International Surgery Journal
Shetty SM et al. Int Surg J. 2019 Nov;6(11):3955-3959
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20195103

Original Research Article

Diagnostic utility of fine needle aspiration cytology in salivary gland lesions: a teaching institutional experience

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Received: 01 October 2019
Revised: 15 October 2019
Accepted: 16 October 2019

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is being widely used for pre-operative diagnosis of salivary gland lesions. It is a simple, cost effective and safe procedure that provides valuable information for planning appropriate management. The aim was to study cytohistopathological correlation of salivary gland lesions; to examine sensitivity, specificity and diagnostic accuracy of fine needle aspiration cytology of salivary gland lesions.
Methods: A 4 year 8 months study was conducted from January 2015 to August 2019. Salivary gland lesion FNAC performed in the Department of Pathology, SIMS, Shimoga who were followed up with corresponding biopsy specimen were included in the study.
Results: Total of 42 cases was included in the study. Pleomorphic adenoma was the commonest lesion encountered. The overall sensitivity, specificity, diagnostic accuracy, positive predictive value and negative predictive value was 50%, 97.22%, 90.47%, 75% and 92.10%. Diagnostic pit falls occurred because of sampling error and overlapping morphological features.
Conclusions: Fine needle aspiration (FNA) though poses diagnostic dilemma in some cases, it still forms an easy and less invasive procedure that can assess therapeutic management of salivary gland lesions.

Keywords: Parotid, FNAC, Pleomorphic adenoma, Histopathology, Diagnostic accuracy

INTRODUCTION

Salivary gland swelling can be classified into a wide range of non-neoplastic to neoplastic lesions. Fine needle aspiration cytology (FNAC) acts as an excellent pre-operative procedure providing valuable information on the salivary gland lesions. FNA has got an edge over incisional biopsy previously used for diagnosis of salivary gland lesions.[1] FNA being safe, cost effective and relatively non-traumatic procedure, hence widely used. It not only guides pre-operative management and thus avoiding unnecessary surgeries, but also helps in distinguishing salivary gland lesions from clinical mimickers, especially lymph node enlargement.[2]

Clinical signs and symptoms of salivary gland malignancies though present is seen only in 25-35% of cases.[3] Due to overlapping clinical and cytological features, there is wide range of sensitivities (62-97%) and specificities (94.3-100%) of FNAC in diagnosing salivary gland lesions. Purpose of FNA is not to provide exact diagnosis, but is to provide information by which further management can be assessed.[4] It is very important to correlate FNA with clinical and radiological features. Histopathological examination of excised specimens

should be used in conjunction with FNA and never be replaced by FNA.[5]

Present study was undertaken to analyse cytohistopathological correlation and evaluate sensitivity, specificity, diagnostic accuracy of FNAC in diagnosing salivary gland lesions.

METHODS

We conducted a 4 year 8 months study from January 2015 to August 2019 at Shimoga institute of medical sciences, Shimoga. Only salivary gland lesions referred for FNAC to Pathology department at our institute during the study period with the presence of corresponding biopsy specimens were included in the study, with exclusion of cases where there was absence of cytohistopathological correlation. FNAC was performed using 10ml disposable syringe and 22-23 G needle after explaining the procedure to the concerned patient. Smears were performed and stained with H&E stain, Leishman stain and Papanicolaou stain. Corresponding excision biopsies were received in 10% buffered formalin. After thorough gross examination, representative bits were given for tissue processing and stained with H&E stain. After obtaining permission from the Head of the department and Institutional Head; details pertaining to age, gender and site of involvement was obtained from FNAC/ biopsy request forms.

Total of 42 cases having cytohistopathological correlation were included in the study. Sensitivity, specificity and diagnostic accuracy for the given cases was calculated.

RESULTS

In the 42 cases studied, commonest age group involved was 41-50yrs with 23.8% of cases and majority of cases with salivary gland tumors presented in the 5th decade. Commonest site involved was parotid gland (54.76%), followed by submandibular gland (38.09%) and minor salivary gland (hard palate- 4.76%, cheek- 2.38%). Overall male to female ratio was 1.1:1. On cytological diagnosis (Table 1) commonest lesion was pleomorphic adenoma (52.38%). In non-neoplastic category, inflammatory lesion was common with 28.57% of cases (chronic sialadenitis - 14.28%, acute sialadenitis -9.52%, acute on chronic sialadenitis -4.76%). In malignant neoplasm there was 1 case each (2.38%) of epithelial-myoepithelial carcinoma/ mucoepidermoid carcinoma and acinic cell carcinoma. 2 other cases (2.38% each) were diagnosed as Suspicious of malignancy and Positive for malignancy without further typing of tumor. In one case (2.38%) definitive cytological diagnosis was not possible. Milan system of categorization of salivary gland lesions (Table 2) showed majority of lesions in category IV (57.14%).

Following histopathological examination (Table 3) also, commonest lesion was found to be pleomorphic adenoma (52.38%).

Table 1: Cytological diagnosis of salivary gland lesions.

S. no.	Category	No. of cases
1.	Non-diagnostic	01/42
2.	Non-neoplastic	13/42
	Inflammatory	
	-Chronic sialadenitis	06
	-Acute sialadenitis	04
	-Acute on chronic sialadenitis	02
	Cystic	01
3.	Neoplastic	28/42
	Benign	
	-Pleomorphic adenoma	21
	-Warthin's tumor	02
	-Basal cell adenoma	01
	Malignant	
	-Epithelial-myoepithelial carcinoma/ Mucoepidermoid carcinoma	01
	-Suspicious for malignancy	01
	-Acinic cell carcinoma	01
	-Positive for malignancy	01

Table 2: Milan system for cytological grading of salivary gland lesions:

Category	No. of cases	% of cases
I. Non-diagnostic	01	2.38
II. Non-neoplastic	13	30.95
III. Atypia of undetermined significance	00	00
IV. Neoplasm	24 (IV A)	57.14
V. Suspicious for malignancy	01	2.38
VI. Malignant	03	7.14

Cytohistopathological correlation (Table 4) done in these 42 cases, revealed 01 false positive case where cytological diagnosis of acinic cell carcinoma was confirmed to be pleomorphic adenoma on histopathology. There were 03 false negative cases which on cytology were diagnosed as 1 case of cystic lesion and 2 cases of pleomorphic adenoma. These 3 cases were diagnosed as mucoepidermoid carcinoma on histopathology.

Overall sensitivity, specificity, diagnostic accuracy, positive predictive value and negative predictive value of FNAC in diagnosing salivary gland lesions was found to be 50%, 97.22%, 90.47%, 75% and 92.10%.

Table 3: Histopathological diagnosis of salivary gland lesions.

S. no.	Category	No. of cases
1.	Non-neoplastic	10/42
	Inflammatory	
	-Chronic sialadenitis	09
	-Acute on chronic sialadenitis	01
2.	Neoplastic	32/42
	Benign	
	-Pleomorphic adenoma	22
	-Warthins tumor	03
	-Myoepithelioma	01
	Malignant	
	-Mucoepidermoid carcinoma	04
	-Acinic cell carcinoma	01
	-Salivary duct carcinoma	01

Table 4: Cytohistopathological correlation of salivary gland lesions.

Sl. No.	Cytological diagnosis	Histopathological diagnosis
1.	Non-diagnostic (01)	Warthin's tumor (01)
2.	Sialadenitis (12)	Sialadenitis (10) Warthin's tumor (01) Pleomorphic adenoma (01)
3.	Cystic lesion (01)	Intermediate grade mucoepidermoid carcinoma (01)
4.	Pleomorphic adenoma (21)	Pleomorphic adenoma (18) Myoepithelioma (01) Low grade mucoepidermoid carcinoma (01) Acinic cell carcinoma (01)
5.	Warthin's tumor (02)	Warthin's tumor (01) Pleomorphic adenoma (01)
6.	Basal cell adenoma (01)	Pleomorphic adenoma (01)
7.	Suspicious for malignancy(01)	Low grade mucoepidermoid carcinoma (01)
8.	Positive for malignancy (01)	Low grade mucoepidermoid carcinoma (01)
9.	Epithelial-myoepithelial carcinoma/ Mucoepidermoid carcinoma(01)	Salivary duct carcinoma (01)
10.	Acinic cell carcinoma (01)	Pleomorphic adenoma (01)

DISCUSSION

FNAC helps to distinguish salivary gland lesions into following category- inflammatory, benign and malignant. FNA has been widely accepted as an excellent diagnostic modality as it is reliable, inexpensive and easy to perform.

In the present study, salivary gland tumors was commonly seen in the 5th decade and the finding was similar to that observed by Choudhury et al and Tessy et al in their respective studies.[4,6] Male:female ratio in the present study was 1.1:1. Omhare et al and Saldanha et al in their respective studies found M:F ratio of 1.17:1 and 1.2:1.[7,8] Commonest site of involvement in the present study was parotid gland with 54.76% of cases which correlated well with study done by Todase et al and Kakoty et al.[9,10] Commonest lesion was pleomorphic adenoma both on cytology (42.46%) and histopathology (37.67%); which was also observed by Arul et al in their respective study.[11] Majority of cases (57.14%) belonged to Milan grading system of IV A, which was similar to study done by Vishwanathan et al with 31.4% of cases.[12] Overall sensitivity, specificity, diagnostic accuracy, positive predictive value and negative predictive value was 50%, 97.22%, 90.47%, 75% and 92.10% respectively. In a study done by Zerpa et al, sensitivity, specificity, diagnostic accuracy, positive predictive value and negative predictive value was 57.1%, 95.1%, 92.22%, 50% and 96.3% respectively.[13]

In present study, 01 case of chronic sialadenitis was diagnosed as Warthin's tumor on histopathology; because on aspirate predominance of lymphocytic infiltrate was seen with presence of occasional ductal epithelial cells and lack of apocrine epithelium. 01 case of cystic lesion was diagnosed as Intermediate grade mucoepidermoid carcinoma on histopathology; which might have occurred due to aspiration of mucoid paucicellular material on FNA. 01 case of pleomorphic adenoma was diagnosed as low grade mucoepidermoid carcinoma; because mucoid material in the background was mistaken for chondromyxoid matrix. Another case of Pleomorphic adenoma was diagnosed as acinic cell carcinoma; false negative diagnosis occurred due to increased cellular component, scant chondromyxoid matrix and absence of nuclear atypia. One more case of pleomorphic adenoma was diagnosed as myoepithelioma on histopathology; but this confusion is of little biological consequence. 01 case each of basal cell adenoma and acinic cell carcinoma, were both diagnosed as pleomorphic adenoma on histopathology. Absence of chondromyxoid matrix and presence of scanty myoepithelial cells on FNA in a case of pleomorphic adenoma can be easily mistaken for basal cell adenoma. Cellular pleomorphic adenoma with scant chonromyxoid matrix causes diagnostic dilemma and may be mistaken for acinic cell carcinoma on FNA.

01 case on FNA was just diagnosed as positive for malignancy, as repeated aspiration yielded scant to moderate cellularity with many atypical cells which could not be typed further. 01 case on FNA was diagnosed as Suspicious of malignancy because of aspiration of scant

fluid like material which on cytology showed few atypical cells. 01 case of epithelial-myoepithelial carcinoma/ mucoepidermoid carcinoma was diagnosed as salivary duct carcinoma on histopathology. 01 case was non-diagnostic on FNA because of many lymphocytes and absence of ductal/ acinar cells; and on histopathology was confirmed to be Warthin's tumor.

CONCLUSION

FNA forms an inexpensive and reliable diagnostic modality, providing guidance towards appropriate treatment strategies. Overlapping clinical and cytological features of salivary gland lesions, causes diagnostic dilemma. However a significant sensitivity, specificity, diagnostic accuracy, positive predictive value and negative predictive value were assessed in the present study, thus emphasising the use of FNA for pre-operative management of salivary gland lesions.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ali NS, Akhtar S, Junaid M, Awan S, Aftab K. Diagnostic accuracy of fine needle aspiration cytology in Parotid lesions. Int Scholarly Res Net. 2011:721525:1-5.
2. Naz S, Hashmi A A, Khurshid A, Faridi N, Edhi M M, Kamal A, Khan M. Diagnostic role of fine needle aspiration cytology (FNAC) in the evaluation of salivary gland swelling: an institutional experience. BMC Res Notes. 2015;8:1-5.
3. Zbaren P, Nuyens M, Loosli H, Stauffer E. Diagnostic accuracy of fine needle aspiration cytology and frozen section in primary parotid carcinoma. Cancer. 2004;100:1876-83.
4. Choudhury S, Mishra B. A study on cytohistopathologic correlation in diagnosis of salivary gland lesions. J Evid Based Med Health. 2016;3(87):4733-6.
5. Gupta R, Dewan D, Kumar D, Suri J. Fine needle aspiration cytology (FNAC) of salivary gland lesions with histopathological correlation in a district hospital of Jammu region. Indian J Pathol Oncol. 2016;3(1):32-7.
6. Tessy PJ, Jayalekshmy PS, Cicy PJ, Poothiode U. Fine needle aspiration cytology of salivary gland lesions with histopathological correlation - A two year study. Int J Healthcare Biomed Res. 2015;3(4):91-9.
7. Omhare A, Singh SK, Nigam JS, Sharma A. Cytohistopathological study of salivary gland lesions in Bundelkhand region, Uttar Pradesh, India. Pathol Res Int. 2014;804265:1-5.
8. Saldanha C, Fernandes H, Fazalbhoy Z, Jayaprakash CS, Sumanth D, Kini R. Diagnostic accuracy and pitfalls in Fine needle aspiration cytology of Salivary gland lesions. Ann Pathol Lab Med. 2017;4(3):274-8.
9. Todase V, Panchonia A, Kulkarni CV, Mehar R, Shinde P, Likhar K, et al. Cytopathological study of salivary gland lesion in patients at a tertiary care centre, Indore: a one - year study. Int J Res Med Sci. 2017;5(6):2406-11.
10. Kakoty S, Baruah T D, Ganesh Babu C P. FNAC and histopathological correlation of salivary gland lesions: an observational study. Int Surg J. 2017;4(7):2148-52.
11. Arul P, Akshatha C, Masilamani S, Jonathan S. Diagnosis of Salivary gland lesions by fine needle aspiration cytology and its histopathological correlation in a tertiary care centre in Southern India. J Clin Diagnos Res. 2015;9(6):7-10.
12. Vishwanathan K, Sung S, Scognamiglio T, Yang GC, Siddiqui MT, Rao RA. The role of the Milan system for reporting salivary gland cytopathology: A 5 year institutional experience. Cancer Cytopathol. 2018;126(8):541-51.
13. Zerpa VZ, Gonzales MT, Porras GA, Acuna MM, Ferriol EE, Galofre JD. Diagnostic accuracy of Fine needle aspiration cytology in parotid tumors. Acta Otorrinolaringol. 2014;65(3):157-61.
14. Eveson JW, Auclair P, Gnepp DR, El-Naggar AK. Tumours of the salivary glands: Introduction. In: Barnes L, Eveson JW, Reichart P, Sidransky D. World health organization Classification of tumors - Pathology and genetics, Head and neck tumors. Lyon: IARC; 2005: 212-214.
15. McHugh JB. Major and minor salivary glands. In: Goldblum JR, Lamps LW, McKenney JK, Myer JL. Rosai and Ackerman's Surgical Pathology. Volume 1, Edition 11th. Philadelphia: Elsevier; 2018: 235-238.
16. Mills SE. Salivary glands. In: Mills SE, Greenson JK, Hornick JL, Longacre TA, Reuter VE. Sternberg's Diagnostic surgical pathology. Edition 6th. Philadelphia: Wolters Kluwer; 2015: 906-912.
17. Young JA, Warfield AT. The salivary glands. In: Gray W, McKee GT. Diagnostic cytopathology. Edition 2nd. Philadelphia: Elsevier; 2003: 305-306.
18. Klijanienko J. Head and neck; salivary glands. In: Orell SR, Sterett GF, Whitaker D. Fine needle aspiration cytology. Edition 4th. India: Churchill Livingstone; 2005: 42-44.
19. Verma S. Fine needle aspiration cytology of salivary gland lesions: study in a tertiary care hospital of North Bihar. Int J Res Med Sci. 2016;4(9):3869-72.
20. Bobati SS, Patil B V, Dombale V D. Histopathological study of salivary gland tumors. J Oral Maxillofacial Pathol. 2017;21(1):46-50.
21. Sushma HM, Shashidhar MR, Meghashree V, Pai MR. Fine needle aspiration of salivary gland lesions

- diagnostic pitfalls. J Evol Med Dent Sci. 2017;6(8):600-4.
22. Upasana P, Ina S, Hansa G. A cytological and histological comparative study of salivary gland lesions at tertiary health care centre. Int J Biomed Adv Res. 2015;6(6):470-4.

Cite this article as: Shetty SM, Kusuma KN. Diagnostic utility of fine needle aspiration cytology in salivary gland lesions: a teaching institutional experience. Int Surg J 2019;6:3955-9.