

Infections of the salivary glands.

Parotitis is an inflammation of one or both parotid glands. There are a number of causes, but the clinical picture remains broadly similar.

Classification. I. Bacterial and Viral. 1. Epidemic viral parotitis (mumps). 2. Bacterial parotitis (sialadenitis). 3. Acute. 4. Chronic. 5. Recurrent parotitis of children. II. Obstructive Sialadenitis. 1. Sialolithiasis. 2. Mucous plugs. 3. Stricture-stenosis. 4. Foreign body. III. Systemic Granulomatous Disease. 1. Tuberculosis. 2. Actinomycosis. 3. Fungal infections. 4. Uveoparotid fever (sarcoid)

Acute bacterial parotitis

This is an acute inflammatory response to bacterial infection which causes erythema (redness), pain, swelling and tenderness over the gland on the side of the cheek along with the appearance of pus from the opening of the duct on the inside of the cheek.

It was previously common in dehydrated and debilitated patients, often in the postoperative period, but is now more commonly seen after radiotherapy or in patients with a compromised immune system.

Treatment comprises correction of the lack of fluids (rehydration), antibiotics and pain relief.

Acute parotitis in neonates

This rare form of parotitis is lethal without treatment. In January 2004, Spiegel et al reviewed the literature and stated that only 32 cases had been reported in journals during the previous 3 decades.⁵ The characteristic clinical picture was of a sick premature infant with unilateral parotid swelling and inflammation. Seventy-five percent of the cases were in male infants. Pus expressed from the duct cultured *S aureus* in more than half of the cases. Most all of the cultured bacteria were from organisms present in the oral cavity, which suggests an ascending infection from the mouth.

Treatment is prompt administration of gentamicin and antistaphylococcal antibiotics plus adequate hydration, with a cure in approximately 80% of cases. Failure to improve after 24-48 hours of treatment necessitates surgical drainage. Recurrence is uncommon. Acute bacterial parotitis in children between one year of age and adolescence is extremely rare and only a few have been reported. The etiology and treatment is the same as for adults.

Chronic bacterial parotitis

Chronic bacterial parotitis may exist in the presence of calculi or stenosis of the ducts secondary to injury. A number of articles and book chapters describe that chronic infection is a sequela of acute bacterial infection, but the evidence is scant. Most authors have suggested that decreased salivary flow was the common denominator, but reduced flow may be due to the inflammation. In most instances, the chronic disease is either autoimmune or of unknown etiology with superimposed bacterial infections and should not be designated as a chronic bacterial infection.

Chronic recurrent parotitis

This refers to repeated episodes of discomfort and swelling of the parotid gland often after eating. It is caused by decreased flow of saliva often secondary to either blockage of the duct by a stone or the formation of a duct stricture (narrowing).

It is treated conservatively with gland massage, methods to stimulate the flow of saliva, eg lemon juice, and antibiotics if required. Surgery to remove the gland is possible but its benefits need to be balanced against the risk of damage to the facial nerve (which allows the muscles of facial expression to function).

Mumps (Viral parotitis)

The commonest viral cause of parotitis is mumps. It usually affects 4 to 10 year olds and causes painful swelling of both parotid glands. Mumps, one of the classic childhood infections, is spread by droplets or by direct spread from oropharyngeal secretions that contain the paramyxovirus. Universal immunization, which began in 1977, has made the clinical disease unusual in developed countries. The child should receive the first measles, mumps and rubella (MMR) vaccine at age one year and a second at age 4-6 years.

Occasional outbreaks of mumps are seen, mostly in teenagers or patients in their early twenties who did not receive the second shot. Before the vaccines were available, exposure was almost universal, and clinical disease resulted in 60-70% of those who were exposed. The disease was characterized by grossly enlarged and modestly tender parotid glands. Parotid stimulation caused pain in the gland and ear. Mumps was a benign disease in the vast majority of cases but was occasionally complicated by meningoencephalitis, pancreatitis, orchitis, or deafness especially in young adults. Treatment was and is symptomatic and supportive.

HIV parotitis in children

Salivary gland involvement in children with HIV is well recognized and is much more common than involvement in adults. Characteristically, the gland is

firm, nontender, and chronically enlarged (unilateral or bilateral) and usually causes few symptoms. Lymphoepithelial cysts are less common than in adults. Xerostomia with decreased salivary flow rates occurs in adults but is infrequent in children. Infiltration of CD8-positive lymphocytes, possibly as a result of HIV, Epstein-Barr virus (EBV), or an interaction between the 2, enlarges the gland. The diagnosis of HIV parotitis is usually clinical with the typical findings. Other forms of chronic parotitis are rare in children.⁶

The picture is not typical for acute bacterial infection. No specific treatment exists for this parotitis, and none is usually required. Some evidence indicates that parotid involvement is a good prognostic sign.

Salivary stone (sialolithiasis)

Formation of stones within the duct system is one of the more frequent disorders of the salivary glands. The exact cause is not known, but most agree that the stone begins as a small nidus and grows by concentric deposition of inorganic crystals in an organic matrix. Calculi are much less common in the parotid gland than in the submandibular gland, possibly because the secretions are more serous than the mucoid saliva of the submandibular gland.

Calculi do not cause symptoms until they become large enough to impede the flow of saliva. Partial obstruction causes the gland to inflate itself with marked stimulation to secrete saliva, as occurs in eating. The gland swells while eating and soon becomes painful. The swelling and pain subside in 30-60 minutes only to recur at the next meal. Total obstruction causes pain, swelling, and infection. Complications of the calculi include infection within the gland (sialadenitis), scarring with stenosis, fistula formation, and rarely the stone migrates outside the duct to appear as an inflammatory mass in the neck

The diagnosis is confirmed by imaging studies including plain radiographs with or without injection of contrast media into the duct. CT scans also show single or multiple stones.

Treatment is removal of the stone. Massage of the gland from posterior to anterior may occasionally remove stones, but most require surgical removal. Lidocaine injected around the duct orifice and into the duct allows serial dilatation with graduated dilators. The duct is filleted with sharp scissors and then massage may deliver the stone. This is the simplest method of removal in most instances because the required instruments are available in the ENT or dental office. Extracorporeal shock wave lithotripsy is an alternate treatment to fragment the stone.

Interventional sialoendoscopy is growing in popularity and availability and

seems to be the best method of treatment. The duct is anesthetized and dilated to insert a telescope for inspection of the large ducts. A working channel in the telescope permits irrigation, suction, and insertion of forceps, wire loop, or even laser energy via a glass fiber to remove the calculi. The clinician has much more information as to the condition of the duct system. This instrument is useful for the assessment and treatment of several inflammatory disorders of the gland.

Recurrent parotitis in children (Juvenile Recurrent Parotitis)

Another uncommon syndrome that has been recognized for the past 50 years is recurrent parotitis of childhood, in which recurring episodes clinically resemble mumps. Juvenile recurrent parotitis (JRP) is a nonobstructive, nonsuppurative parotid inflammation in young children. Causative factors, such as local autoimmune manifestation, allergy, infection, and genetic inheritance, have been suggested, but none of them has been proved to date. Until now, treatment of JRP was divided into conservative observation and antibiotic treatment, and no preventive therapy was available.

Generally, episodes begin by age 5 years, and virtually all patients become asymptomatic by age 10-15 years. The duration of attacks averages 3-7 days but may last 2-3 weeks in some individuals. The spectrum varies from mild and infrequent attacks to episodes so frequent that they prevent regular school attendance. The child, although not ill, is regularly sent home with the diagnosis of mumps until school officials are informed of the nature of the disease.

During the attacks, the parotid gland is enlarged, moderately red, and tender. Massaging the gland from back to front produces clear saliva with lots of "snowflakes" or little white curds from the Stensen duct. The disease is unilateral most commonly and, if bilateral, is most apt to be asymmetric. The child generally is not very sick during the episodes.

Bacterial cultures from saliva generally produce *Streptococcus viridans* or another low-virulence bacterium that is considered normal oral flora. Even between attacks, bacteria are present in the saliva. Ultrasonography and sialography reveal punctate sialectasis as in Sjögren syndrome. Even when symptoms are unilateral, sialectasis is demonstrated by sialography in the opposite gland in most instances. Sialographic changes persist even after all other symptoms have ceased. Findings may eventually disappear, but the natural history of gland findings is not clear.

The histopathology is essentially the same as Sjögren and Mikulicz disease. Some children with recurrent parotitis may actually have Sjögren syndrome and may develop the full-blown clinical picture. The cause of the disease is unknown. Sialectases may precede infections and may be a site of lowered resistance. A number of etiologies have been suggested. The disease is unrelated to mumps, and when viral studies have been performed, elevated

serum titers to numerous other viruses have been found. One theory is that infection of the glands at a young age affects the immune system, and the disease may represent immaturity of the immunologic response. Searches for autoantibodies have not been successful. The benign self-limiting nature of this entity makes autoimmunity doubtful. No evidence suggests that allergy is a cause. Resolution of symptoms with age may be due to regeneration of glandular elements and return to normal function.

Applying local heat applied to the gland, massaging the gland from back to front, and taking penicillin usually cure individual episodes. Treatment of individual infections may prevent injury to the gland parenchyma. Severe disease may be treated by parotidectomy. Parotidectomy is rarely indicated.

Case report. A four-year-old male child presented with a history of repeated episodes (thrice over last one year) of painful swelling below the right ear. Each time the swelling subsided over a period of 7-10 days. This time also he complained of increasing swelling accompanied by pain and fever. Except for bad oral hygiene his physical examination was unremarkable. His height (96 cm) and weight (13 kg) were normal for age. Initially possibilities of salivary duct calculi, Sjogren's syndrome and juvenile recurrent parotitis were considered. The laboratory investigations revealed hemoglobin of 10.1 g/dl and total leukocyte count of 8,600/mm³ with 68% neutrophils, 30% lymphocytes and 2% eosinophils. Erythrocyte sedimentation rate was elevated (25 mm/h; normal: 1-20). Gram stain and culture of saliva did not reveal any micro-organism. As juvenile recurrent parotitis is associated with immunological abnormalities, a detailed immunological workup including NBT test, ELISA for HIV, Rebuck skin window test and serum immune electrophoresis was done, which was normal. Schirmers' test and slit lamp examination done for Sjogren's syndrome were non-contributory. Investigations for auto-immune markers were not done.

Plain X-rays of the skull (AP and lateral) did not reveal any abnormalities. Ultrasound of right parotid gland revealed enlarged gland with hypoechoic areas. Other salivary glands were normal. Sialography performed with water soluble contrast medium revealed multiple ectatic ducts in the periphery which were uniform in size measuring 2-3 mm in diameter (*Figs. 1 & 2*). The main parotid duct was normal, there was no filling defect within it to suggest calculus.

The child was treated with oral penicillin V (250 mg bd) and naproxen for seven days. The swelling subsided within three days. The child is on regular follow up.

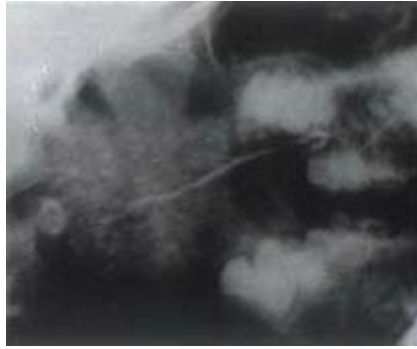


Fig. 1. Lateral projection of right parotid gland sialography.



Fig. 2. Lateral oblique projection of right parotid gland sialography.

Discussion. Juvenile recurrent parotitis is characterized by recurrent episodes of swelling and pain in parotid gland(1). This condition is usually misdiagnosed as mumps but in contrast, the swelling is recurrent and affects the parotid gland unilaterally and when bilateral, one gland is affected less than the other(1). The onset of disease is early in life with a peak during 3-5 years of age. It is usually accompanied by pain, fever and malaise and the frequency of exacerbations can be quite variable, though the disease disappears completely in adult life(2). The disease is more common in males(3).

The histological features of recurrent parotitis in childhood include sialectasis of peripheral ducts in the parotid gland with periductal lymphocytic infiltration. The ectatic ducts are usually 1-2 mm in diameter. Congenital ectasia of portions of salivary gland ducts and infection ascending from mouth have been postulated to explain the parenchymal changes and pathogenesis of juvenile recurrent parotitis(2). An extensive search of the medical literature did not reveal involvement of other salivary glands in this clinical entity. The higher rate of secretion in the submandibular gland compared to parotid gland may protect it from infections and hence from recurrent enlargement. Also, the submandibular secretion has been found to have antiseptic properties(2).

Sialographic examination is the commonly used diagnostic modality for children with recurrent parotitis. It reveals numerous scattered punctate/globular pools of contrast medium which usually measure 1-2 mm in diameter(4). Histologically these pools of contrast correspond to the peripheral intralobular ducts(2).

Ultrasonography of the parotid gland using 7.5 MHz high frequency transducer reveals enlarged parotid gland in majority of patients with multiple small hypoechoic areas measuring 2-3 mm in diameter(4,5). The hypoechoic areas represent both sialectasis of peripheral ducts and surrounding lymphocytic infiltration. The ultrasonographic findings are characteristic of recurrent parotitis but is not specific for this disease. The differential diagnosis includes mumps, Sjogren's syndrome and other chronic inflammatory diseases(5). Juvenile recurrent parotitis has been occasionally associated with immunological abnormalities, especially phagocytic dysfunctions(6).

The recurrent attacks are treated conservatively with oral penicillin and analgesics. However, no prophylactic therapy is available. In addition to antibiotics, analgesics and attention to good oral hygiene, massage of the parotid gland, warmth, use of chewing gum and sialogogic agents may be helpful in reducing the attack frequency(3).

More aggressive treatment is justified only for those patients with persistent problems. This may include parotid duct ligation, parotidectomy or tympanic neurectomy depending upon preference and experience of the treating physician(3). Intraductal tetracycline produced acinar atrophy in rabbits(7). No studies have been conducted on human subjects.

Sarcoidosis

Sarcoidosis is a chronic multisystem disorder of unknown cause that is characterized by accumulations of T lymphocytes and mononuclear phagocytes, noncaseating epithelioid granulomas, and the derangement of normal tissue architecture. Skin anergy and depressed cellular immune processes in the blood are common. In the United States, the incidence is much higher in African Americans and generally begins in people aged 20-40 years.

Diagnosis requires the typical clinical picture and biopsy reveals noncaseating granuloma, plus exclusion of other diseases associated with such granulomas. In most instances, the process does not attack involved organs, but the bulk of the accumulated cells may distort the normal architecture enough to impair function. The lungs, skin, and lymph nodes are most often affected, but the salivary glands are involved in approximately 10% of cases. Bilateral firm, smooth, and nontender parotid enlargement is classic. Xerostomia occasionally occurs. The Heerfordt-Waldenstrom syndrome consists of sarcoidosis with parotid enlargement, fever, anterior uveitis, and facial nerve palsy.

Sarcoidosis is benign in most instances, and treatment is generally not advisable unless organ dysfunction occurs. The only effective treatment is corticosteroids administered for several weeks. Treatment of the parotid glands â

is not necessary, but most would treat facial paralysis because of the fear of permanent function loss.

Medical Care

- Most episodes of chronic parotitis are treated symptomatically.
 - Sialogogues, local heat, gentle massage of the gland from posterior to anterior, and hydration provide variable symptomatic relief. When pus is expressed from the Stensen duct, culture and sensitivity studies guide antibiotic selection. Treatment of the primary disease (eg, HIV, rheumatoid arthritis) is all that is required. Some authors advocate intermittent irrigation of the ductal system with saline, steroid solution, and/or an antibiotic to treat the infection and mechanically remove inspissated mucous or pus from the ducts. This may retard the disease progression. The rationale is stronger for those with the dilated “sausage-shaped” ducts.
 - This treatment is advocated for those patients not responding to symptomatic treatment and should be attempted before considering surgery. Baurmash advocates a Decadron (dexamethasone) and penicillin solution in saline to cleanse the ducts and for topical therapy.⁶ If successful, this irrigation is repeated as needed.
- Acute bacterial parotitis is caused by bacteria that ascends from the mouth and most frequently occurs in chronically ill patients. The patient quickly becomes extremely ill. In the hospital setting, *S aureus* is apt to be methicillin resistant (MRSA). Gram stains and culture and sensitivity testing is ordered. Intravenous vancomycin at 500 mg every 6 hours is begun empirically. Therapy may be altered based upon cultures or infectious disease consultation.

Surgical Care

The treatment of chronic parotitis is based on the symptoms of the patient and decisions are, by definition, subjective.

- Recurring parotitis, an unpleasant and distressing condition, is managed conservatively in most instances but occasionally requires surgery to end the frequent and severe episodes of infection. The decision for surgery is based on subjective symptoms.
- The swollen inflamed gland makes surgery more difficult, and the incidence of injury to the facial nerve may be slightly higher than for removal of benign tumors.
- The standard treatment is superficial parotidectomy, but if CT scanning or surgery reveals significant involvement of the deep lobe, that portion of the gland is dissected from beneath the nerve.

- Fibrosis makes the tensile strength of the surrounding gland much greater than the nerve itself. Surgery is difficult and expensive. Parotidectomy is still the most acceptable treatment in the United States.
- In tympanic neurectomy, the parasympathetic supply to the parotid gland is sectioned within the middle ear so as to cause gland atrophy. Success is not uniform, but the magnitude of the surgery is less. If one believes that decreased salivary flow is the cause of chronic parotitis, the treatment is irrational.
- In ligation of the parotid duct, the duct can be ligated so as to cause atrophy of the gland and prevent ascending bacterial infections from entering the mouth. The duct should be dissected for a short distance within the cheek and severed. The duct should be oversewn to ensure that the soft tissue heals. Simple ligation frequently results in recanalization of the duct. The procedure is based on assumptions that may not be true, and the rationale is weak.
- Installation of methyl violet into the parotid duct to destroy the gland: Intermittent reports of this method have been reported for more than 40 years, but it is not commonly performed in the United States, possibly because of the fear that the chemical may be carcinogenic. The gland is massaged to remove saliva, and the duct is cannulated with a 1-3 mm polyethylene tube. One to 3 mL of 1% methyl violet is instilled until the ducts are full and the patient complains of pressure. The tube is occluded for 30 minutes and then removed. The gland swells for 1-2 weeks, and the duct system should be obliterated in 2-4 weeks. If symptoms persist after this time, a second injection may be performed. This method is much cheaper than parotidectomy and should prevent ascending infections from the mouth. Whether the acini involute and disappear is not certain. Other substances such as tetracycline have been shown to cause necrosis of the gland when instilled into the ductal system.

Consultations. Patients with autoimmune parotitis experience xerostomia and excessive tooth decay. These patients should have dental consultation and frequent dental care.

Diet. The diet does not significantly affect cases of parotitis. **Further Inpatient Care** Hospitalization for parotitis is extremely unusual. Parotitis may arise in hospitalized patients who are severely ill, and it is treated as indicated above (see [Treatment](#)).

Follow up. Inpatient & Outpatient Medications. Treatment of generic parotitis involves no specific medications. Discontinue medicines with atropinelike effects and substitute other medications when feasible.

Deterrence/Prevention.

- Generic deterrence is not available.
- Adequate hydration, oral hygiene, and minimizing medications with atropine effects are helpful.
- Immunization avoids epidemic parotitis (mumps).

Complications

- Chronic parotitis destroys the glandular elements of the salivary glands and impairs the protective functions of saliva, leading to dental infections and caries.
- Autoimmune parotitis is associated with an increased incidence of lymphoma.

Prognosis

The prognosis is good for all forms of parotitis. Associated or underlying diseases are the actual determinants of the prognosis.

Patient Education

Patients with chronic parotitis are instructed to maintain scrupulous dental care. Minor swelling and discomfort are managed with local heat and massage.

