purulent exudate within the ducts as well as parenchymal suppuration. In contrast, mucous cells and acini and the epithelial cells of the intercalated and intralobular ducts exhibit little histologic change. The acute inflammatory reaction subsides without treatment provided that the irradiation is stopped. Continued irradiation leads to complete destruction of the serous acini and subsequent atrophy of the gland. Radiation-induced thyroid neoplasms are well documented, and there is growing evidence that salivary and parathyroid tumors are also induced. A significant increase in malignant neoplasms, when compared with nonirradiated controls, has been reported. The parotid gland is the most common site of malignant neoplasm. In addition, an increased risk of pleomorphic adenoma developing has been reported.

Sialadenosis

Sialadenosis is a nonspecific term used to describe a noninflammatory, non-neoplastic enlargement of a salivary gland, usually the parotid gland. In general, the mechanism is unknown and there are many causes. In this setting, the salivary gland enlargement is usually asymptomatic. Bilateral parotid gland swelling is common in obesity secondary to fatty hypertrophy. A complete endocrinologic and metabolic workup should be performed before this diagnosis can be made, because obesity is frequently associated with other disorders such as

diabetes mellitus, hypertension, hyperlipidemia, and menopause. In particular, hypertrophy is frequently associated with diabetes mellitus and has been reported in acromegaly.

Malnutrition is frequently associated with sialadenosis, but it is also associated with pellagra, cirrhosis, diabetes mellitus, and beriberi. Sialadenosis has been reported in kwashiorkor and hypovitaminosis A. The swelling in these conditions is due to acinar hypertrophy.

The association of parotid swelling with alcoholic cirrhosis is well recognized. It is so rare in nonalcoholic cirrhosis that it can be used as a differential diagnostic feature. Parotid enlargement occurs in 30 to 80 per cent of cases of alcoholic cirrhosis. Current evidence suggests that enlargement is based on protein deficiency, and the histologic changes are similar to those in malnutrition.

Any disease that disrupts gastrointestinal absorption of nutrients may lead to parotid gland hypertrophy. Reported diseases include celiac disease, bacillary dysentery, carcinoma of the esophagus, Chagas' disease, and ancylostomiasis. Sialoadenosis may also occur in uremia, hypothyroidism, myxedema, testicular or ovarian atrophy, pregnancy, lactation, and chronic relapsing pancreatitis.

The prognosis of sialadenosis is generally good, with the parotid glands generally reverting to normal following correction of the underlying cause.

Other Disorders

A number of drugs may cause salivary gland enlargement as a side effect. They include thiourea, isoproterenol, methimazole, phenylbutazone, phenothiazine, thiocyanate, iodine compounds, and heavy metals.

Pneumoparotitis may result from any factor that increases intrabuccal pressure. It has been reported in glass blowers and following intubation and endoscopy as an idiopathic event.

Kussmaul's disease (sialodochitis fibrinosa) consists of a mucus plug obstructing a collecting duct. This usually occurs in a dehydrated patient and is manifested by recurrent swelling with associated pain. The appearance of a mucus plug at the duct orifice is diagnostic. Treatment consists of gentle massage and sialogogues to extrude the plug, in addition to rehydration when appropriate.

Cheilitis glandularis is an uncommon disease characterized by enlarged labial salivary glands that secrete a clear, thick, sticky mucus. The glandular hypertrophy may occur to such a degree that eversion of the lower lip results. Vermilionectomy is usually curative.

Necrotizing sialometaplasia is a disease of cryptogenic origin, although some cases appear to occur as a reaction to injury. The lesion generally begins as mucosal ulceration, most commonly on the hard palate, but may occur anywhere salivary tissue is found. There is a male

predominance. The disease was first reported in 1973. It can be mistaken histologically for squamous cell or mucoepidermoid carcinoma. There is mucosal ulceration with pseudoepitheliomatous hyperplasia, ischemic necrosis, and dissolution of acinar walls with a release of mucus, which causes a subsequent inflammatory and granulation tissue response, combined with squamous metaplasia of acini and ducts. The lesion is always self-healing and requires no treatment; however, a biopsy should be performed.

Aberrant salivary gland tissue may occur in a variety of locations. It may be found within lymph nodes, especially in the parotid area. It is reported in 1 per cent of tonsillar tissue. Other sites reported include the mandible, the lower neck, the hypopharynx, the middle ear, the sternoclavicular joint, the thyroglossal duct, and the pituitary gland. In the mandible, the tissue may be on the surface or in a central location. If on the surface, lesions appear to be merely ectopic submandibular tissue and are always benign. Central lesions are uncommon and are even less common in the maxilla. When these tissues become neoplastic, the type of tumor may be, in descending order of frequency, mucoepidermoid carcinoma, adenocystic carcinoma, or adenocarcinoma.