

# Evaluation Of Salivary Gland Lesions By Fine Needle Aspiration Cytology

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## ABSTRACT

Salivary gland tumors accounts for 2-6. 5% of all head and neck neoplasms. There are various inflammatory lesions, benign and malignant neoplasms in the salivary gland which can present as palpable lump. Various tools are available for the diagnosis of salivary gland lesion for confirmation of diagnosis but fine needle aspiration cytology (FNAC) is now days considered the simplest method. Fine needle aspiration cytology is one of the initial and most useful diagnostic methods, and is being increasingly used for evaluating suspicious salivary gland lesions for the appropriate therapeutic management.

## INTRODUCTION

The salivary gland (SG) comprises of three pairs of major SGs (parotid, submandibular and sublingual glands) and many minor SGs are found throughout the submucosa of the oral mucosa which includes lips, gingiva, floor of the mouth, cheek, hard and soft palates, tongue, tonsillar areas and oropharynx. [1] Salivary gland swellings can result from an inflammatory process, cysts or tumors. [2]

Fine Needle Aspiration Cytology (FNAC) is a major diagnostic tool and is of great relevance in head and neck lesions, including major salivary glands. [1] The diagnostic accuracy of FNAC in salivary gland lesions is relatively high, and has been reported to be 84-98.3% in discrimination of benign from malignant lesions. [3-6] The role of FNAC in suspected salivary gland swellings is two folds. Firstly, to confirm the origin, as preauricular and submandibular lymph node swellings can mimic salivary gland neoplasm clinically, and secondly to get a preliminary diagnosis about the nature of the disease process before embarking on definite management plan. [7] Although salivary gland tumor accounts for 2-6. 5% of all head and neck tumor, their superficial location, easy accessibility and high diagnostic accuracy makes FNAC a popular method for evaluating salivary gland lesions. [8]

## HISTORICAL ASPECTS:

The first report on the use of needles for therapeutic

purposes can be found in Arab medicine, in the writings of Albucasis (936-1013). In 1847, Kun described an exploring needle incorporating a depression at the tip with cutting edge for extracting tissue from subcutaneous tumor. In 1883, Leydon used needle aspiration to obtain cells to isolate pneumonic microorganisms. [9] In 1904, Greig and Gary diagnosed Trypanosomiasis in cervical lymph node aspirates from patients with sleeping sickness in Uganda. A detailed and systemic study on FNAC was carried out in the late 1920s by Hayes Martin. [10] FNAC of the salivary glands was developed by Eneroth et al. between the 1950s. [3]

## NORMAL CYTOLOGY OF SALIVARY GLAND:

Normal aspirate from the salivary glands comprises of:

- Acinar cells (serous or mucinous)
- Ductal epithelial cells
- Scant fibrovascular stroma

Aspiration of normal or near-normal salivary glands usually yields only a small amount of epithelial cells. The normal structures are viewed as basically acinar cells in well-preserved cohesive ball-like formations and as ductal cells in monolayered sheets or small tubuli. [11]

## Intraparotid lymph nodes:

Clinically, a frequently encountered problem is the distinction between enlarged lymph nodes and sialomegaly, particularly in the case of the parotid glands. Due to late encapsulation in fetal life, small

lymph nodes are commonly enclosed within the parotid. It is not possible to distinguish between intraparotid lymphadenopathy and true salivary gland pathology reliably by palpation or imaging. [12]

#### **ECTOPIC SALIVARY GLANDS:**

Ectopic (heterotopic) salivary gland tissue is commonly found in periparotid lymph nodes, middle ear and lower neck, but can also occur in more remote regions. Either normal acinar cells or material indicating benign or malignant disease can be encountered, as any of the salivary gland disorders found in normally placed salivary gland tissue can develop. [12]

#### **PRINCIPLE LESIONS OF SALIVARY GLAND IDENTIFIED ON ASPIRATION CYTOLOGY: [13]**

##### **NON-NEOPLASTIC LESIONS:**

###### **A) Inflammatory reactive conditions:**

- Acute sialadenitis (AS)
- Chronic sialadenitis (CS)
- Granulomatous sialadenitis
- Necrotizing sialadenitis

###### **B) Benign inflammatory cystic lesion:**

- Mucocele
- Mucus retention cyst
- Lymphoepithelial cyst
- Sialadenosis (SA)

##### **NEOPLASTIC LESIONS:**

###### **C) Benign salivary gland tumors:**

- Pleomorphic adenoma (PA)
- Warthin's tumor (WT)
- Oncocytoma
- Monomorphic adenoma
- Myoepithelioma
- Basal cell adenoma (BCA)

###### **D) Malignant salivary gland tumors:**

- Mucoepidermoid carcinoma (MEC)
- Acinic cell carcinoma (ACC)
- Adenoid cystic carcinoma (AdCC)
- Undifferentiated carcinoma
- Ca ex pleomorphic adenoma (CaExPA)
- Epithelial-Myoepithelial carcinoma (EMCa)
- Poorly differentiated carcinoma

- Metastatic squamous cell carcinoma

**CYST:** Cystic lesions account for approximately 5% of salivary gland FNACs. [14] A systemic approach to the diagnosis of cystic salivary gland lesions by FNAC can result in a correct diagnosis in >70% of cases broadly categorized into non-neoplastic and neoplastic cysts. [15, 16]

##### **ACUTE AND CHRONIC SIALADENITIS:**

Acute sialadenitis is rarely aspirated because it is usually diagnosed clinically. There is usually no discrete mass, and most cases affect the parotid gland. However, Wax et al. has said that cytomegalovirus sialadenitis should be considered in the diagnosis of painless salivary gland enlargement in patients with acquired immunodeficiency syndrome. [17] Chronic sialadenitis is more likely to present as a clinically discrete mass, often in the submandibular gland. [18] Cystic changes with a variety of crystalloids may occasionally be encountered. [19]

##### **CHRONIC SCLEROSING SIALADENITIS OR KUTTNER TUMOR:**

A specific variant of chronic sialadenitis, usually produces a palpable mass clinically mimicking a neoplasm. FNAC can aid in differentiating it from a neoplasm. [20]

##### **PLEOMORPHIC ADENOMA:**

Pleomorphic adenoma is the most common benign mixed tumor comprising of 75% of all salivary gland tumors. [21] The most commonly encountered site is the superficial parotid followed by submandibular glands. It is also occasionally encountered in the nasal cavity, paranasal sinuses, upper respiratory tract and gastrointestinal tract. [22] PAs are benign tumors with a well-documented transformation to malignancy (carcinoma expleomorphic adenoma) in upto 25% of untreated PAs. Therefore, early definitive treatment is strongly recommended. [23]

##### **WARTHIN'S TUMOR:**

It is the second most common benign neoplasm and accounts for approximately 15%, and 5-6%. [24,25]

It occurs within the parotid and periparotid lymph nodes. [26]

**ONCOCYTOMA:**

It is a rare benign salivary gland neoplasm comprising 1-3% of all salivary gland tumors. Most occurs in the parotid glands, and the peak incidence is in the seventh to ninth decades; are rare in patients under 50 years of age. [27, 28]

**BASAL CELL ADENOMA:**

It occurs more frequently in the parotid gland and clinically is usually mistaken for pleomorphic adenoma and can exhibit a variety of histologic patterns: solid, tubular, trabecular, membranous, and mixed patterns. [29]

**MUCOEPIDERMOID CARCINOMA:**

It is the most common malignancy of the salivary gland malignancy of childhood and adulthood. Approximately half of the tumors occur in the major salivary glands, with about 45% of MECs occurring in the parotid gland. [30]

**ACINIC CELL CARCINOMA:**

ACCs comprises approximately 7-15% of all malignant salivary gland tumors; majority of them occurring in parotid gland (80%) and 13-17% involving minor salivary glands. [31]

**ADENOID CYSTIC CARCINOMA:**

It accounts for 3-5% of all salivary gland tumors and occurs in both the major and minor salivary glands. [32]  
It is the most common malignant tumor in minor salivary glands with neural invasion producing paralysis of motor nerves in about one third and pain in about one half of the patients. [33]

**SALIVARY DUCT CARCINOMA:**

It is an uncommon, clinically aggressive malignancy, most common in the parotid gland in elderly men. It resembles a high-grade, comedo type ductal carcinoma of breast, although a rare low-grade variant has been described. [34, 35]

**CARCINOMA EXPLEOMORPHIC ADENOMA:**  
This is an uncommon tumor said to occur in 3-4% of pleomorphic adenoma. [36]

**RARE MALIGNANT NEOPLASMS:** [18,19]

- Basal cell adenocarcinoma
- Epithelial-Myoepithelial carcinoma
- Lymphoepithelial carcinoma:
- Adenocarcinoma, not otherwise specified

**DIAGNOSTIC DILEMMAS IN SALIVARY GLAND FINE NEEDLE ASPIRATION:** [19]

- Basaloid neoplasms (specially basal cell adenoma, solid variant of adenoid cystic carcinoma and basal cell adenocarcinoma).
- Oncocytic lesions (specially Oncocytoma and Acinic cell carcinoma).
- Mucus-containing cysts (specially Mucoepidermoid carcinoma, Mucocele and Mucinous metaplasia).
- High-grade carcinomas (including Mucoepidermoid carcinoma, Salivary gland carcinoma, Carcinoma ex pleomorphic adenoma and salivary duct carcinoma).
- Clear cell neoplasm.
- Spindle cell lesions (specially Myoepithelioma and Schwannoma).

The presence of cystic change and bilateral nature can also help narrow down diagnostic possibilities.

**TUMORS THAT ARE OFTEN CYSTIC:**

- Warthin's tumor
- Mucoepidermoid carcinoma
- Acinic cell carcinoma

**LESIONS THAT ARE SOMETIMES BILATERAL:**

- Sialadenitis
- Lymphoepithelial cyst
- Warthin's tumor
- Acinic cell carcinoma
- Lymphoma

Attention to the constituents of an aspirate is the key to the neoplastic, inflammatory, lymphoid, or cystic nature of a lesion:

- Hypercellular specimen are typical of neoplastic lesions.

- Inflammatory cells are prominent in sialadenitis and cystic lesions.
- Stone fragments are diagnostic of sialolithiasis.
- Abundant lymphoid cells can be seen in variety of salivary gland lesions.

#### NUMEROUS LYMPHOCYTES ARE SEEN IN:

- Intraparotid or periparotid lymph node
- Lymphoma
- Lymphoepithelial cyst
- Warthin's tumor
- Mucoepidermoid carcinoma
- Acinic cell carcinoma
- Lymphoepithelial carcinoma

The presence and character of matrix material provides important diagnostic information:

- Mucin suggests a mucoepidermoid carcinoma, mucocele, retention cyst, or mucinous metaplasia.
- Chondromyxoid matrix is characteristic of pleomorphic adenoma.
- Stromal spheres are typical of adenoid cystic carcinoma.

Hyaline globules are typical of adenoid cystic carcinoma. However, diagnostic dilemma occurs due to their frequent presence in other lesions like PA, BCA, EMCa etc. A close evaluation to epithelial morphology and other features helps in differentiating these lesions. But neither finding is entirely specific. Such findings, along with a more detailed impression of the cell type(s) seen (myoepithelial, duct-lining epithelial, basaloid, oncocytic, mucinous, squamous, acinic, sebaceous, and clear cells) enable one to refine the differential diagnosis.

A variety of crystalloids are seen in the salivary glands. [36,37] Importantly, none of them is specific for any particular salivary gland lesion or neoplasm.

- Tyrosine crystalloids are floret-shaped and often encountered in PAs, but they can be seen in other lesions, both benign and malignant. [38-40]
- Amylase crystalloids (non-tyrosine crystalloids) are polygonal, plate-like, or needle shaped and are most often seen in benign, non-neoplastic conditions, specially infections and cysts. [41-43]

#### CONCLUSION

The assessment of patients with salivary gland lesions includes clinical examination and investigations like FNAC and imaging. FNAC of the salivary gland is now an established, accurate and highly reliable procedure for the evaluation of the salivary gland lesions. It has significant diagnostic value in differentiating neoplastic from non-neoplastic lesions and offer valuable information for planning and subsequent management. However, limitations are encountered while predicting specific lesions on cytology, especially when dealing with cystic and some malignant lesions. Hence, it can be concluded that FNAC is a valuable technique which differentiates between benign and malignant lesions.

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