Epidemiology of Salivary Gland Infections

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KEYWORDS

• Salivary gland infection • Sialadenitis
• Parotitis • Sialolithiasis

Bacterial or viral infections can cause acute or chronic sialadenitis. Sialadenitis of bacterial origin is a relatively uncommon occurrence today and is normally associated with sialoliths. In a study of 877 cases of obstruction, 73.2% were due to salivary calculi and 22.6% were due to salivary stricture formation with no stone present at time of examination.[1]

A hospital study of admissions in the United Kingdom found that the incidence of symptomatic sialadenitis and sialolithiasis was 27.5 and 31.5 per million population respectively.[2] However postmortem studies suggest that the prevalence of salivary calculi might be about 1.2% and they probably form as microcalculi continuously throughout life, being passed spontaneously in most cases without complication.[3]

The most common viral infection of the salivary glands is mumps.

The main factor limiting newer methodologies in, and deeper understanding of, the treatment of salivary disease, appears to be a collective lack of experience. Disorders of the salivary glands are uncommon and, when they occur, experience in managing the process is diluted over a range of disciplines (pediatrics; ear, nose, and throat; general and maxillofacial surgery). The result is that traditional views go unchallenged and are recast unchanged from one textbook to another. This article deviates from this pattern in that sialadenitis is approached on a personal perspective based on 15 years of clinical practice limited mainly to salivary gland diseases.

Ascending acute bacterial parotitis was once a common perimortal event. This is probably because, in advanced disease, the combination of failure to eat and drink leads to dehydration and lack of salivary stimulation, which in combination with immunocompromising comorbidities predispose to infection of the parotid gland by the ascent of oral bacteria. Indeed, President James Garfield died on September 19, 1881, with acute parotitis 2 months after he sustained a gunshot wound followed by several botched procedures that failed to find the projectile.

This scenario is less common today because the advent of antibiotics and improved general hygiene, together with basic modern care, minimize the likelihood of patients becoming very dehydrated.

BACTERIAL INFECTIONS

Acute Bacterial Infections

Acute bacterial sialadenitis is usually caused by bacteria ascending the salivary ducts from the mouth, although bacteremia can occur in the immunocompromised patient. The natural protective barriers to infection are the biologic properties of the saliva, the body's general immune mechanisms, and the physical features of the duct and glandular system. The saliva itself has antibacterial properties and the salivary flow physically washes debris and bacteria out of the duct. It is not widely appreciated that both the submandibular and parotid glands have, in effect, a combination of valves and sphincters to prevent ingress of contaminants.

It follows then that any process that disrupts these natural mechanisms increases the risk of ascending infections. These can be classified as conditions that disrupt the physical flushing effect of saliva through destruction, reduced production

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of saliva, and impact on the protective action of valves and sphincters. Other causes are generalized immunosuppression.

Acute bacterial sialadenitis is more common in the parotid than in either the submandibular or sublingual glands. An explanation for this may be the higher mucoid content of submandibular and sublingual secretions, which protect against bacterial infection. Certainly mucoid saliva contains lysoszyme, which acts by breaking down the 1–4 link between N-acetyl-muramic acid and N-acetyl-glucosamine, which are two of the main bacterial cell wall mucopeptides.[4] Mucoid saliva also contains significant quantities of secretory IgA and, to a lesser extent, IgM and IgD. Mucins also contain sialic acids, which inhibit bacterial attachment to epithelial cells through agglutinating bacteria and glycoproteins.[5] It may also be relevant that the opening of the parotid duct lies opposite the upper second molar teeth, which may be a ready source of bacteria in the unkempt mouth.

Acute bacterial parotitis

By far the most common cause of acute bacterial parotitis is obstruction by calculi or other foreign body. Looking for the cause should be the first line of investigation when confronted by acute bacterial parotitis. Reduced salivary flow in itself is not a strong risk factor and bacterial sialadenitis infection is not a common feature of Sjögren disease. However, reduced salivary flow has increased significance in the presence of other factors, notably immune suppression. Apart from stones, the other factor often associated with acute sialoadenitis is immunosuppression in all its forms. Systemic disorders, such as hepatic and renal disease, and poorly controlled diabetes may precipitate infection as can immunosuppression medication in its more aggressive form (oncology).

Fine needle aspiration of a parotid gland tumor, especially a Warthin tumor, has also been shown to rarely introduce infection[6] and 4% of patients treated by lithography have an acute exacerbation of infection due to the release of bacteria from the shattered calculus.[7]

Causes of reduction in salivary flow may be systemic or local. Systemic factors include dehydration and chemical inhibition of salivary stimulation. Traditionally, local factors include radiation, sialectasis, strictures, tumors, and glandular diseases, such as sarcoidosis and Sjögren disease (**Box 1**).

In practice, the risk of acute infection from these local factors is miniscule. The gland most affected by radiation is the parotid, where salivary flow may be all but eliminated. In most cases, debris or mucoid discharge can be milked from the duct, indicating chronic infection, but acute symptoms are uncommon. Similarly, sialectasis due to chronic obstruction does not lead to acute sialadenitis, but sialectasis arising as a result of repeated infection and destruction of the parenchymal tissues of the gland does indeed represent a significant risk for acute infection. Obstruction by stricture or tumors does not lead to acute symptoms, as saliva on its own is a powerful bacteriostatic agent (ranula and mucocoeles do not frequently become infected). Similarly, acute bacterial sialadenitis is an uncommon event with Sjögren disease and sarcoidosis. Occasionally, patients with advanced Sjögren disease report intermittent painful swelling of parotid glands that seem to respond to antibiotics. A careful inspection of the parotid saliva shows it to be clear. In most of these individuals, the acute swelling and inflammation are due to disregulation of lymphocyte function. A parotid tail biopsy reveals many of these patients to have mucosa-associated lymphatic tissue lymphoma, not recurrent

Box 1
Causes of reduced saliva production and flow

- Chemical inhibition (see **Box 2**)
- Dehydration
- Autoimmune disorder
  - Sjögren disease
  - Sarcoidosis
  - Primary biliary cirrhosis
- Cystic fibrosis
- Renal failure
- Infections
  - Hepatitis C virus
  - HIV
- Extremes of age
  - Elderly
  - Neonates
- Menopause
- Autonomic nervous system dysfunction
  - Diabetes mellitus
- Radiation
- Strictures
- Stones
- Tumors
- Iatrogenic damage

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