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Diagnostic Utility of Fine Needle Aspiration Cytology in Salivary Gland Tumors

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Original Research Article

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Abstract: Fine needle aspiration cytology (FNAC) is a valuable adjuvant to preoperative assessment in patients with salivary tumors. The study aimed at studying the cytological features of benign and malignant salivary gland tumors, improving the diagnostic accuracy by using immunocytochemistry and correlating it with histopathology. A total of 46 salivary gland tumors including twenty three cases each of benign and malignant tumors with available histology were included in the study. We studied 23 benign tumors, Pleomorphic Adenoma comprised 86.7% of all benign tumors and rest three cases were diagnosed as Warthin's tumors. Positive correlation with histology was obtained in 95% in Pleomorphic adenoma and 100% in Warthin's tumors. Twenty three malignant salivary gland tumors comprised 11 Mucoepidermoid carcinoma,10 Adenoid cystic and 2 Acinic Cell Carcinoma. Positive cytohistological correlation was established in eight out of eleven Mucoepidermoid carcinoma (Diagnostic Accuracy=72.7%) and all cases of Adenoid cystic and Acinic cell carcinoma. Diagnostic accuracy of FNAC for malignant tumors was 95.65%. Our study shows that FNAC is a highly sensitive and specific technique for diagnosis of salivary gland tumors. Immunocytochemistry can act as adjuvant in diagnosing salivary gland tumors, however it did not help in improving the diagnostic accuracy of FNAC in our study .Kappa value of 0.88 in our study indicated an excellent agreement between typing of salivary gland tumors on FNAC and histopathology.

Keywords: Fine needle aspiration cytology, salivary gland tumors, immunocytochemistry.

INTRODUCTION

Salivary gland cancers represent approximately 6% of head and neck cancers and about 0.3%–0.5% of all malignancies[1]. Salivary glands are generally not subjected to incisional or core needle biopsy because of the risk of fistula formation & in case of neoplasm, of tumor implantation[3]. Role of FNAC for the diagnosis of salivary gland tumors is emerging day by day. It speeds up the diagnostic process and is a valuable adjuvant to preoperative assessment in patients with salivary tumors thereby reducing the need for Surgery.by as much as one third .The great majority of the common variants of the non neoplastic and both benign and malignant salivary gland tumors can be diagnosed with a high level of accuracy[2]. However there are many problems and pitfalls in FNAC diagnosis of salivary gland tumors. Immunostaining can be helpful in the diagnosis of salivary gland tumors. Ki-67 fraction may aid in distinction of malignant and benign tumors, myoepithelial markers such as S-100 and smooth muscle actin to identify myoepithelial component and EMA or CEA help in highlighting ductal structures.

MATERIALS AND METHODS

The study included forty six salivary gland tumors comprising of twenty three cases each of benign and malignant tumors in duration of 12 months. A detailed clinical history was taken. FNAC was performed with a 23 gauge needle attached to a 20 ml syringe. Smears were stained with Papanicolaou(Pap) and MGG .Cytological smears showing sufficient tumor cellularity were destained for immunocytochemical staining. EMA, Pan CK, LCA, Ki 67, SMA and S-100 were applied. The paraffin sections were stained with hematoxylin and eosin. Statistical analysis was done using SPSS software version 16.0

RESULTS

Twenty three of both benign and malignant cases were evaluated and cytological diagnosis was compared with corresponding histological typing of tumor. Mean age of presentation of all salivary gland tumors was 41.06 years (39.22 years for benign tumors and 44 years for malignant tumors). Incidence of salivary gland tumors was highest in parotid gland (58.7%) followed by submandibular gland (36.96%) and other sites constituted only 4.35%. Pleomorphic adenoma was the commonest benign tumor and mucoepidermoid carcinoma was the most common

malignant salivary gland tumor. Cytology was sensitive in 91.3%and specific in 100% in diagnosing salivary gland malignancies.

Positive and Negative predictive value of FNAC in diagnosing malignancy were 100.0% and 92% respectively. Diagnostic accuracy of FNAC for malignant tumors was 95.65%. Our study showed FNAC was a useful tool for preoperative diagnosis of benign and malignant salivary gland tumors.

Table-1: FNAC as diagnostic test for malignancy of Salivary gland tumors

Cytological diagnosis	Histological diagnosis		Total
	Malignant	Non-malignant	
Malignant	21	0	21
Non-malignant	02	23	25
Total	23	23	46

Table-2: Cytological and Histological correlation of salivary gland tumors

Histological diagnosis	No. of cases	Cytology Concordant with Histology	Cytology Discordant with Histology		
			Benign Tumor	Malignant Tumor	Cyst
PA	20	19			1
Warthin's Tumor	3	3			
Mucoepidermoid carcinoma	11	8	1	1	1
Adenoid cystic carcinoma	10	10			
Acinic cell carcinoma	2	2			

Table-2: Calculation of agreement between histology and cytology

HISTOLOGY / CYTOLOGY	PA	Warthin's Tumor	Mucoepidermoid carcinoma	Adenoid Cystic Carcinoma	Acinic Cell Carcinoma
PA	19	0	1	0	0
Warthin'sTumour	0	3	0	0	0
Cyst	1	0	1	0	0
Mucoepidermoid carcinoma	0	0	8	0	0
Adenoid Cystic Carcinoma	0	0	0	10	0
Acinic Cell Carcinoma	0	0	0	0	2
Squamous Cell Carcinoma	0	0	1	0	0
Total	20	3	11	10	2

In our study kappa value (calculated using SPSS software version 16.0) came out to be 0.88(p value<0.001) which indicated an excellent agreement between histological and cytological typing of salivary gland tumors.

DISCUSSION

The present study included forty six salivary gland tumors. Twenty three benign and twenty three malignant cases were evaluated and cytological diagnosis was compared with corresponding histological typing of tumor. There were four discordant cases in our study.

In a case of pleomorphic adenoma with absence of chondromyxoid stroma and lack of ductal and myoepithelial cells a diagnosis of Parotid cyst was made on cytology. Similar difficulties in cytological interpretation have been reported where the abundance of myxoid substance and sparse epithelial cells lead to misdiagnosis as retention cyst [4, 5].

A very small swelling measuring 2x1 cm in the postauricular region and clinical impression of parotid cyst was given by clinicians. The aspirate was blood mixed mucoid and on cytology smear there was scant cellular material comprising of mainly dense acute inflammatory cells and macrophages. On histology it turned out to be Mucoepidermoid Carcinoma .There were no mucinophages in the smear and squamous cells were entrapped in mucin. All these led to false diagnosis of Parotid cyst on cytology.

A 2x2 cm firm to hard swelling in the parotid region and was reported as pleomorphic adenoma on cytology which was found to be Low grade Mucoepidermoid on subsequent histology. The macrophages on previous report were actually mucinophages filled with pink droplets of mucin. False interpretation of smear on cytology led to a misdiagnosis on cytology.

In a 2x2 cm soft swelling on the palate,on cytology possibility of squamous cell carcinoma was given. On histology it was reported as high grade mucoepidermoid carcinoma of the palate. Review of slides showed malignant squamous cells in a necrotic background. No vacuolated or clear cells were seen in the cytology smear. Klienjienko *et al.* [6] also misdiagnosed few cases of high grade mucoepidermoid carcinoma for squamous cell carcinoma. Eveson stated that higher grade mucoepidermoid carcinoma tends to be solid and have fewer mucous cell elements and often the squamous element resembles squamous cell carcinoma [7].

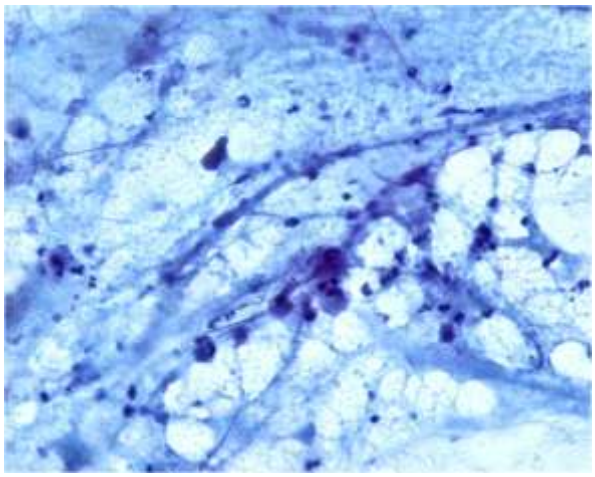

Fig-1a: Low grade Mucoepidermoid carcinoma with scant cellularity and inflammatory cells reported as Parotid cyst. Papanicolaou; 100X

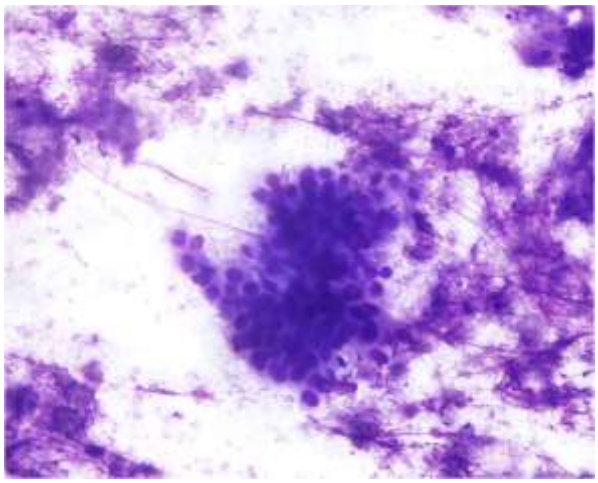

Fig-1b: High grade Mucoepidermoid carcinoma showing malignant squamous cells in a necrotic background reported as Squamous cell Carcinoma.MGG;100X

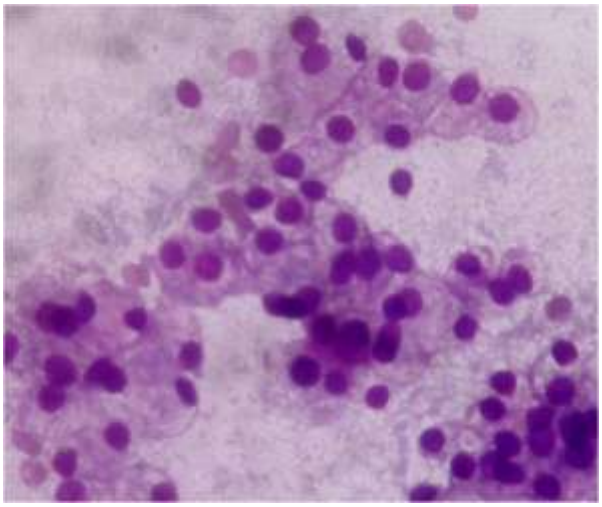

Fig-2: Acinic cell Carcinoma. showing vacuolated acinar cells with mild pleomorphism.MGG ;400X

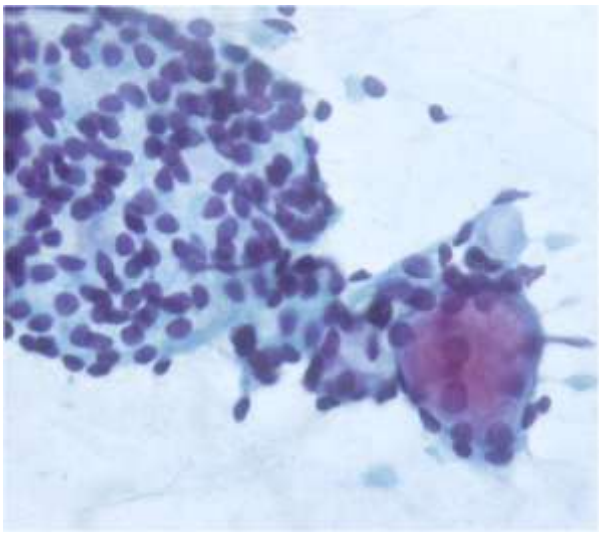

Fig-3: Adenoid cystic Carcinoma showing basaloid cells around hyaline globules.Papanicolaou;400X

Immune markers did not improve the diagnostic accuracy in our study and they had limited utility in the diagnosis of salivary gland tumors as stated in previous studies [1,2]. We applied a panel of antibodies such as SMA, S-100, Vimentin to highlight Myoepithelial cells and Pan-Cytokeratin for ductal epithelial cells on destained smears of Pleomorphic Adenoma found cytoplasmic positivity of myoepithelial cells in SMA, S-100, cytoplasmic positivity of epithelial cells in panCytokeratin and Vimentin. EMA showed membranous positivity epithelial cells. A low Ki 67 index was observed in Pleomorphic Adenoma while Adenoid cystic carcinoma showed high Ki 67 index.

Immunocytochemistry Pleomorphic Adenoma

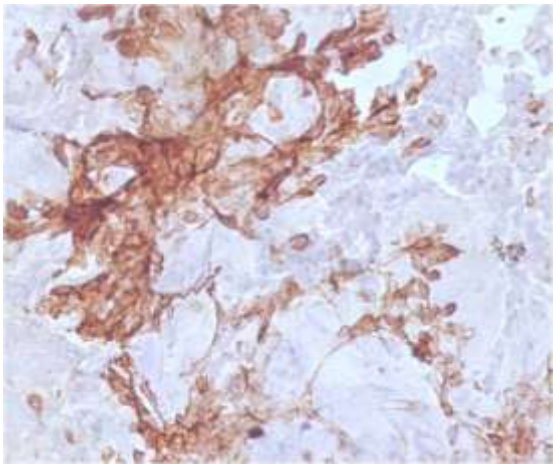

Fig-4a: Cytokeratin positivity in ductal epithelial cells; 400X

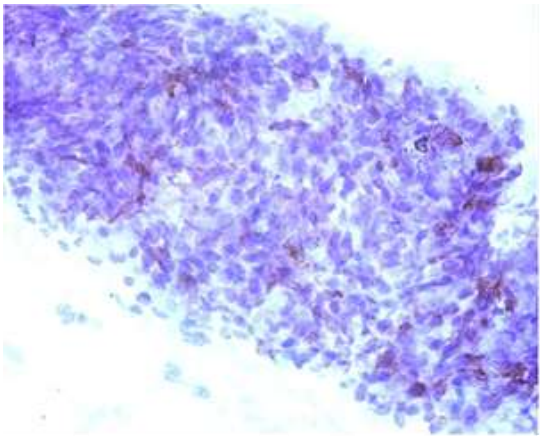

Fig-4b: EMA positivity (membranous) in ductal epithelial cells ;400X

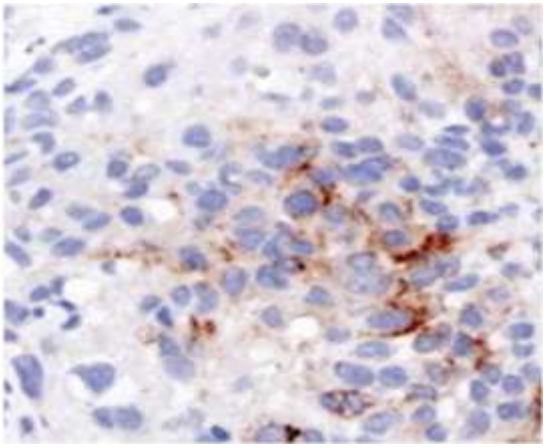

Fig-4c: SMA postivity in myoepithelial cells ;400X

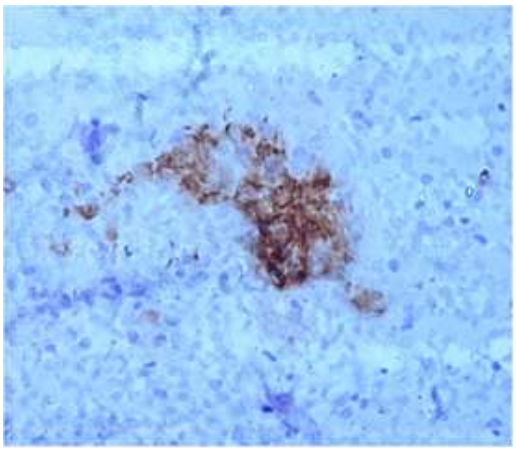

Fig-4d: Focal S-100 postivity in myoepithelial cells ;400X

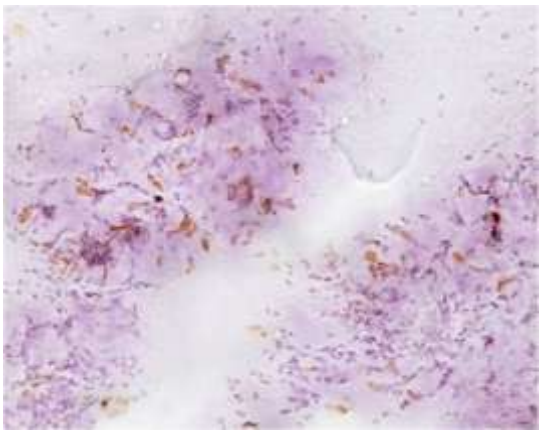

Fig-4e: Focal Vimentin postivity in myoepithelial cells; 100X

Cytology was sensitive in 91.3%and specific in 100% in diagnosing salivary gland malignancies. Accuracy of FNAC in diagnosing malignancy was 95.65%. Senstivity in previous studies ranged from 64-98.5% [3,8,9,10,11,12,13.14-22]. Specificity in previous studies ranged from 80-100% [3,8,9,10,11,12,13.14-22]. Positive and Negative predictive value of FNAC in diagnosing malignancy were 100.0% and 92%.. Diagnostic accuracy of FNAC for malignant tumors was 95.65%.

On conclusion FNAC is a highly sensitive and specific technique for diagnosis of salivary gland tumors. Considering an excellent agreement between cytology and histology in our study; a type specific diagnosis can be reached on FNAC of salivary gland tumors.

REFERENCES

1. Willian, C.F., Celeste, N.P. (2004). Salivary gland Cytolopathology New York, Springer.
2. Orell, S.R., Sterrett, G, F., Whitaker, D., Klienjienko, J. (2005). Head and neck: salivary glands. In: Orell's fine needle aspiration cytology. 4th ed. Philaldelphia: Churchill Livingstone. p.53-77.
3. Ashraf, A., Shaikh, A. S., Kamal, F., Sarfraz, R., & Bukhari, M. H. (2010). Diagnostic reliability of FNAC for salivary gland swellings: a comparative study. *Diagnostic cytopathology*, *38*(7), 499-504.
4. Kumar, N., Kapila, K., & Verma, K. (1991). Fine needle aspiration cytology of mucoepidermoid carcinoma. A diagnostic problem. *Acta cytologica*, *35*(3), 357-359.
5. Young, J. A. (1993). Fine needle aspiration cytopathology. *The Journal of Pathology*, *169*(1), 109-114.
6. Klijanienko, J., & Vielh, P. (1997). Fine-needle sampling of salivary gland lesions IV. Review of 50 cases of mucoepidermoid carcinoma with histologic correlation. *Diagnostic cytopathology*, *17*(2), 92-98.
7. Eveson, J. W. (1992). Troublesome tumours 2: borderline tumours of salivary glands. *Journal of clinical pathology*, *45*(5), 369.
8. Stewart, C. J. R., MacKenzie, K., McGarry, G. W., & Mowat, A. (2000). Fine-needle aspiration cytology of salivary gland: a review of 341 cases. *Diagnostic cytopathology*, *22*(3), 139-146.
9. Stramandinoli, R. T., Sassi, L. M., Pedruzzi, P. A., Ramos, G. H., Oliveira, B. V., Ogata, D. C., & Ioshii, S. O. (2010). Accuracy, sensitivity and specificity of fine needle aspiration biopsy in

salivary gland tumours: A retrospective study. *Med Oral Patol Oral Cir Bucal*, *15*(1), e32-37.

10. Choudhury, A. A., Sultana, T., Siddique, B. H., & Amin, A. S. A. (2011). Diagnosis of Parotid Gland Mass by the Fine Needle Aspiration Cytology (FNAC) and it s Histopathological Correlation-2 Years Study in BSMMU, Dhaka. *Bangabandhu Sheikh Mujib Medical University Journal*, *4*(2), 65-69.
11. Cristallini, E. G., Ascani, S., Farabi, R., Liberati, F., Macciò, T., Peciarolo, A., & Bolis, G. B. (1997). Fine needle aspiration biopsy of salivary gland, 1985–1995. *Acta cytologica*, *41*(5), 1421-1425.
12. Kumar, S., Permi, H. S., ParameSHa, K., Hl, P., Teerthanath, S., SHeTTY, J., & ZaKariaH, S. (2011). Role of fine needle aspiration cytology in salivary gland tumours in correlation with their histopathology: a two year prospective study. *Journal of Clinical and Diagnostic research*, 1375-1380.
13. Postema, R. J., van Velthuysen, M. L. F., van den Brekel, M. W., Balm, A. J., & Peterse, J. L. (2004). Accuracy of fine-needle aspiration cytology of salivary gland lesions in the netherlands cancer institute. *Head & neck*, *26*(5), 418-424.
14. Ersöz, C., Uguz, A. H., Tuncer, Ü., Soylu, L., & Kiroglu, M. (2004). Fine needle aspiration cytology of the salivary glands: a twelve years' experience. *Aegean pathology journal*, *1*(3), 51-56.
15. Elagoz, S., Gulluoglu, M., Yılmazbayhan, D., Ozer, H., & Arslan, I. (2007). The value of fine-needle aspiration cytology in salivary gland lesions, 1994–2004. *ORL*, *69*(1), 51-56.
16. Akhter, J., Hirachand, S., & Lakhey, M. (2008). Role of FNAC in the diagnosis of salivary gland swellings.
17. Palza, C. M., Jiménez, Á. C., Serrano, R. T., Mata, R. G., Molina, P. C., & Muñoz, I. G. (2010). Cyto-histological correlation in parotid gland tumors. *Acta Otorrinolaringologica (English Edition)*, *61*(3), 184-188.
18. Zbären, P., Schär, C., Hotz, M. A., & Loosli, H. (2001). Value of Fine-Needle Aspiration Cytology of Parotid Gland Masses. *The Laryngoscope*, *111*(11), 1989-1992.
19. Frable, M. A. S., & Frable, W. J. (1991). Fine-needle aspiration biopsy of salivary glands. *The Laryngoscope*, *101*(3), 245-249.
20. Atula, T., Grénman, R., Laippala, P., & Klemi, P. J. (1996). Fine-needle aspiration biopsy in the diagnosis of parotid gland lesions: Evaluation of 438 biopsies. *Diagnostic cytopathology*, *15*(3), 185-190.
21. Brennan, P. A., Davies, B., Poller, D., Mead, Z., Bayne, D., Puxeddu, R., & Oeppen, R. S. (2010). Fine needle aspiration cytology (FNAC) of salivary gland tumours: repeat aspiration provides further information in cases with an unclear initial cytological diagnosis. *British Journal of Oral and Maxillofacial Surgery*, *48*(1), 26-29.
22. Ali, N. S., Akhtar, S., Junaid, M., Awan, S., & Aftab, K. (2011). Diagnostic accuracy of fine needle aspiration cytology in parotid lesions. *ISRN surgery*, *2011*.