

Diagnostic Accuracy of FNAC in Malignant Salivary Gland Lesions - A Study with Histopathological Correlation

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ABSTRACT

BACKGROUND

Fine needle aspiration cytology (FNAC) is widely used as a single, safe and minimally invasive diagnostic modality in salivary gland lesions. However, the role of FNAC in the diagnosis of salivary gland lesions is still controversial because, correct tumour typing and the diagnostic accuracy has been dependent on the quality and yield of the aspirate, as well as the expertise of cytopathologist. We wanted to analyse the accuracy, sensitivity, and specificity of FNAC in the pre-operative diagnosis of malignant salivary gland lesions by comparing them with those of histopathologic sections.

METHODS

This is a diagnostic test evaluation conducted on 11 samples obtained from patients who had undergone pre-operative FNAC and diagnosed as malignant lesions followed by surgical procedure and histologic examination in Government Medical College, Thrissur, during the time period 1/1/2013 to 30/6/2015.

RESULTS

Among the malignant neoplasms diagnosed on cytopathology, out of 4 cases of acinic cell carcinoma only 3 were confirmed by histopathology and one was found to be chronic sialadenosis. So, this case was a false positive. The two cases of adenoid cystic carcinoma and two out of three mucoepidermoid carcinoma were confirmed by histopathology. Two cases of poorly differentiated carcinoma and one out of 3 cases of mucoepidermoid carcinoma were salivary duct carcinomas.

CONCLUSIONS

FNAC is a safe, cost effective, accurate, sensitive, and specific technique in the initial evaluation of head and neck lesions. It can be done on an outpatient basis and offers a simple method of diagnosis of neoplastic and non-neoplastic lesions of salivary gland.

KEY WORDS

Salivary Gland, Fine Needle Aspiration Cytology, Malignant Tumours, Acinic Cell Carcinoma, Mucoepidermoid Carcinoma, Salivary Duct Carcinoma.

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BACKGROUND

Fine Needle Aspiration Cytology (FNAC) is widely used as a single, safe and minimally invasive diagnostic modality in salivary glandular lesions.¹ The cytologic features of salivary gland lesions are relatively well defined and the diagnostic accuracy of FNAC of salivary gland lesions is relatively high and has been reported to be 87-100% in discrimination of benign from malignant lesions.^{2,3} However the role of FNAC in the diagnosis of salivary gland lesions is still controversial because correct tumour typing and the diagnostic accuracy has been dependent on the quality and yield of the aspirate, as well as the expertise of the cytopathologist. FNAC of salivary gland lesions is of clinical value that it can provide a pre-operative diagnosis of a benign versus malignant neoplasm and in many cases also of the specific tumour type. If the diagnosis is of a non-neoplastic lesion, surgical intervention can be avoided. If the diagnosis is of a benign neoplasm, surgery can be avoided in the elderly patients or others who are at poor surgical risks.⁴ There are limitations in the FNA diagnosis of salivary gland lesions due to sampling problems. Most false negative diagnoses relate to cystic tumours-Warthin's tumour, mucoepidermoid carcinoma and occasionally pleomorphic adenoma, in which the sample is only cyst contents.⁵ Mucoepidermoid and other carcinomas associated with focal inflammation and mucus retention may be mis diagnosed on cytology as sialadenitis or cystic lesions. False positive diagnosis has mainly been related to the misinterpretation of squamous metaplasia and atypia associated with sialadenitis, Warthin's tumour, or cellular pleomorphic adenoma, as evidence of malignancy.⁶ The present study is designed to compare the cytologic findings of malignant salivary gland lesions with the histologic diagnosis, in order to assess the sensitivity, specificity and diagnostic accuracy of FNAC, with emphasis on discordant cases.

Objectives

To analyse the accuracy, sensitivity and specificity of FNAC in the pre-operative diagnosis of salivary gland lesions by comparing it with the histopathologic sections.

METHODS

We evaluated the diagnostic tests among 11 patients over a period of 18 months. Sample size has been calculated on the basis of the sensitivity obtained by the previous studies done on the topic.

Study Population

All patients who underwent pre-operative FNAC and diagnosed as malignant lesions, followed by surgical procedure and histologic examination in Government Medical college Thrissur during time period 1/1/2013 to 30/6/2015.

Inclusion Criteria

All patients who underwent pre-operative FNAC and diagnosed as malignant lesions followed by surgical procedure and histologic examination in Government Medical college Thrissur during time period 1/1/2013 to 30/6/2015. Both male and female patients of all age group included both direct and ultrasound guided FNAC included Stains used- Papanicolaou stain and MGG for cytology slides and haematoxylin and eosin staining for histopathology slides and special stains when needed.

Exclusion Criteria

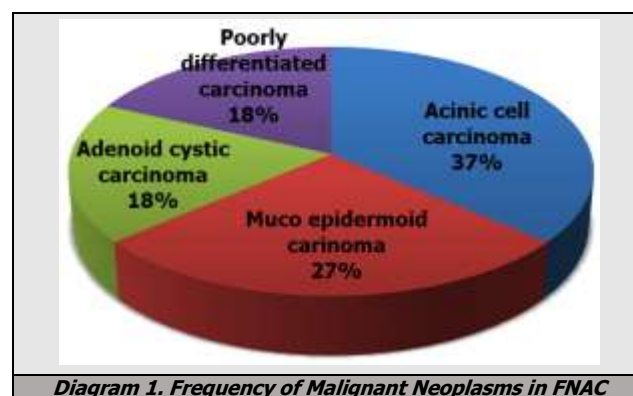
Patients with recurrent lesions and patients who did not undergo surgical excision.

Tools and Techniques of Data Collection

The data of patients who came in 2013 was collected from the records. The patients who came in 2014 and 2015 is being collected directly from the cytology department and followed. The study included patients who underwent preoperative FNAC followed by surgical procedure and histologic examination. The histologic diagnosis is considered as the gold standard. FNAC diagnosis is compared with the final histologic impression and concordance assessed. Sensitivity, specificity and diagnostic accuracy of FNAC for malignant salivary gland lesions are calculated.

RESULTS

A total of 11 malignant salivary gland lesions were observed in the present study. The age range varied from 30 to 77. Majority occurred in 7th decade. The present study included 9 male patients and 2 female patients with overall male predominance, male: female ratio being 4.5:1. Among the malignant neoplasms, 4 cases (37%) were of acinic cell carcinoma, 3 cases (27%) of mucoepidermoid carcinoma, 2 cases (18%) of adenoid cystic carcinoma and 2 cases (18%) of poorly differentiated carcinoma.



Majority of the malignant neoplasms occurred in the submandibular gland (54.5%) followed by parotid gland (36.4%) and sublingual gland (9.1%). Out of 4 cases of acinic cell carcinoma, 2 cases (50%) occurred in parotid gland and 2 cases (50%) in submandibular gland. All the three (100%) cases of mucoepidermoid carcinoma occurred in the submandibular gland. Out of 2 cases of adenoid cystic carcinoma, one case (50%) occurred in submandibular gland and one case (50%) in sublingual salivary gland. All two (100%) cases of poorly differentiated carcinoma were reported in parotid gland. Among the malignant neoplasms diagnosed on cytopathology, out of 4 cases of acinic cell carcinoma only 3 were confirmed by histopathology and one was found to be chronic sialadenosis. So, this case was proved to be false positive. The two cases of adenoid cystic carcinoma and two out of three mucoepidermoid carcinoma were confirmed by histopathology. Two cases of poorly differentiated carcinoma and one out of 3 cases of mucoepidermoid carcinoma were proved to be salivary duct carcinoma.

Cytology	Histology		Total
	Malignant	Others	
Malignant	10 (TP)	1 (FP)	11
Total	10	1	11

Table 1. Cytohistopathological Correlation for Malignant Salivary Gland Lesions

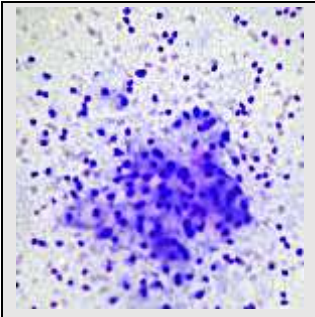
p value <0.001

The sensitivity and specificity of FNA diagnosis of malignant salivary gland lesions in present study was 83.3% and 97.7% respectively. Positive predictive value was 90.9% and negative predictive value was 95.6%.

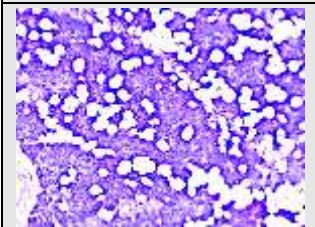
DISCUSSION

The present study was conducted from January 2014 to June 2015 at the Department of Pathology, Government Medical College Thrissur. The maximum incidence of malignant salivary gland lesions was observed in 7th decade of life for all lesions considered together. The male predominance (81.8%), observed in the present study is similar to that reported by other studies.^{7,8,9} Submandibular gland is most frequently involved in present study (54.5%), followed by parotid (36.4%) and sublingual salivary glands (9.1%).^{7,8,10}

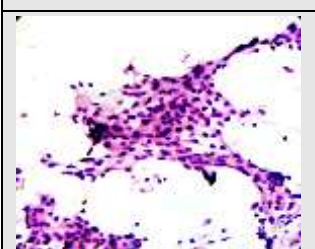
The smears from acinic cell carcinoma showed abundant cell material with a clean background with cells mainly in clusters and micro acinar groupings. Individual cells had abundant, fragile, finely vacuolated, occasionally dense oncocyte-like cytoplasm, and rounded, medium-sized nuclei, bland chromatin, Background showed many stripped nuclei. Three out of four cases of acinic cell carcinoma were confirmed by histopathology. One of the cases diagnosed as well differentiated acinic cell carcinoma on cytology turned out to be chronic sialadenosis on histopathology. The patient had a hard swelling and the smears were cellular with acinar cells arranged in clusters and in micro acinar pattern. Background showed many stripped nuclei. Ductal epithelial



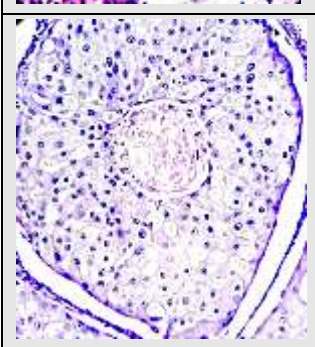
Picture 1. (400X, Giemsa): Cytology Smear Showing Acinar Cell Clusters and Scattered Bare Nuclei. Diagnosis Given was Well Differentiated Acinic Cell Carcinoma



Picture 2. H & E (100X) of the Same Case Showing Chronic Sialadenosis



Picture 3. Cytology Smear Showing Sheets of Squamoid Cells. Report Given was Mucoepidermoid Carcinoma (100X). Pap



Picture 4. Gross and H&E (400X) of the Same Case Showing Salivary Duct Carcinoma

cells were absent. In view of increased cellularity, a diagnosis of well differentiated acinic cell carcinoma was given and advised excision. On histopathology it turned out to be a case of chronic sialadenosis. According Orell et al¹¹ FNB of sialadenosis yields plenty of acinar epithelial cells, which appear normal or slightly increased in size. The smears from Mucoepidermoid Carcinoma showed variable cytomorphology according to grade of tumour. The low-grade tumours showed mucous secreting cells in few groups and dispersed singly with finely vacuolated cytoplasm. Few small clusters of and dispersed cells with 'squamous differentiation' were also seen. The cells showed bland nuclei. The high-grade tumours showed definite features of malignancy like nuclear pleomorphism, hyperchromasia and more obvious squamous differentiation. Smears from all the cases showed dirty background of mucus, and debris. Two out of three cases of mucoepidermoid carcinoma were confirmed by histopathology and one turned out to be salivary duct carcinoma. At the time of FNAC, a diagnosis of salivary duct carcinoma is very rarely made. The differential diagnosis offered are high-grade mucoepidermoid carcinoma, adenocarcinoma not otherwise specified (ADC-NOS), oncocytic neoplasms, Warthin's tumour (WT) with

nuclear atypia and acinic cell carcinoma.^{12,13,14} Confusion with high-grade mucoepidermoid carcinoma may arise due to the possibility of finding cells with dense and vacuolated cytoplasm resembling squamoid and mucous cells.^{12,13,14}

The smears from adenoid cystic carcinoma showed abundant cellular material with basaloid cells arranged in clusters and scatter singly. Hyaline globules and characteristic cup shaped fragments were seen. Background showed numerous stripped nuclei. All the two cases of adenoid cystic carcinoma were confirmed by histopathology. Smears from poorly differentiated carcinoma showed sheets and clusters of highly pleomorphic cells with scant to moderate cytoplasm and hyperchromatic to vesicular nuclei with nucleoli. Both the cases of poorly differentiated carcinoma were diagnosed as salivary duct carcinoma on histopathology. There have been several reports describing the cytologic features of salivary duct carcinoma; however, accurate diagnosis by FNAC can still be difficult due to its nonspecific, high-grade nuclear features.^{12,13,14} The cytologic features of ADC-NOS may be indistinguishable from salivary duct carcinoma.¹² Cytology of Salivary duct carcinoma shows many three-dimensional clusters, higher nuclear cytoplasmic ratio, and less granular cytoplasm. So, overall in the present study there was one false positive case. The diagnostic accuracy was found to be 94.6%. The sensitivity and specificity of FNA diagnosis of malignant salivary gland lesions in present study was 83.3% and 97.7% respectively which is comparable with other studies.^{15,16,17,18}

CONCLUSIONS

From this study it is concluded that FNAC is a safe, cost effective, accurate, sensitive and specific technique in the initial evaluation of head and neck lesions. It can be done on an outpatient basis and offers a simple method of diagnosis of neoplastic and non-neoplastic lesions of salivary gland. A correct cytological diagnosis can be achieved in a majority of cases, thus obviating the need for surgical intervention. A careful and diligent search for various cytological features and accurate sampling can help in reducing the number of indeterminate, false positive, and false negative diagnosis.

Financial or Other Competing Interests: None.

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