

Management of a Palpable Parotid Lump- A Narrative Review

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Abstract

Background: Preoperative clinical assessment that includes clinical, radiological and cytological assessment can accurately distinguish benign from malignant diseases of the parotid gland in 90% of cases. Ultrasound can visualise superficial lesions with main advantages being, it is quick and readily available, relatively cheap and non-invasive. But some recognised limitations such as operator dependent and difficulty in evaluating the deep lobe as it is obscured by the ramus of the mandible. MRI is used for local and regional assessment and CT for thoracic staging. High frequency modern ultrasound (US) maybe used to guide fine needle aspiration cytology (FNAC) with high levels of diagnostic accuracy and safety. FNAC alone can distinguish benign from malignant salivary gland neoplasm with a precision range of 81-98% with sensitivity of 64 to 100% and specificity of 85 to 100%. Despite this fact, it can misinterpret the diagnosis of malignant tumours. The previously practised surgical

treatment by enucleation was associated with recurrence rates of 10-35%, but the current techniques have reduced the recurrence rate of 0-2.5%. Even after surgical resection, around 43% of patients are at risk of recurrence even till 45 years after their initial surgery. The main problem in surgery for recurrent tumour is the increased rate of injury to the facial nerve as there is a risk of 15-29% after second and subsequent surgeries compared to less than 2.5% at primary surgery. Pleomorphic adenomas and Warthin tumours are benign tumours and the most common parotid tumours. Cytology has the most important role to play in the management of parotid tumours among the three diagnostic modalities.

Keywords: Pleomorphic adenoma, Warthin tumour, Ultrasonography, FNAC, Superficial parotidectomy.

Introduction

Salivary gland neoplasms accounts for 0.5% of all malignancies. The incidence of Salivary gland tumour is

0.4-13.5 per 100,000 and 0.4-2.6 per 100,000 for the malignant variety¹.

There are numerous salivary glands present in our maxillofacial region, where the parotid gland being one of the major salivary gland located in the pre-auricular region. The parotid gland consists of superficial as well as the deep lobe, demarcated by the intervening facial nerve.

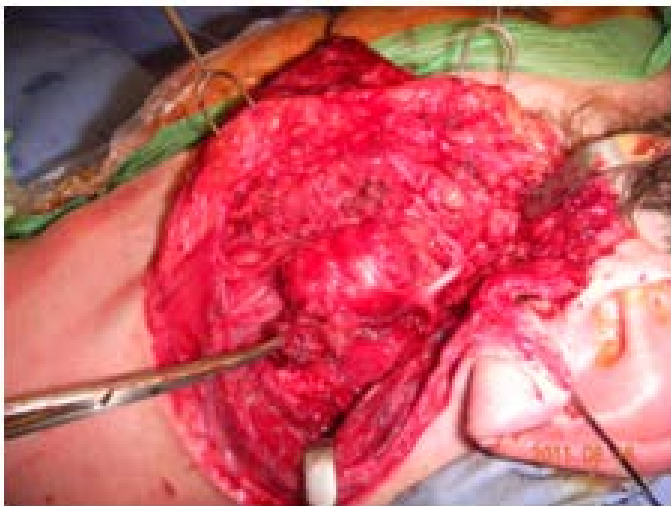


Figure 1: Operative finding of deep lobe tumour and difficulty in dissecting facial nerve. (Source: Sunil Kumar Sah, Consultant Oral and Maxillofacial Surgeon, Pinderfields Hospital, Wakefield)

Though the clear-cut aetiology for the salivary gland tumours is not characterized, there are numerous risk factors which have been put forward. Deficiency of Vitamin A and Vitamin C, young patients with histologically defined benign pathology of the salivary gland or irradiation have been associated with the occurrence of malignant salivary gland tumours².

The lesion within the parotid gland can present themselves in a varied number of ways and constitute the diagnostic as well as the treatment challenges to the clinician.

To differentiate the benign lesion of the parotid gland from its malignant counterpart, the clinical examination only, is not sufficient. Hence it is important to take into account the radiological (CT, MRI, USG) as well as

cytological (FNAC) investigation too, to come to an appropriate diagnosis³.

Fine-needle aspiration cytology (FNAC) is considered to be a gold standard in distinguishing the benign and the malignant parotid tumours. There are various advantages associated with FNAC i.e. it is economical, not a technique sensitive procedure and is well tolerated by patients. Compared with the histopathological diagnosis, FNAC has a specificity of 98%, a sensitivity of 84% and a diagnosis accuracy of 94%⁴.

Imaging of the parotid tumour

The advent of modern imaging techniques has improved the accuracy in preoperative diagnosis. Accurate imaging can be used to define the primary lesion and detect distant metastasis as well as differentiate between a benign and malignant tumour. This should allow the surgeon to plan for surgery in a more rational way and counsel the patient on the most appropriate management.

Ultrasonography (US): Some authorities recommend ultrasound as the first line investigation for any mass within the salivary glands. In the diagnosis of parotid lump, 5-10 MHz frequency is employed to visualise a superficial lesion. The images are seen as a high frequency sound wave into the sonographer's monitor in real time during the examination^{5,6}.

The main advantages of ultrasound for the evaluation of salivary lumps are that it is quick, readily available, relatively cheap and non invasive⁷.

However, Ultrasound has some recognised limitations: it is operator-dependent, and the deep lobe is difficult to evaluate because it is obscured by the ramus of the mandible⁸. For patients with confirmed malignancy, MRI is often used for local and regional assessment and CT for thoracic staging. Ultrasound can often differentiate between benign and malignant tumours and may distinguish between glandular and extra glandular masses

(such as those in the tail of the parotid and that in level II of the neck) with accuracy of up to 90%⁹.

Pleomorphic adenoma: On ultrasound examination, a pleomorphic adenoma typically appears as a solid, rounded, well circumscribed, homogeneous, hypoechoic lesion with low vascularity. It may have a lobulated border with acoustic enhancement. In addition, it may present as multiple adjacent daughter lesion¹⁰.

Warthin's tumour: Typically appears as a heterogeneous, uni- or multi-focal cystic or solid area with posterior acoustic enhancement. It may appear as a rounded or lobulated with internal cystic change. It is most commonly found in the tail of the parotid gland. It might be multiple¹¹ or bilateral in 10-15% of cases¹².

Malignant tumour: Ultrasound features of a malignancy appear as heterogeneous, hypoechoic and with a poorly defined margin. It may also be present as shadowing with digital acoustic enhancement. The use of ultrasound with Doppler provides information about increased or disorganised pattern of blood flow in malignant tumour¹³. A low grade lesion may appear with a homogeneous internal architecture, hypoechoic and with well-defined margin. On the other hand, a high grade aggressive lesion may appear with a heterogeneous, ecotexture and with an ill-defined margin.

MRI / CT: MRI is more expensive than CT but has several advantages. MRI does not use ionizing radiation and the images can be acquired in any plane. The soft tissue contrast is superior to CT due to the choice of pulse sequencing; contrast agents are not always required. However, slow acquisition times in MRI may lead to significant artefacts due to patient movement or swallowing¹⁴. If nerve infiltration is suspected, it is reasonable to consider evaluation by MRI. Cross-sectional imaging using CT or MRI is a powerful evaluation tool.

Pleomorphic adenoma: Using CT imaging a pleomorphic adenoma generally appears well circumscribed with homogeneous enhancement. Following administration of contrast medium, dystrophic internal calcification can be seen. MRI has a great advantage over CT scanning, due to its multiplanar capacity and advanced spatial resolution. A pleomorphic adenoma appears too homogeneous and heterogeneous with low signal intensity on T1 weighting and high signal intensity on T2 weighting, which is related to myxoid component within tumour. Large tumours may appear as heterogeneous and have an ill-defined margin. On T2 weighting, pleomorphic adenomas shows homogeneous enhancement after the administration of contrast medium^{15,16}.

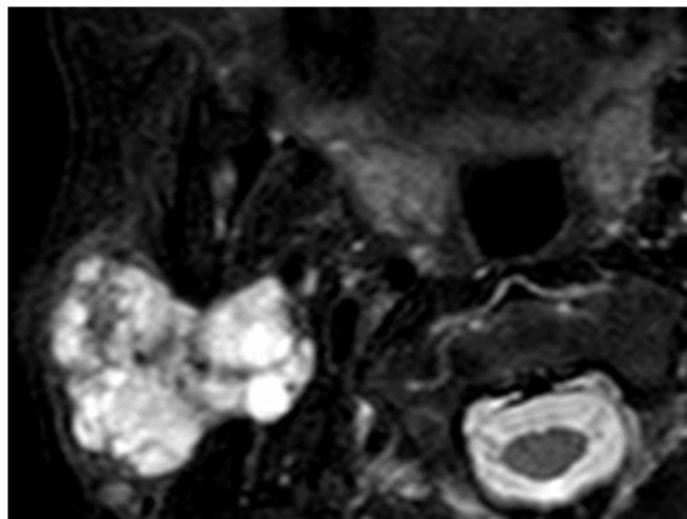


Figure 2: MRI image of superficial and deep lobe parotid tumour. (Source: Sunil Kumar Sah, Consultant Oral and Maxillofacial Surgeon, Pinderfields Hospital, Wakefield)

Warthin's tumour: Warthin's tumour appears as heterogeneous, with intermediate signal on T1 weighting and hyper intensive on T2 weighting. There is usually lack of enhancement following administration of intravenous gadolinium – DTPA, which can be helpful to differentiate from pleomorphic adenoma¹⁰.

Malignant tumour: A malignant tumour on CT/MRI scan usually appears as a poorly defined, heterogenous enhancing mass. There is a variable enhancement on CT and MRI. Even a high grade lesion may appear with low signal intensity with T1 and T2 weighting¹⁶.

Nuclear medicine: Traditionally, technetium pertechnetate has been used to help in the diagnosis of Warthin's tumour and oncocytomas¹⁷. Positron emission tomography (PET) using fluoro-2-deoxy-D-glucose has been used successfully in evaluating tumours of the head and neck¹⁷.

Fine-needle aspiration cytology (FNAC)

Cytological features of a parotid tumour have been well described and are highly reproducible in the most cases. If these strict criteria are followed then most of the cases can be diagnosed with a high level of accuracy.

The choice is a 21- 23-gauge hypodermic needle (0.6-0.8 mm in diameter), coupled with a 10- or 20-ml disposable syringe using gentle constant suction by a 'braced thumb' technique^{18,19}. This method is preferred to the syringe pistol invented by Franzen in 1960²⁰. However, most head and neck units use a capillary pressure system for the FNAC. The aspirate is rapidly air-dried, methanol fixated, and stained with Giesma alone or with May-Grunwald Giemsa. Wet fixation and Papanicolaou staining is also possible²¹.

The puncture must be performed gently, and the number of 'needle passes' recommended varies from one to five²². FNAC is simple to perform but a technically demanding procedure. It has to be learned and regularly performed in order to ensure adequate smears.

Pleomorphic adenoma: Pleomorphic adenoma is the most common benign parotid tumour. It typically presents as an asymptomatic, slow growing lump in middle aged patients. It is thought to originate from myoepithelial cells. A pleomorphic adenoma can be easily diagnosed

cytologically due to the characteristic condromyxoid background with biphasic pattern of epithelial-myoeepithelial cells. The stromal component is lacking in a typical pleomorphic adenoma. So, the stromal component is not always helpful in diagnosing pleomorphic adenoma cytologically. It can also present with keratin-filled cyst with squamous differentiation²³.

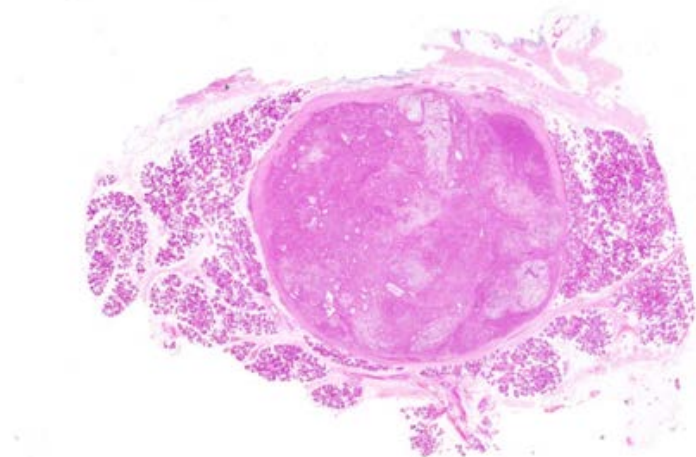


Figure 3: Focal pale myxoid areas of tumour, Peripheral pink capsule, Foci of early capsular herniation/budding. (Source: Sunil Kumar Sah, Consultant Oral and Maxillofacial Surgeon, Pinderfields Hospital, Wakefield).

Warthin's tumour: Warthin's tumour is the second most common benign parotid tumour. It is male dominant and largely seen in an older age group when compared to pleomorphic adenoma. It arises from heterotropic parotid lymphatic tissue. It presents as a slow growing lump within the superficial lobe of the parotid gland. Warthin's tumour shows typical cytology by the presence of oncocytic epithelial cells in a monolayer sheet with small lymphocytes in the background²¹. In general, it contains amorphous cystic fluid. Similarly, it has been seen that oncocytic carcinoma can be cystic^{24,25}.

Malignant tumour: In the case of a malignant tumour, mucoepidermoid carcinoma is the most common parotid gland tumour. These tumours typically present as slow growing masses in middle age patients. The cytological

features depend upon the histological grade of tumour. Mucoepidermoid carcinoma may be cystic with mucoid background with intermediate and mucus containing cells. In a few cases, the more complex branching pattern of epithelial cluster may be the key finding to differentiate mucoepidermoid carcinoma. The mucous containing cells are columnar to cuboidal shape with abundant cytoplasm, which can be confirmed by special stain to establish the correct diagnosis. Metaplastic epithelial changes in the cytology with absence of lymphoid background will favour low-grade mucoepidermoid carcinoma. The second most common type is adenoid cystic carcinoma, which has a tendency for perineural and perivascular invasion²⁶.

Lymphoma of the parotid gland is rare and usually presents as a part of haematological malignancy or in patients with long standing Sjogren's syndrome.

The opinion of National Institute of Clinical Excellence (NICE)

The recommendation from National Institute of Clinical Excellence (NICE) for the establishment of head and neck lump clinics should be similar to one-stop breast diagnosis clinics. It was recommended that experienced consultant cytologist be present within the clinic to provide Fine Needle Aspiration Cytology (FNAC) to determine the diagnosis of the lump²⁷. The provision of alternate models of diagnostic clinics may offer equally or more effective patient care than their stipulated 'one-stop' surgeon and pathologist model²⁸.

Recurrence of parotid tumour

Pleomorphic adenoma is the most common salivary gland neoplasm and comprises about 70%-80% of all parotid gland tumours²⁹. It is solitary and usually benign. Multiple or bilateral pleomorphic adenomas are rare³⁰. The probability of malignant transformation ranges from 2% to 24 %^{31,32}. Until 1950, treatment by enucleation was associated with recurrence rates of 10% to 35%, but

current surgical techniques have markedly reduced this to 0% to 2.5 %^{33,34}. Inappropriate treatment and management may be responsible for the recurrence of tumour, with women being affected more often than men³². If it re-occurs it often has multiple lesions in 73.3% of patients. The incidence of local recurrence is 5-50 %, depending on the type and the adequacy of treatment^{33,34}. Recurrent tumours grow very slowly and may not be apparent until 10 to 20 years later³⁵. Findings show that recurrent pleomorphic adenomas are most likely to occur as multiple lesions. Such characteristics of the lesion are a reliable diagnostic indicator of recurrent disease³⁶. Even after surgical resection, up to 43% of patients are at risk for recurrence, even as late as 45 years after their initial surgery³⁷.

The factor that contributes to recurrence is the distinctive histological characteristic of pleomorphic adenomas. These tumours lack a true capsule³⁸ and have small protrusions, pseudopodia, which extend beyond the central tumour mass³³. Other hypotheses to explain recurrence include a multicentric origin of the tumour, accidental tumour rupture, and the type of excisional surgical procedure³⁹.

The parenchymal to stromal ratio differs, and hence parenchyma-rich and stroma-rich variants have been recognized. It is not determined whether the capsule is newly proliferated or reflects pre-existing connective tissue compressed by the growing tumour. Morphologically, the capsule consists of variably thick, dense, fibrous tissue that may be irregular or absent or become invaded and even being invaded by a tumour (Figs. 3). Accumulation of myxoid stroma in the subcapsule is a common feature of parotid pleomorphic adenoma³⁹.

Surgery for recurrent tumour is difficult due to the proximity of the facial nerve. The rate of injury to the

facial nerve shows a drastic increase from less than 2.5% at primary surgery to as high as 15-29% after second and subsequent surgeries³⁹. The facial nerve is frequently found embedded in scar tissue at the time of surgery thus increasing the risk of damage.

Strategy for Management of parotid Tumour

The possibility of a false negative diagnosis of parotid tumour following FNA cytology is the basis for a surgical excision⁴⁰. The alternative management is a conservative approach with strict follow up⁴¹. This option is clearly appealing to the patient, since it avoids risks of the procedure such as permanent facial nerve palsy. Despite the high specificity of US guided cytology, it can underestimate the diagnosis of malignant tumours, and this remains a significant risk in the balance of therapeutic options⁴¹.

Discussion

If a parotid tumour is suspected, and this is usually seen as a slowly enlarging mass, its management is essentially surgery. The unknown tumour is most likely, statistically speaking, to be a pleomorphic adenoma. Undoubtedly, the history, examination, imaging and fine-needle aspiration cytological examination are aids to produce an accurate diagnosis.

To diagnose the parotid lump Ultrasound guided FNAC proved to be an excellent tool but being practiced at few specialized centers with the special interest in the neck and neck tumours. The limitations of cytological diagnosis of lymphoma can be improved by using special cytological techniques such as flow cytometry⁴² and immunocytochemistry⁴³, which includes fluorescence in-situ hybridisation (FISH) and polymerase chain reaction (PCR).

The theoretical risk of seeding⁴⁴ has been now discredited as the overwhelming evidence indicates that FNAC is an oncologically safe procedure⁴⁵. Improved results are

obtained if aspirations are performed by the cytologist directly⁴⁶.

Ultrasound is an operator-dependent technique⁴⁷, though in our study all cases were seen by a consultant radiologist with a subspecialty interest in head and neck imaging. When these results are compared with the available literature it shows that our results correlated with other studies⁴⁷. A study conducted by Yang et al. found that sensitivity, specificity for ultrasound was 97%, and 85%, respectively⁴⁷.

Few authors suggested that patients with benign tumour of the parotid gland confined to the superficial lobe, does not need any additional imaging modalities like CT or MRI as the Ultrasonography itself is sufficient for the diagnosis and treatment plan⁹.

However in few cases pre-operative MRI is advised so that any second tumour if present, does not goes missing and also in cases where the extracapsular dissection is planned for.

Despite the advantages of imaging techniques, the diagnosis of salivary gland disease often rests upon a tissue diagnosis. However, in the major salivary glands, it is difficult to obtain an accurate preoperative histological result. The role of large-core needle biopsy, or open biopsy is controversial⁴⁸.

For the cytologists the FNAC is considered to be an appropriate tool but it can give disappointing results if carried out by the less experienced clinician. The two main sources of error are; the lack of representative sample and the variable cytological appearance of parotid tumour²⁵. Various other factors that contribute to the error include failure to obtain insufficient material due to haemorrhage, necrotic tissue and poor cellularity⁴⁹.

Characteristic cytology appearance of cellular debris mixed with lymphocytes and oncocytes is often seen, however, there may be a predominance of the lymphoid

component, squamous cells and necrotic debris¹⁸. This can cause a significant diagnostic challenge. Squamous cells in particular are seen in squamous cell carcinoma and mucoepidermoid carcinoma, and demonstrate the malignant types of pathology which display a similar cytological appearance to Warthin's tumour¹⁸. Therefore, the sensitivity of FNA cytology to detect malignant tumours is low and it is debatable whether the decision of surgery should be based solely on the results of cytology. The sensitivity, specificity and diagnostic accuracy in diagnosing parotid tumour has been reported as about 80-95%⁴³, or in wider studies, ranging from 74-100%⁴³.

The excisional biopsy is done by either partial or complete removal of the gland however it rarely done pre-operatively. In cases where malignancy is suspected the intra-operative frozen section can be done.

These results suggest that the capsule characteristics and myxoid histological subtype may be one of the causes of postoperative recurrence of pleomorphic adenomas. MRI is considered to be the best tool to delineate the extension of the lesion and capsule characteristics, although it can miss microscopic nodules¹⁴.

Recent results suggest that recurrence after extra-capsular dissection/partial superficial parotidectomy⁴⁹ is not higher when compared with superficial or total parotidectomy. Nevertheless, many specialists remain convinced that superficial parotidectomy is the minimum surgical technique for pleomorphic adenoma⁴⁹.

Conclusion

Most parotid lumps are benign and are comprised primarily of pleomorphic adenomas and Warthin's tumours. Ultrasound scanning is a valuable adjunct to clinical examination and should be combined with needle biopsy for most patients to maximise diagnostic yield. It is observed that among the three diagnostic modalities, cytology has an important role to play in the management

of a parotid tumour. Despite the advances and advantages of imaging techniques, the diagnosis of salivary gland diseases can only be confirmed unequivocally with a tissue diagnosis.

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