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Pitfalls in Salivary Gland Fine-Needle Aspiration Cytology

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Introduction: Fine needle aspiration cytology (FNAC) of salivary gland lesion is being increasingly used. Major salivary glands and some minor salivary glands are optimal targets for fine-needle aspiration (FNA). In some instances the final histology of these lesions differs from the FNA result.
Objective: To determine the diagnostic accuracy of FNAC in salivary gland lesions and identify the salivary gland FNA cases having discordant histological diagnosis so that most common diagnostic pitfalls can be avoided.
Material and Methods: In Pathology department, PIMS, 61 salivary gland FNAC cases from Jan 2008 to Sep 2009 were retrospectively reviewed to identify the cytological characteristics that may have contributed to this discrepancy.
Results: 31 were males and age ranges from 04-76 years (mean 38.84 ± 14). 25(43.1%) were diagnosed non-neoplastic, 31(55.1%) were rendered benign while 02 (3.44%) were malignant on cytology. Positive predictive value of FNAC was 100% and negative predictive value was 91.4%. 08 FNAC cases show discordant diagnosis in specific typing of the lesion. 6/8 cases were misdiagnosed as pleomorphic adenoma. The most common missed diagnosis was mucoepidermoid carcinoma.
Conclusion: Pleomorphic adenoma and mucoepidermoid carcinoma are common in occurrence and create problems in diagnosis. Experience cytopathologist should review all the cytology slides
Keywords: FNAC, histopathology, salivary glands lesions

Introduction

Fine needle aspiration cytology (FNAC) is being increasingly used in the diagnosis of salivary gland lesions. Major salivary glands and some minor salivary glands are easily accessible; therefore they are optimal targets for Fine Needle Aspiration (FNA). Different studies reveal high sensitivity and specificity of FNA with few pitfalls[1-3]. It has some edge over an incisional biopsy and frozen section. FNAC is a simple, quick, useful and reliable procedure. Wide sampling of the lump is possible. This procedure takes only 5-10 minutes and result could be available after 15-20 minutes. In majority of cases FNA is helpful in differentiating between benign and malignant lesions. However due to diverse morphological patterns and overlapping features between benign and malignant lesions, distinction between two is not very easy in every case. Thus at times it becomes very challenging and difficult to give precise diagnoses. The aim of the present study is to discuss pitfalls and problems in salivary gland lesions and try to find out possible solutions.

Material and Methods

This study was carried out on 60 FNAC cases of salivary gland in Pathology Department, PIMS. These patients underwent excision after FNAC. Data from Jan 2009 to Oct 2009 was collected and analyzed. Data was retrieved through Lab Management Information System (LMIS). Cases having discordant results on FNAC were reviewed by resident and consultant pathologists.

2-3 aspirates were obtained from palpable swelling through 23 gauge needle. These were immediately spread on glass slides and fixed with absolute alcohol. All slides were stained with H&E stain.

The lesions were divided into two groups Non-neoplastic and neoplastic lesions. The non-neoplastic lesions included acute sialadenitis, chronic sialadenitis, retention cyst, granulomatous sialadenitis, and non specific reactive changes.

The neoplastic lesions were divided into benign and malignant category. The benign lesions included pleomorphic adenoma, oncocytic adenoma, myoepithelioma and monomorphic adenoma. The malignant cases were mucoepidermoid carcinoma and squamous cell carcinoma.

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Results

The study group consisted of 31 males and 29 females, age ranges from 04-76 years (mean 38.84 ± 14). 25(43.1%) were diagnosed non-neoplastic, while 31(55.1%) were rendered benign while 02 (3.44%) were malignant on cytology. 2 FNA cases were inadequate due to sparse cellularity. Cytohistopathological correlation was available for 34 (58.6%) cases.

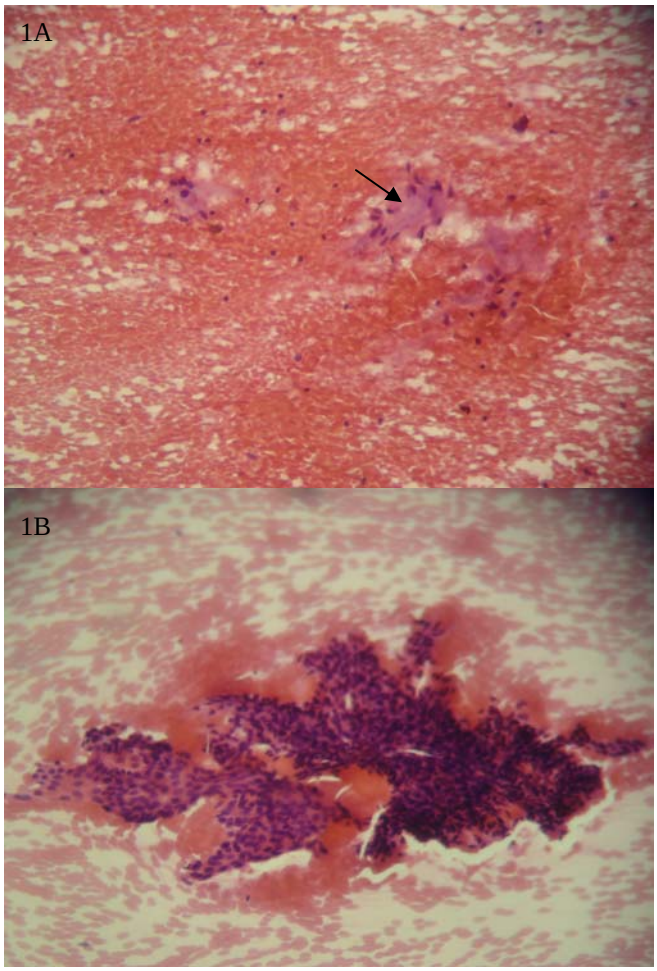

Figure 1 A & B shows FNAC of myoepithelioma misdiagnosed as pleomorphic adenoma on FNA. The mucinous material (arrow head) was interpreted as myxoid stroma of pleomorphic adenoma. (H&Ex10)

Out of 25 non-neoplastic lesions, histopathology of only 01 case was available to us, and the absence of neoplasm was histologically confirmed. Cytohistopathological correlation was available for all 33 neoplastic lesions. 31 cases were given as cytologically benign and out of these, 28 (90.3%) were confirmed as benign on histology, while 03 cases turned out as malignant on histology. 2 cases which were given as cytologically malignant were histologically confirmed (100%).

For neoplastic lesions positive correlation was present in 31 cases. Using histology as the "gold standard" Positive predictive value: 100%, Negative predictive value: 91.4% and Diagnostic efficacy: 91.8%

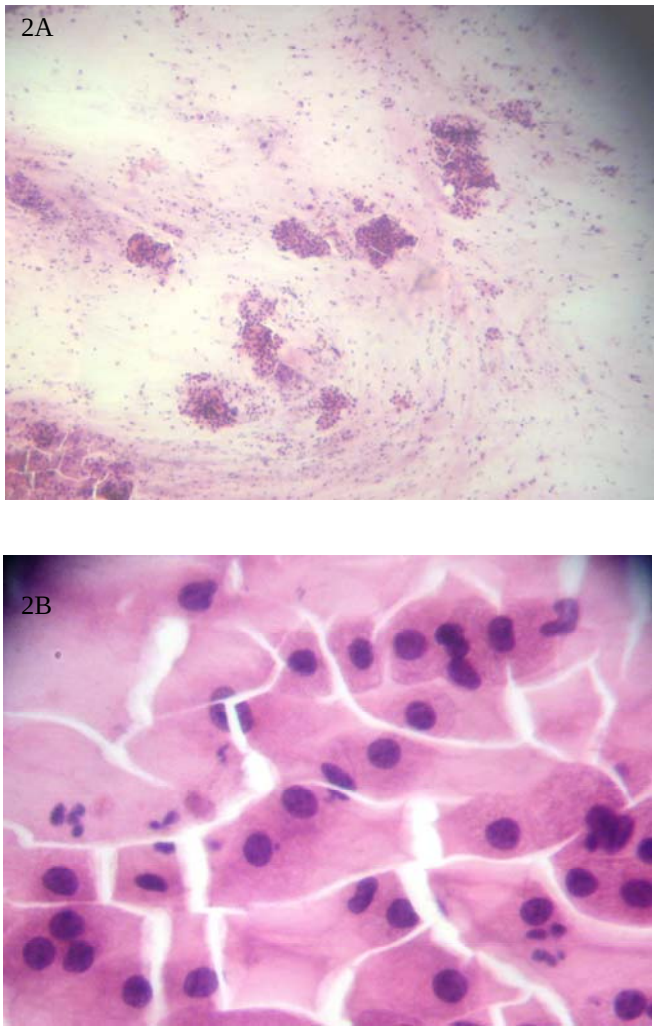

Figure 2 A & B shows a FNAC of mucoepidermoid carcinoma, which was incorrectly interpreted as Squamous cell carcinoma on FNA due to the presence of sheets of squamous cells and lack of intermediate and columnar cells (H&E x2,x40)

08 FNAC cases show discordant diagnosis in specific typing of the lesion (Table-1). Diagnosis of 1 malignant case on FNA was changed on histology, regarding its specific typing. While 03 cases remained benign on histology however tumor type was changed.

Summary of the discordant cases are as follows:

The case 01 was that of myoepithelioma which was incorrectly diagnosed as pleomorphic adenoma. The vascular matrix of the tumor was misinterpreted as myxoid stroma of pleomorphic adenoma. (Figure 01)

The case 02 was that of mucoepidermoid carcinoma incorrectly interpreted as Squamous cell carcinoma. FNAC may obtain predominantly squamous cell component and hence mimicked Squamous cell carcinoma. (Figure 02)

The case 03 was that of mucoepidermoid carcinoma incorrectly interpreted as oncocytic adenoma. Smears were hypocellular and had dense eosinophilic cytoplasm. The low cellularity of the smear had led to this erroneous benign diagnosis. (Figure 03)

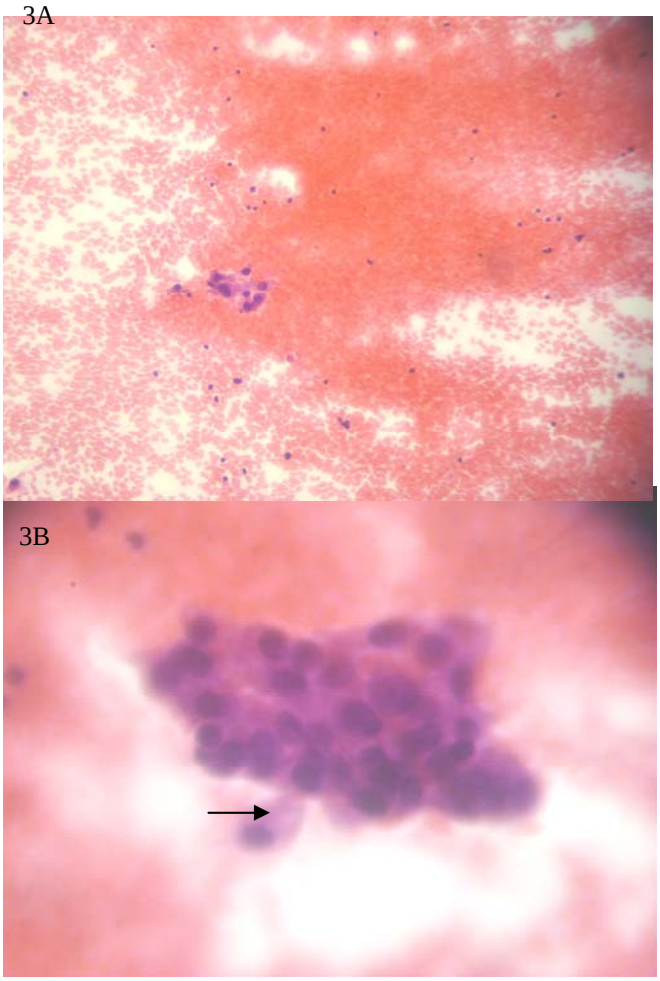

Figure 3 A & B shows a FNAC of mucoepidermoid carcinoma. This was misinterpreted as oncocytic adenoma due to hypocellularity of smear and dense eosinophilic cytoplasm of cells. Arrowhead points the cells with intracellular mucin which was initially missed. (H&E x2,x40)

4th case was of ameloblastoma misdiagnosed as adenoma. This patient was referred to us for FNAC of apparently looking salivary gland swelling. The smears show clusters of benign looking cells which were interpreted as benign ductal cells. However no myxoid stroma was found, so the diagnosis of adenoma was given, without considering the possibility of ameloblastoma. This highlights the importance of clinical and radiological correlation of every case. (Figure 04)

The case 05 was that of mucoepidermoid carcinoma incorrectly diagnosed as pleomorphic adenoma. On FNAC, it was moderately cellular with little atypia, cells were

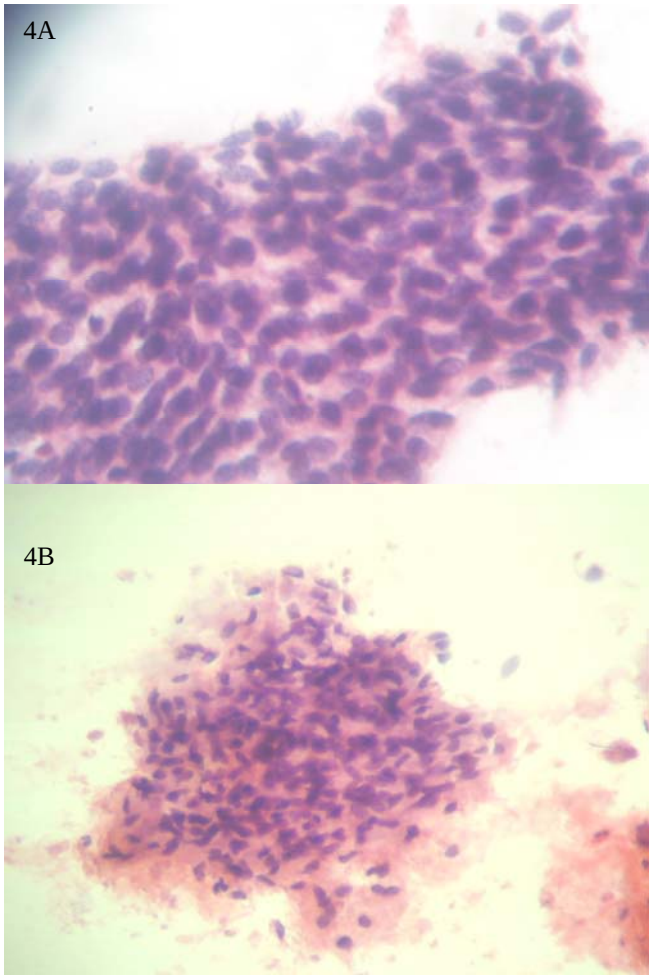

Figure 4 A & B shows a FNAC of ameloblastoma misdiagnosed as adenoma on FNA. (H&E x2,x 40)

plasmacytoid type and background was mucinous mimicking myxoid stroma of pleomorphic stroma. No squamous, columnar and clear cells were seen in the examined material

Discussion

Salivary gland FNAc are very common in pathology practices. It is very useful, quick, and accurate and less traumatic method, however it present several interpretation challenges. Different studies have documented the accuracy and limitation of salivary gland FNAc. The overall accuracy has been reported to be 87% to 100% in distinguishing benign from malignant lesions. FNAc also has a reported sensitivity of 87% to 100% and a specificity of 90% to 100%.[4-8]

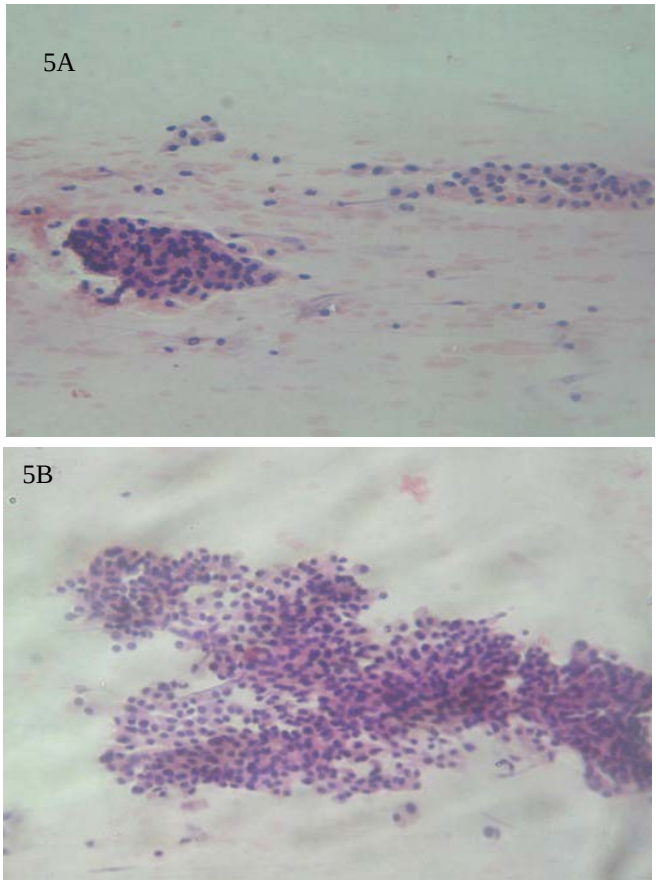

Figure 5 A & B shows a FNAC of case of mucoepidermoid carcinoma misinterpreted as pleomorphic adenoma. Cells were almost uniform and plasmacytoid type mimicking myoepithelial cells. However no columnar, intermediate and clear cells seen, which were diagnostic for mucoepidermoid carcinoma were seen on FNA. (H&E x2,x 10)

Our study reveals 100% positive predictive value, 91.4% negative predictive value and 91.8% diagnostic efficacy. For neoplastic lesions positive correlation was seen in 93.9% cases. These data are similar to those observed in other studies. [9-10]

The diagnosis that was most often given was pleomorphic adenoma that is in 6 out of 8 cases. On histopathology three cases were turned out as low grade mucoepidermoid carcinoma and 2 were given myoepithelioma and 1 was monomorphic adenoma.

Pleomorphic adenoma is the most common neoplasm of parotid gland. On FNAc it usually reveals moderately cellular aspirate and shows biphasic pattern of benign looking ductal cells and myxochondroid stroma. In this study failure of recognition of myxochondroid stroma is the major pitfall that we have encountered in most of our cases. Stranded stroma, crushed nuclei and exuadated plasma had mimicked myxoid stroma of pleomorphic adenoma which leaded the cytopathologist to erroneous diagnosis.

The mucoepidermoid carcinoma is probably the most difficult to diagnose accurately by FNAC and mucoepidermoid carcinoma and pleomorphic adenoma need to be differentiated as it is a recognized pitfall. Kotwal et al was observed the same in his case series in which 3/4 lesions were misdiagnosed as PA[11].

Some times the intermediate cell population of mucoepidermoid carcinoma were closely resembled the basal or myoepithelial cells of pleomorphic adenoma. On the other hand occasional squamous or mucinous differentiation is also seen in pleomorphic adenoma but myxochondroid stroma is usually not seen in mucoepidermoid carcinoma. For mucoepidermoid carcinoma detection of intracellular mucin is the key feature. Romanowsky stain could help in the recognition of stroma and some special stain like PAS-D and mucicarmine would definitely help for detection of intracellular mucin.

In case no: 3 it was hypocellular smear, cells were benign looking having abundant eosinophilic cytoplasm and have no clear cut atypia. So on the basis of these features the diagnosis of oncocytoma was given. Usually low cellularity indicates the benign nature of disease but we felt that one should observe strict criteria for adequacy of any aspirate. Therefore instead of rendering a straight forward diagnosis, an option of re-aspiration, a list of differential diagnosis and asking for tissue diagnosis could pay a lot.

In another case (case no: 4) jaw swelling was interpreted as adenoma, which was actually ameloblastoma. It signifies the role of radiological and clinical correlation. It lessoned us that every swelling which lies over the bone or seems to be arising from the bone should be interpreted under the light of radiological findings.

One case (case no: 2) was initially diagnosed as squamous cell carcinoma and finally it turned out as mucoepidermoid carcinoma on histopathology. On aspirate, only squamous cells of mucoepidermoid carcinoma were aspirated by chance; however the diagnosis did not render any change in mode of treatment offered. In this case we observed that more sampling and rendering a list of differentials with opinion of malignant lesion would be the better option.

Conclusion

- Pleomorphic adenoma and Mucoepidermoid carcinoma both are common in occurrence and create problems in diagnosis.
- Multiple passes from multiple sites should be done.
- Experience cytolopathologist should review all the cytology slides and difficult cases should be reviewed by panel.
- Oil immersion lens should be use to detect subtle atypia to avoid the chance of missing malignant lesion

Acknowledgment

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Table 1: 08 FNAC cases of discordant diagnoses in specific typing of the lesion

Cases	Age(yrs) & Gender	Location	Cytological diagnosis	Histological diagnosis
01	46 M	parotid	Pleomorphic adenoma	Mucoepidermoid carcinoma
02	28 M	parotid	Pleomorphic adenoma	Mucoepidermoid carcinoma
03	56 M	parotid	Oncocytic adenoma	Mucoepidermpid carcinoma
04	19 M	parotid	Pleomorphic adenoma	Ameloblastoma
05	55 M	parotid	Pleomorphic adenoma	Myoepithelioma
06	42 F	parotid	Pleomorphic adenoma	Myoepithelioma

07	69 M	submandibular	Pleomorphic adenoma	Monomorphic adenoma
08	51 F	parotid	Squamous cell carcinoma	Mucoepidermoid carcinoma

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