

# Diseases of the salivary glands

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## Abstract

Salivary gland disease is managed by a number of specialities. There are three pairs of major salivary glands and several hundred minor salivary glands within the upper aerodigestive tract. Pathology is diverse, including infective, inflammatory and neoplastic diseases. Clinical presentation is usually with a lump within, or swelling of the gland. Investigations combine clinical assessment, fine needle aspiration cytology and radiology. Management is medical or surgical dependent on pathology. Surgical intervention is commonly performed for chronic inflammatory disorders and neoplasms. Management requires a sound knowledge of anatomy and oncologic principles.

**Keywords** Inflammatory diseases; minor salivary glands; neoplasia; parotid gland; submandibular gland

Diseases of the salivary glands are heterogeneous and may present to a number of specialities. The usual presentation of a 'lump', in or making up all of a gland, may indicate localized pathology or be part of a more generalized condition. The salivary glands are the paired parotid, submandibular and lingual glands along with several hundred minor salivary glands, distributed throughout the upper aerodigestive system.

## Anatomy

**The parotid gland** is the largest of the salivary glands producing mainly serous saliva. It covers the area anterior to the tragus of the external ear from the zygomatic arch superiorly to the upper neck inferiorly. It is shaped like a wedge, lying between the ramus of the mandible anteriorly and the temporal bone posteriorly. Its deep lobe occupies the pre-styloid component of the parapharyngeal space and approaches the lateral wall of the oropharynx. The parotid (Stensen) duct crosses the masseter, piercing the buccinator opening into the oral cavity opposite the second upper molar tooth.

The facial nerve enters the parotid gland, dividing into two main divisions and five branches (temporal, zygomatic, buccal, mandibular and cervical), splitting the parotid gland into its superficial and deep lobes. The nerve is motor to the muscles of facial expression, sensory to a small patch of the external ear canal and special sensory to the anterior two-thirds of the tongue.

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**The submandibular gland** produces mixed mucinous and serous saliva, accounting for the majority of the saliva at rest. The gland lies between the mandible superiorly, the anterior belly of the digastric muscle antero-inferiorly and the posterior belly of digastric postero-inferiorly. The gland is divided into superficial and deep lobes as it hooks around the posterior border of the mylohyoid muscle. Superficially the gland is covered by the deep layer of investing cervical fascia. The mandibular and cervical branches of the facial nerve lie on this. The deep lobe lies on the hyoglossus muscle medially, with the lingual nerve positioned superiorly and the hypoglossal nerve inferiorly. Wharton's duct runs anteriorly to open into the oral cavity lateral to the frenulum of the tongue.

**The sublingual glands** lie deep to the mucosa of the floor of the mouth between the mylohyoid and genioglossus muscles, opening directly onto the mucosa, or into the submandibular ductal system. They produce mucinous saliva.

## Clinical assessment

For the majority of patients, the history helps establish a diagnosis. It is important to determine chronicity, whether pain is a feature, fluctuation or change in size with eating with a differential diagnosis. A history of chronic inflammatory disorders is important. Palpation of the lump should be performed bimanually with a gloved finger intraorally. The facial nerve function should be assessed, the oropharynx should be examined to establish any deep lobe extension and the cervical lymph nodes examined for any associated lymphadenopathy.

## Imaging

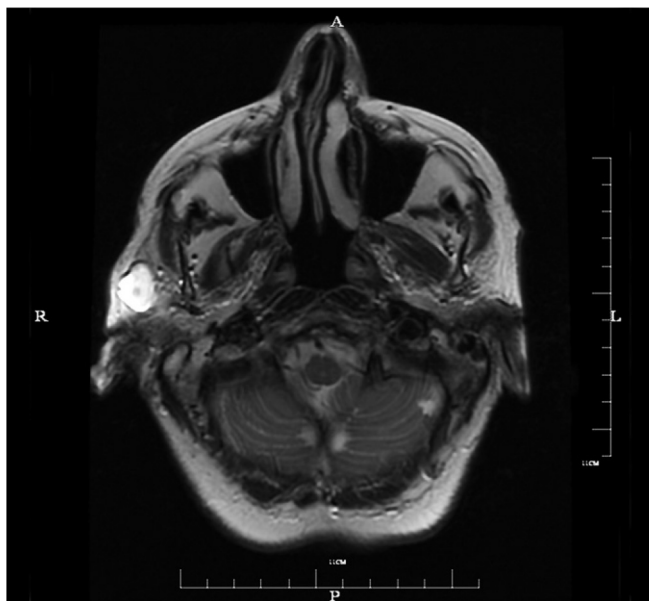
Plain radiographs have an historic role in the investigation of salivary gland pathology, predominantly in the diagnosis of submandibular duct calculi, 90% of which are radio-opaque. Sialography is the most sensitive investigation to assess ductal pathology but is increasingly being replaced by magnetic resonance sialography and ultrasound. Ultrasound (US) is increasingly the initial imaging modality of choice.<sup>1</sup> US allows simultaneous fine needle aspiration cytology (FNAC) (Figure 1), will pick up 90% of salivary duct stones and can characterize salivary tumours in great detail but is limited by the mandible in obtaining good views of the deep parotid lobe. Computed tomography (CT) is more accessible and cheaper than magnetic resonance imaging (MRI), but images can be distorted by dental artefact. It is also useful in imaging bone involvement and the thorax and the abdomen, in the case of metastatic disease from and to the salivary glands. MRI gives superior soft tissue images and clearer definition of the anatomical relations to cranial nerves and peri-neural spread (Figure 2).

## Fine needle aspiration cytology (FNAC)

FNAC can be used as a first-line investigation of a salivary gland lesion. A needle attached to a 20-ml syringe is inserted into the lesion applying suction if preferred and several passes made with a forward-backward movement. A core biopsy offers improved diagnostic accuracy, utilizing a wider gauge needle, but is more



**Figure 1** Fine needle aspiration cytology can be performed simultaneously with diagnostic ultrasound for the parotid and submandibular glands.



**Figure 2** T2-weighted, axial MRI scan demonstrating a pleomorphic adenoma of the right parotid gland.

painful for patients and has a higher risk of haematoma. The role of cytology is to aid clinical distinction between neoplastic and non-neoplastic disease of the salivary gland and also between benign and malignant salivary neoplasms.

## Sialendoscopy

Sialendoscopy is the use of endoscopes in the diagnosis and treatment of ductal pathology. It is most applicable to patients who have symptoms of salivary gland swelling on eating; indicative of a stone or stenosis.<sup>2</sup> Interventional sialendoscopes incorporate a working channel through which baskets, guide wires, laser fibres and balloons can be passed.

## Non-neoplastic disease

### Inflammatory conditions

**Acute viral inflammation:** the commonest cause of acute viral parotitis is mumps; caused by the paromyxovirus. Patients present with malaise, fever, anorexia and acute bilateral parotid enlargement. Parotitis may be unilateral and can present with swelling in the submandibular and sublingual glands. Systemic complications include meningitis, encephalitis, hepatitis, carditis, orchitis and hearing loss. Treatment is supportive.

**Acute suppurative sialadenitis:** bacterial infections are uncommon and most frequently occur in the parotid gland. The most common presentation is of unilateral parotid enlargement with cellulitis, in a dehydrated elderly patient. Pus is often demonstrable at the duct orifice. The commonest causative agent is *Staphylococcus aureus*. Treatment is broad-spectrum intravenous antibiotics and rehydration. Occasionally, abscess formation can occur requiring incision and drainage.

### Chronic inflammatory conditions

#### Infective:

***Mycobacterium tuberculosis* (TB)** of the salivary glands is relatively rare in the UK. It may mimic a malignant neoplasm, with enlargement and pain, most commonly in the parotid gland due to infection within the peri-parotid lymph nodes. A chest radiograph may confirm coexistent pulmonary TB. Definitive diagnosis can be made with aspiration or formal incision and drainage of pus, allowing identification of acid-fast bacilli on microscopy and culture. Treatment is anti-tuberculous chemotherapy.

**Atypical tuberculosis** is now an increasingly common condition affecting children between the ages of 2 and 5.<sup>3</sup> *Mycobacterium avium intracellulare* is the commonest cause and may be transmitted through contact with soil. Painless lesions over either the parotid or submandibular glands occur. The patient is otherwise well. Whilst combination antibiotics are favoured some paediatric surgeons advocate excision because untreated it can discharge as a sinus on a chronic basis, before 'burning out' leaving scarring of the overlying skin.

**Cat scratch disease** is a granulomatous disease affecting the periglandular lymph nodes in the parotid and submandibular regions. It is caused by the Gram-negative bacterium *Bartonella henselae* transmitted through a bite or scratch from a domestic cat. Serum immunoglobulin G (IgG) and IgM will confirm the diagnosis. Treatment is supportive, but occasionally surgery may be considered for non-regressing enlarged, tender lymphadenopathy.<sup>4</sup>

**Actinomycosis** – the Gram-positive anaerobe *Actinomyces israelii* may cause painless hard masses in the neck overlying the salivary glands. Necrosis and multiple sinus tracts often occur

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