

Comparison of pre operative fine needle aspiration cytology and histopathological diagnosis of salivary gland tumours

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Abstract

Objective: FNAC is a useful method for evaluating suspicious salivary gland lesions due to its low cost, minimum morbidity, rapid turnaround time, high specificity, and sensitivity. The present study was undertaken to diagnose salivary gland tumors based on the cytomorphology and to correlate with histopathology wherever available and to review the histologic and cytomorphological features in discordant cases and evaluate the possible reasons of misinterpretation. **Methods:** The study was both prospective and retrospective. All the cases of salivary gland tumors that had fine needle aspiration cytology reports were taken from records of Nizam's Institute of Medical Sciences. This study was done between January 2000 to May 2008. **Results:** A total of 135 cases of salivary gland neoplasms were identified during 8 1/2 period of our study. 1. Histologic correlation was available for 36 cases 2. There is a concordance between cytology and histopathology in 31/36 cases (86.1%). In three cases (8.3%) diagnostic possibilities were given. 94.1% of pleomorphic adenoma cases had concordance (16/17). 3. The number of discordant cases were 5/36 (13.9%) and the discordance was due to scant cellularity and rarity of the lesions. Majority of the cases 4(80%) it was underdiagnosis and in one case (20%) it was over diagnosis. **Conclusion:** FNAC is a highly reliable technique for pre-operative diagnosis of salivary gland tumors in the hands of experienced pathologists. However, there still remain few cases that may be inaccurately diagnosed on cytology due to overlapping features and in these cases histopathology is the only modality for final diagnosis.

Keywords: Fine Needle Aspiration Cytology (FNAC), Histopathology, Pleomorphic adenoma, Salivary gland neoplasms

Introduction

Neoplasms that arise in the salivary glands are relatively rare, yet they represent a wide variety of both benign and malignant histologic subtypes. They make up 6% of all head and neck tumors [1]. Most of these glands are easily accessible. Hence, fine needle aspiration cytology is the primary mode of investigation and is fairly accurate in the preoperative diagnosis of neoplasms.

Pleomorphic adenoma is the commonest of all [2]. In recent times several new entities have been described in literature [3]. However, since they are fewer in number and experience is limited, familiarity with the cytomorphology of these lesions is necessary for a

confident diagnosis. Hence we have undertaken this study with the following objectives:

1. To diagnose salivary gland tumors based on the cytomorphology and to correlate with the histopathology wherever available
2. To review the histologic and cytomorphological features in discordant cases and evaluate the possible reasons of misinterpretation.

Identification of such grey areas in cytology may aid in proper pre operative planning.

Materials and Methods

The study was both prospective and retrospective. All the cases of salivary gland tumors that had fine needle aspiration cytology reports were taken from records of Nizam's Institute of Medical Sciences. This study was

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done between the periods of January 2000 to May 2008. Cases with inadequate material were excluded from this study.

FNAC was performed in a standard manner with the aid of a 5ml syringe or according to a non-aspiration technique. In both instances, a 22G needle was applied. One or two passes with a needle usually produced sufficient material. The material was spread onto a slide as a direct smear and the unstained air-dried smears

were examined under microscope to look for adequacy. Slides with inadequate material were discarded. Some of the slides were alcohol fixed.

Air dried smears were stained with May-Grunwald-Giemsa. Alcohol fixed smears were stained with Papanicolaou stain. Haematoxylin and eosin stain, special stains and immunohistochemistry were used for histopathologic slides. Appropriate statistical analysis was done to analyze the data.

Results

Table 1: Site wise distribution of total cases (n=135)

Serial No:	Site	Number of cases	Percentage
1.	Parotid	115	85.2%
2.	Submandibular	14	10.4%
3.	Palate	6	4.4%

The total number of FNAC cases where salivary gland neoplasms were considered in the diagnosis were 135. Most common site was found to be parotid followed by submandibular gland and minor salivary glands respectively.

Table 2: Cytological and Histological diagnosis comparison of salivary neoplasms (n=36)

Histology Diagnosis	Cytology Diagnosis	No: of Cases	
		Concordant	Discordant
Benign			
1.Pleomorphic adenoma (17)	Pleomorphic adenoma	16	1
2.Warthin's tumor (1)	Warthin's tumor	1	-
3.Basal cell adenoma (2)	Basal cell adenoma in the differential diagnosis	2	-
4.Inverted ductal papilloma (1)	? MEC	-	1
Malignant			
1. Mucoepidermoid carcinoma (7)	Mucoepidermoid carcinoma	6	1
2. Adenoid cystic carcinoma (2)	Adenoid cystic carcinoma in the differential diagnosis	2	-
3. Acinic cell carcinoma (1)	Acinic cell carcinoma	1	-
4. Carcinoma ex pleomorphic adenoma (1)	1.Epithelial-myoepithelial carcinoma 2.Pleomorphic adenoma with infarction	-	1
5.Salivary duct carcinoma (1)	NEM/Benign	-	1
6.Papillary cystadenocarcinoma (1)	Papillary mucinous neoplasm	1	-
7. Hodgkin's lymphoma (1)	Hodgkin's lymphoma	1	-
8.Burkitt's lymphoma (1)	Burkitt's lymphoma	1	-

Table 3: Cases where differential diagnosis was offered on cytology (n=3)

Serial No:	Cyto diagnosis	Histo diagnosis
Case 1	1.Basal cell adenoma 2.Pleomorphic adenoma	Basal cell adenoma
Case 2	1. Basal cell adenoma 2. Pleomorphic adenoma 3. Adenoid cystic carcinoma	Adenoid cystic carcinoma
Case 3	1.Epithelial-myoepithelial carcinoma 2.Pleomorphic adenoma with infarction	Carcinoma ex pleomorphic adenoma

Table 4 : Analysis of discordant cases (n=5)

Serial No:	Cytology	Histology
1	? MEC	Inverted ductal papilloma
2	NEM/Benign	MEC
3	NEM/Benign	Salivary duct carcinoma
4	Epithelial-myoepithelial carcinoma/pleomorphic adenoma with infarction	Ca ex pleomorphic adenoma
5	Myoepithelioma	Pleomorphic adenoma with myoepithelial differentiation

In the present study we analyzed 135 cases of salivary gland aspirates over 8 ½ year period. 36 cases had histological correlation (Table 2).

Among the 36 cases where cyto-histo correlation was available, in three cases definite diagnosis could not be given and differential diagnosis was considered (Table 3)

Among the 36 cases where cyto-histo correlation was available, 5 discordant cases were found. Three cases had discrepancies in benign versus malignant with two cases being false negative (Table 4). Percentage of concordance was 86.1% (31/36 cases)

Majority of salivary gland tumors in the present study were benign (23/36) – 63.9%. The most common benign tumor in the present study was pleomorphic adenoma followed by basal cell adenoma and Warthin's tumor. The most common malignant tumor was mucoepidermoid carcinoma followed by adenoid cystic carcinoma.

Discussion

Among 58 cases of pleomorphic adenoma diagnosed on FNAC, in 55 cases pleomorphic adenoma was considered as the only possibility. In remaining 3 cases it was considered as 2nd or 3rd possibility.

Histopathological correlation was available for 17 cases of which 16 cases showed positive correlation. Only one discordant case was found. Here the case was diagnosed as myoepithelioma on FNAC and later was given as pleomorphic adenoma on histopathology. In 3 cases pleomorphic adenoma was considered in the differential diagnosis on FNAC.

In the first case basal cell adenoma was given as first possibility and pleomorphic adenoma as second

possibility. This was later confirmed as basal cell adenoma on histology.

Pleomorphic adenoma was considered in the differential diagnosis as sometimes on FNAC only epithelial component may be represented without chondromyxoid matrix and mesenchymal component and moreover it is the most common salivary gland neoplasm. In the second case, PA was considered as a second possibility and third possibility as adenoid cystic carcinoma, with first possibility as basal cell adenoma. It was later diagnosed as adenoid cystic carcinoma on histology.

Presence of hyaline globules, small cells on FNAC and basement membrane material around the cell clusters favored basal cell adenoma and hence it was considered as the first possible diagnosis in this case. But hyaline

globules can be seen in PA as well as adenoid cystic carcinoma and so they were also considered in the differential diagnosis.

According to the study of Foote and Frazell, when the tumor is predominantly cellular and characteristic chondromyxoid areas are absent it may be misdiagnosed and should be differentiated from monomorphic adenoma, myoepithelioma and adenoid cystic carcinoma[4].

In the present study one such difficulty encountered made us to consider PA in the differential diagnosis. Collagenous stroma interdigitating with adjacent cells, with stroma containing rare spindle cells or capillaries favor basal cell adenoma over adenoid cystic carcinoma in all variants except solid variant of adenoid cystic carcinoma. This feature was found to be useful in our study on review [5].

In the third case where PA with infarction was given as 2nd possibility and epithelial myoepithelial carcinoma as first possibility was later diagnosed as carcinoma ex PA. Because of presence of two populations of cells, spindle cells as well as polygonal cells and presence of pleomorphism, we considered the first possibility as epithelial myoepithelial carcinoma in this case.

We considered PA as the second possible diagnosis in this case because, pleomorphism[6], spontaneous infarctions in PA [7,8,9], presence of necrosis as well as small cells with dark nuclei on cytology mimicking carcinoma and necrosis after FNAC of PA[9] are important features which can cause diagnostic problems on FNAC.

Viguer et al studied 212 cases of PA diagnosed on FNAC and found sensitivity of 92.6 %, specificity of 98.4%. They found typical cytologic appearance with no diagnostic difficulties in 67.4 %. The remainder showed cytologic variations [6]. No such variations were encountered in our study.

In the study of Rajwanshi et al, it was found that in any tumor undergoing cystic change the regenerative ductal epithelial cells may undergo oncocytic change with the background of inflammatory cells and the lesion may be wrongly interpreted as Warthin's tumor [4]. No such difficulty was encountered in our study.

In the present study, we encountered two cases of adenoid cystic carcinoma. In one case definite diagnosis

of adenoid cystic carcinoma was given on FNAC. In another case, differential diagnosis of basal cell adenoma, pleomorphic adenoma and adenoid cystic carcinoma were given on FNAC.

In the present study the number of basal cell adenomas were 2. One case was given as no evidence of malignancy on FNAC. In another case a differential diagnosis of both basal cell adenoma and pleomorphic adenoma were considered on FNAC.

Total number of cases diagnosed as Mucoepidermoid carcinoma on FNAC was 11. Histocorrelation was available for 7 cases. 6 out of 7 cases showed positive correlation. Remaining one was a false-negative case. This was given as no evidence of malignancy (benign) on FNAC and MEC (malignant) on histology. The reason for false negativity in this case was scant cellularity and aspiration of the cystic contents.

Wasserman,[10] Frable and Frable[11] and Mavec *et al.*[12] stated that most false negative diagnoses in cytology of salivary gland lesions were related to cystic lesions and due to failure to obtain diagnostic material. Positive histocorrelation was available for one case each of Warthin's tumour and acinic cell carcinoma.

In discordant cases on 4(80%) of the occasions it was underdiagnosis. However a case of inverted ductal papilloma was thought to be a possible mucoepidermoid carcinoma.

Young age of the patient (15y/F), location in parotid which is otherwise uncommon site for inverted ductal papilloma and presence of sheets of squamoid looking polygonal cells made us to consider MEC on FNAC in this case.

Hence awareness of the cytomorphological picture of inverted ductal papilloma is required and that it can occur in the parotid is essential for correct diagnosis.

In one case epithelial-myoepithelial carcinoma as well as pleomorphic adenoma with infarction were considered as differential diagnosis on FNAC and later on histology was diagnosed as carcinoma ex pleomorphic adenoma (minimally invasive).

A single case of salivary duct carcinoma was seen in our study. The reasons for the misinterpretation of salivary duct carcinoma as a benign lesion on FNAC

was scant cellularity and predominance of bland monomorphic cells.

Only one case of papillary cystadenocarcinoma was seen in our study. It was given as papillary mucinous neoplasm on FNAC, as invasion could not be assessed.

Conclusion

Fine-needle aspiration cytology is a useful technique to diagnose majority of the salivary gland lesions. Familiarity with the cytologic features of rare lesions and morphological variations of the commoner lesions is necessary to avoid misinterpretation. Cystic lesions remain a problematic area for correct diagnosis on cytology.

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