

Tumours of the submandibular gland

Tumours of the submandibular gland are uncommon and usually present as a slow-growing, painless swelling within the submandibular triangle (Figure1). Only 50 per cent of submandibular gland tumours are benign, in contrast to 80–90 per cent of parotid gland tumours. In many circumstances, the swelling cannot, on clinical examination, be differentiated from submandibular lymphadenopathy. Most salivary neoplasms, even malignant tumours, are often slow growing, painless swellings. Unfortunately, pain is not a reliable indication of malignancy as benign tumours often present with pain in the affected gland, presumably due to capsular distension or outflow obstruction.



Figure1 Benign tumour of the right submandibular gland.

Clinical features of malignant salivary tumours

These include:

- facial nerve weakness
- rapid enlargement of the swelling
- induration and/or ulceration of the overlying skin
- cervical node enlargement.

Investigation

Computed tomography (CT) and MRI scanning are the most helpful techniques for imaging tumours arising in the major salivary glands. The tumour is intrinsic to the gland, and its border can be imaged to highlight whether it is circumscribed and probably benign, or diffuse, invasive and probably malignant. The scan will highlight the relationship of the tumour to other anatomical structures, which is helpful in planning surgery. Open surgical biopsy is contraindicated as this may seed the tumour into surrounding tissues, making it

impossible to eradicate microscopic deposits of tumour cells. Fine-needle aspiration biopsy is a safe alternative to open biopsy. There is evidence to suggest that, provided the needle gauge does not exceed 18G, there is no risk of seeding viable tumour cells. The role of fine-needle aspiration biopsy is, however, controversial as it rarely alters surgical management.

Management of submandibular gland tumours

As with all salivary gland tumours, surgical excision with a cuff of normal tissue is the goal. When the tumour is small and entirely encased within the submandibular gland parenchyma, straightforward intracapsular submandibular gland excision is appropriate. However, benign tumours that are large and project beyond the submandibular gland are best served by suprahyoid neck dissection, preserving the marginal mandibular branch of the facial nerve, lingual nerve and hypoglossal nerves. This entails a full clearance of the submandibular triangle, involving the development of a subplatysmal skin flap, dissection of periosteum along the lower border and inner aspect of the mandible, and delivery of the gland and tumour with a cuff of normal tissue. In cases of overt malignancy, modified neck dissection or radical neck dissection is appropriate. This may necessitate sacrifice of the lingual and hypoglossal nerves if the tumour is adherent to the deep bed of the gland.

THE PAROTID GLAND

Anatomy

The parotid gland lies in a recess bounded by the ramus of the mandible, the base of the skull and the mastoid process. It lies on the carotid sheath and the XIth and XIIth cranial nerves and extends forward over the masseter muscle. The gland is enclosed in a sheath of dense deep cervical fascia. Its upper pole extends just below the zygoma and its lower pole into the neck. Several important structures run through the parotid gland.

These include:

- branches of the facial nerve;
- the terminal branch of the external carotid artery that divides into the maxillary artery and the superficial temporal artery;
- the retromandibular vein;
- intraparotid lymph nodes.

The gland is arbitrarily divided into deep and superficial lobes, separated by the facial nerve. Eighty per cent of the parotid gland lies superficial and 20 per cent deep to the nerve. An accessory lobe is occasionally present lying anterior to the superficial lobe on the masseter muscle.

Developmental disorders

Developmental disorders such as agenesis, duct atresia and congenital fistula are extremely rare.

Inflammatory disorders

Viral infections

Mumps is the most common cause of acute painful parotid swelling and predominantly affects children. It is spread via airborne droplets of infected saliva. The disease starts with a prodromal period of 1–2 days, during which the patient experiences fever, nausea and headache. This is followed by pain and swelling in one or both parotid glands. Parotid pain can be very severe and exacerbated by eating and drinking. Symptoms resolve within 5–10 days. The diagnosis is based on history and clinical examination; a recent contact with an infected patient with a painful parotid swelling is often sufficient to lead to a diagnosis. Atypical viral parotitis does occur and may present with predominantly unilateral swelling or even submandibular involvement. A single episode of infection confers lifelong immunity.

Treatment

Symptomatic with regular paracetamol and adequate oral fluid intake.

Complications

Orchitis, oophoritis, pancreatitis, sensorineural deafness and meningoencephalitis are rare, but are more likely to occur in adults. Other viral agents that produce parotitis include Coxsackie A and B, parainfluenza 1 and 3, Echo and lymphocytic choriomeningitis.

Bacterial infections

Acute ascending bacterial sialadenitis is historically described in dehydrated elderly patients following major surgery. Reduced salivary flow secondary to dehydration results in ascending infection via the parotid duct into the parotid parenchyma. The infecting organism is usually *Staphylococcus aureus* or *Streptococcus viridans*.

Clinical Features

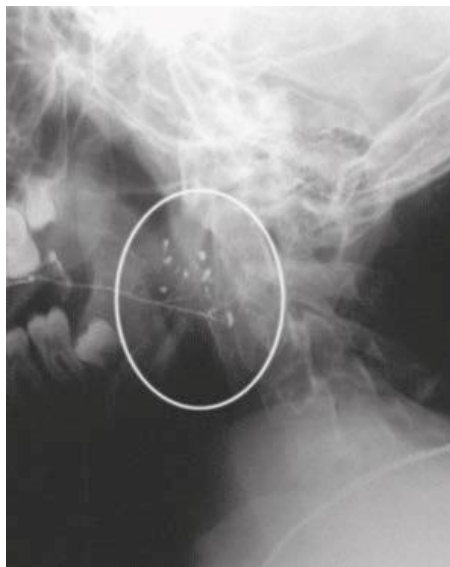
- _ Pyrexia, malaise, pain and trismus.
- _ Red, tender, warm, well-localised, firm swelling is seen in the parotid region (brawny induration).
- _ Tender lymph nodes are palpable in the neck.
- _ Features of bacteraemia are present in severe cases.

_ Pus or cloudy turbid saliva may be expressed from the parotid duct opening.

Treatment is with appropriate intravenous antibiotics. If the gland becomes fluctuant, ultrasound may identify abscess formation within the gland that may require aspiration with a large bore needle or formal drainage under general anaesthesia. In the latter procedure, the skin incision should be made low to avoid damage to the lower branch of the facial nerve. Blunt dissection using sinus forceps is preferred, and the cavity is opened to facilitate drainage. A drain is inserted and left *in situ* for 24–72 hours. Sialography is contraindicated during acute infection. Chronic bacterial sialadenitis is rare in the parotid gland.

RECURRENT CHILDHOOD PAROTITIS

It is a recurrent, rapid enlargement of one or both parotids with fever and malaise in children of age group between 3-6 years without any known aetiology. Recurrent episodes with a quiescent period in between are typical. Sialogram shows snowstorm punctate sialectasis. Low dose antibiotics for long period may be required. Occasionally patient may need total conservative parotidectomy especially if it occurs late in adolescent period.



Characteristic 'snowstorm' appearance of recurrent parotitis of childhood (circled)

Stone formation

Sialolithiasis is less common in the parotid gland (20 per cent) than in the submandibular gland (80 per cent). Parotid duct stones are usually radiolucent and rarely visible on plain radiography. They are frequently located at the confluence of the collecting ducts or located in the distal aspect of the parotid duct adjacent to the parotid papilla. Parotid gland Sialography is usually required to identify the stone. A stone located in the collecting duct or within the gland may be managed by either endoscopic retrieval, lithotripsy or, least likely, surgical removal via a parotidectomy approach.

Tumours of the parotid gland

The parotid gland is the most common site for salivary tumours. Most tumours arise in the superficial lobe and present as slow growing, painless swellings below the ear, in front of the ear or in the upper aspect of the neck. Less commonly, tumours may arise from the accessory lobe and present as persistent swellings within the cheek. Rarely, tumours may arise from the deep lobe of the gland and present as parapharyngeal masses.

Aetiology

- *Genetic*—loss of alleles of chromosomes in 12q, 8q, 17q. Eskimos are more prone for salivary neoplasm.
- *Infective*—mumps, Epstein-Barr virus, chronic sialadenitis may be the cause; but not proved emphatically. Recurrent inflammation can cause duct dysplasia and carcinoma.
- *Radiation*—it is more common in survivors of atomic bomb explosion; mucoepidermoid carcinoma is more in these patients.
- *Smoking*—adenolymphoma of Warthin's shows 40% risk in smokers.
- *Sex*—benign tumours and many malignancies are common in females; Warthin's and some malignancies are common in males.
- *Environment and diet*—Arctic-Eskimos show dietary deficiency of vitamin A and develop salivary tumour. Industrial agents like nickel, cadmium, hair dyes, silica, preservatives may increase the risk of salivary tumours.

80–90 per cent of tumours of the parotid gland are benign, the most common being pleomorphic adenoma. Malignant salivary gland tumours are divided into two distinct subgroups:

1 Low-grade malignant tumours, e.g. acinic cell carcinoma, are indistinguishable on clinical examination from benign neoplasms.

2 High-grade malignant tumours usually present as rapidly growing, often painless swellings in and around the parotid gland. The tumour presents as either a discrete mass with infiltration into the overlying skin or a diffuse but hard swelling of the gland with no discrete mass. Presentation with advanced disease is common, and cervical lymph node metastases may be present.

Incidence

_ Eighty per cent salivary neoplasms are in the parotids of which 80% are benign; 80% of these are pleomorphic adenomas.

_ Fifteen per cent of salivary tumours are in the submandibular salivary gland, of which 50% are benign. 95% of these are pleomorphic adenomas.

_ Ten percent of salivary neoplasms are in the minor salivary glands—palate, lips, cheeks, and sublingual glands. Of these only 10% are benign.

Note:

- Parotid tumours are common but only 20% are malignant.
- Submandibular tumours are uncommon but 50% of them are malignant.
- Minor salivary gland tumours (other than sublingual glands) are rare and 90% of them are malignant.
- Sublingual salivary tumours are very rare but almost all sublingual salivary tumours are malignant.
- Incidence of malignancy in salivary glands is inversely related to size of the gland; in parotid it is 15%; in submandibular it is 50%; in sublingual it is 85%.

PLEOMORPHIC ADENOMA (Mixed Salivary Tumour)

- Commonest of the salivary gland tumour in adult.
- It is 80% common.
- More common in parotids (80%). 10% in submandibular salivary gland; 0.5% in sublingual salivary gland.
- It is mesenchymal, myoepithelial and duct reserve cell origin.

Grossly it contains cartilages, cystic spaces, and solid tissues.

Microscopically it is biphasic in nature with epithelial and stromal components. Benign tumours will usually not show necrosis.

Even though it is capsulated, tumour may come out as *pseudopods* and may extend beyond the main limit of the tumour tissue.

_ When disease occurs in parotid, commonly it involves superficial lobe or superficial and deep lobe together.

_ But sometimes only deep lobe is involved and then it presents as swelling in the lateral wall of the pharynx, soft palate and posterior pillar of the fauces. There may not be any visible swelling in the preauricular region. It is called as '*dumbbell tumour*'. This tumour is in relation to styloid process, mandible, stylohyoid, styloglossus, stylopharyngeus muscles.

Clinical Features

- 80% common.
- Common in females (3:1).
- Occurs in any age group. But common in 4th and 5th decade
- Usually unilateral.
- Present as a single painless, smooth, firm lobulated, mobile swelling in front of the parotid with *positive curtain sign* (As the deep fascia is attached above to the zygomatic bone, it acts as a curtain, not allowing the parotid swelling to move above that level. Any swelling superficial to the deep fascia will move above the zygomatic bone).
- Obliteration of retromandibular groove is common.
- The ear lobule is lifted.
- When deep lobe is involved, swelling is commonly located in the lateral wall of pharynx, posterior pillar and over the soft palate—10%. Deep lobe tumour passes through *Patey's stylomandibular tunnel* pushing tonsils, pharynx, and soft palate often without any visible swelling or only small swelling when only deep lobe tumour is present; it also presents as dysphagia. Bidigital palpation of parotid is significant in such occasion with one finger inside mouth.
- Facial nerve is not involved.



Pleomorphic adenoma showing *curtain sign*



Typical parotid swelling with ear lobe raised.

Facial nerve should be tested by clenching the teeth.

Complications

- Recurrence—5-50%.
- Malignancy: 3-5% in early tumours, 10% in long duration (15 or more years) tumours.

Investigations

- FNAC is very important and diagnostic.
- CT scan to know the status of deep lobe, local extension and spread.
- MRI is better method.

Note:

Incision biopsy of parotid tumour is contraindicated as chances of *seedling* and *recurrence* are high and also there is a chance of *injuring the facial nerve*, and chance of developing *parotid fistula* while doing the biopsy.

Treatment

- ✓ Surgery—first line treatment.
- ✓ If only superficial lobe is involved, then superficial parotidectomy is done wherein parotid superficial to facial nerve is removed.
- ✓ If both lobes are involved, then total conservative parotidectomy is done by retaining facial nerve.

Note:

- Enucleation is avoided as it causes high recurrence due to extension of *tumour outside as pseudopods* across the capsule.
- Incomplete excision, 10% of tumours which are highly cellular are other causes for recurrence.
- RT is given after surgery even though it is benign.
- Inexplicable metastasis can occur even though it is benign.
- Tumour may implant due to spillage while surgical removal into retained residual parotid (deep lobe in superficial parotidectomy).

Recurrence after parotidectomy in pleomorphic adenoma is 5%. It is due to spillage, improper technique, inadequate margin, retained pseudopods, multicentricity. Recurrent tumour is multinodular without any capsule. *Expression of MUC1/DF3* in the tumour is marker to predict recurrence.