

A Comparative Study between Diagnosis Accuracy of Fine Needle Aspiration Cytology and Histopathology in Salivary Gland Swelling

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Abstract

Objectives: The present study was to evaluate the diagnosis accuracy of fine needle aspiration cytology and histopathology of salivary gland swelling in various age group patients.

Methods: Fine needle aspiration cytology was performed in all suspected patients of salivary gland swelling. Using a 22 or 23 G needle, FNAC was done in all patients using a standardized procedure. Strict adherence to the protocol was maintained in all steps of the procedure. Smears prepared were fixed in standard solutions and studied. The cytological diagnosis like chronic sialadenitis, pleomorphic adenoma, warthin's tumors, monomorphic adenoma, adenoid cystic carcinoma, mucoepidermoid carcinoma and acinic cell carcinoma were reported. A scanty cellular smear or drying artifact making interpretation difficult was reported as inadequate.

Results: 100 salivary gland tumours were diagnosed by FNAC. Among these, histopathological correlations were available for 66 cases. All the cases occurred in the age group of 10-70 years and a majority of them were seen in the range of 21-30 years (26%), with a male to female ratio of 3:2. 81(81%) were pleomorphic adenomas (PA), 1(1%) were Warthin's tumours (WT), 4(4%) were mucoepidermoid carcinomas (MEC), 1(1%) were acinic cell carcinomas, 2(2%) were carcinoma ex pleomorphic adenomas, 1(1%) were primary lymphomas of the parotid gland, 1(1%) was metastatic deposits, 5(5%) were benign parotid tumours, 3(3%) were cystic lesions and 2(2%) were malignant tumours (unclassified). PA and MEC were the commonest benign and malignant tumours respectively.

Conclusions: Salivary gland dysfunction was more preponderance in young age male population. FNAC is one of the best choices for the diagnosis of salivary gland swelling in terms of high diagnostic accuracy, immediate results and lack of complications.

Keywords: Salivary gland swelling, FNAC, Diagnostic accuracy

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Introduction

Swelling of salivary glands, specifically parotid and submandibular gland presents as a common problem and being readily visible creates havoc among patients. In addition parotid/submandibular swellings also remain a diagnostic challenge among clinicians. Salivary glands (SGs) are compound exocrine glands which are mainly composed of a ductal and an acinar portion. They are classified into major and minor SGs which are found throughout the submucosa of oral cavity [1]. SGs lesions are ranged from non-neoplastic lesions like inflammation, cysts etc. to neoplastic benign or malignant lesions [2]. The global annual incidence of salivary gland tumors varies from 0.4-13.5 cases per 100,000 population [3]. FNAC serves to determine the nature of the lesion which can be divided into inflammatory, benign and malignant and in some cases, the specific diagnosis is given [4,5]. **B2** Malignant salivary gland neoplasms account for more than 0.5% of all malignancies and approximately 3% to 5% of all head and neck cancers [6]. Pleomorphic adenoma of salivary glands is the most frequently encountered benign tumor [7] and squamous cell carcinoma is the most common malignancy reported in the oral cavity [8]. Fine needle aspiration cytology (FNAC) is accurate, simple, rapid, inexpensive, well tolerated and harmless for the patient [9]. A review of the recent reported series found that the diagnostic sensitivity of FNAC varied from 81-100%, that the specificity varied from 94-100% and that the diagnostic accuracy varied from 61-80% [10,11]. Objectives of our study was to compare the diagnosis accuracy of fine needle aspiration cytology to histopathology in patients of salivary gland swelling.

Material & Methods

This present study was conducted in the Department of Pathology, Jawaharlal Nehru Medical College, Bhagalpur, Bihar,

India during a period from January 2022 to September 2022. Entire subject signed an informed consent approved by institutional ethical committee of Jawaharlal Nehru Medical College, Bhagalpur, Bihar was sought.

A detail history, clinical examinations were performed to all the patients of salivary gland swelling. Patients with recurrent swellings and with skin infiltrations and previous history of neck irradiation were excluded from the study.

Fine needle aspiration cytology was performed in all patients with clinical diagnosis of salivary gland swelling or with feature suggestive of salivary gland swellings from the imaging studies. Using a 22 or 23 G needle, FNAC was done in all patients using a standardized procedure. Strict adherence to the protocol was maintained in all steps of the procedure. Smears prepared were fixed in standard solutions and studied. The cytological diagnosis like chronic sialadenitis, pleomorphic adenoma, warthin's tumors, monomorphic adenoma, adenoid cystic carcinoma, mucoepidermoid carcinoma and acinic cell carcinoma were reported. A scanty cellular smear or drying artifact making interpretation difficult was reported as inadequate. The cytology specimens were reviewed.

Statistical Analysis

Data was analysed by using simple statistical methods with the help of MS-Office software. All data was tabulated and percentages were calculated.

Observations

100 salivary gland tumours were diagnosed by FNAC. Among these, histopathological correlations were available for 66 cases. All the cases occurred in the age group of 10-70 years and a majority of them were seen in the

range of 21-30 years (26%), with a male to female ratio of 3:2.

Out of the 100 cases, 81(81%) were pleomorphic adenomas (PA), 1(1%) were Warthin's tumours (WT), 4(4%) were mucoepidermoid carcinomas (MEC), 1(1%) were acinic cell carcinomas, 2(2%) were carcinoma ex pleomorphic

adenomas, 1(1%) were primary lymphomas of the parotid gland, 1(1%) was metastatic deposits, 5(5%) were benign parotid tumours, 3(3%) were cystic lesions and 2(2%) were malignant tumours (unclassified). PA and MEC were the commonest benign and malignant tumours respectively.

Table 1: Age and gender wise distribution of patients of salivary gland swelling.

Age (Years)	Male	Female	Total
10-20	7(11.66%)	5(12.5%)	12(12%)
21-30	14(23.33%)	12(30%)	26(26%)
31-40	11(18.33%)	10(25%)	21(20%)
41-50	5(8.33%)	10(25%)	15(15%)
51-60	11(18.33%)	3(7.5%)	14(14%)
61-70	12(20%)	00	12(12%)
Total	60(60%)	40(40%)	100(100%)

There were 81 PAs, out of which only 55 cases had a histopathological correlation. 47 of them were concordantly diagnosed as PA histopathologically. One was of basal cell adenoma, myoepithelioma, WT and MEC, whereas 3 were diagnosed as sialadenosis by histopathology.

Among the 3 cases of benign parotid tumours, a histopathological correlation was available for 3 and all were diagnosed as PA. Among 4 cases of cystic lesions, all were histopathologically correlated. Of these, 2 were diagnosed as mucocele and the other 2 as benign lymphoepithelial cysts.

Among 2 cases of carcinoma ex PA, aa were available for histopathological correlation, which were diagnosed as MEC. All 2 cases of MEC were concordantly diagnosed by histopathology.

One case was reported as acinic cell carcinomas, both of which were not available for histopathological correlation. There was one cytologically diagnosed cases of primary lymphoma of the parotid, it was concordantly diagnosed by histopathologically as non-Hodgkins lymphoma- diffuse large B cell type. one case was cytologically diagnosed as metastatic squamous cell carcinomas, that was not available for histopathological correlation.

Table 2: Showing the Histological diagnosis

Histological diagnosis	No. of cases	Percentages
Pleomorphic adenoma	81	81%
Warthin's tumour	1	1%
Benign parotid tumour	5	5%
Cystic lesion	3	3%
Mucoepidermoid carcinoma	4	4%
Acinic cell carcinoma	1	1%
Carcinoma ex Pl adenoma	2	2%
Primary lymphoma	1	1%
Metastatic deposits	1	1%
Malignant tumour (unspecified)	1	1%
Total	100	100%

Table 3: Showing the Cytological diagnosis

Histopathological	Cytological					Total
	Pleomorphic adenoma	Benign parotid tumor	Cystic Lesion	Mucoepidermoid carcinoma	Carcinoma ex pleomorphic adenoma	
PA	47	3				50
Sialadenosis	3					3
Mucocele			2			2
Warthin's tumor	1					1
Basal cell adenoma	1					1
Mucoepidermoid carcinoma	1			2	2	5
Myoepithelioma	2					2
Benign lymphoepithelial cyst			2			2
Total	55	3	4	2	2	66

Discussions

Neoplasms of salivary gland are an interesting diverse group of tumours [12]. They form a fascinating subject for the head and neck surgeons [13]. The relative infrequency combined with considerable histologic and behavioural diversities and their regional anatomic relationship make them unusually interesting and challenging [14]. FNAC is a cytodiagnostic method based on the morphological findings of individual cells, group of cells, and microparticles of tissue, acquired using a needle. The role of FNAC for the diagnosis of salivary gland masses is well documented. The traditional open biopsy is no longer justified because of the risk of tumor spillage and damage to the facial nerve [15]. **B1** FNAC is an easily done procedure with minimal incidence of complication and no risk of implantation of tumor cells (<1%). The complications are rare and bleeding or inflammatory reaction in the region of the puncture. The impairment of the involved nerves has been reported as a very rare complication [16, 17].

In this present study, most of the cases 25(25%) were in age group of 21-30 years. Issac et al. [18], and Kakoty et al. [19], reported similar findings. According to Rutt AL et al. [20], it is essential for physicians to detect salivary gland neoplasms promptly and to evaluate them thoroughly when they are found in young age. FNAC has an edge over biopsy as cytological diagnosis can be made within 24 hours whereas histopathology may take 5-7 days [21].

In this present study, 81 cases (73.3%) were diagnosed as PA cytologically. Fifty five of them were available for histopathological correlation, out of which 47 were concordantly diagnosed. The commonest changes which were observed were epithelial and mesenchymal like elements with a wide variety of patterns within the tumour. The commonest elements that were seen included fibrous, mucinous, myxochondroid and chondroid tissues. Out of the 55 cases which were histopathologically correlated, 1 was discordantly diagnosed as basal cell adenomas and 2 as myoepitheliomas. In both these cases, the FNAC slides were reviewed, both showed highly cellular

smears with scant stromal elements and were mistakenly diagnosed as PA. From the practical perspective, this confusion was of minor importance, since the surgical treatment was similar in both the cases. One case was discordantly diagnosed as Warthin's tumour. The reviewed FNAC slides showed an oncocytic change, which we suspected as epithelial cells with metaplastic change. Many studies showed similar findings [22,23].

In this present study, Among the 100 cases, 1 case was diagnosed as WT by FNAC. These was not available for histopathological correlation. Small cysts (mucoceles or mucus retention cysts) which arise from minor salivary glands are not uncommon. The favoured sites are in the sub-mucosa of the oral cavity of the lower lip, the cheeks, the dorsal surface of the tip of the tongue and the floor of the mouth. In superficial locations, the cyst is well circumscribed and bluish white and it looks like a tiny nodule. The cysts in the salivary gland can occur in some neoplasms like PA, WT, MEC, acinic cell carcinomas and squamous cell carcinomas.

In this present study, there were 2 cases of cysts, which were diagnosed by FNAC. All the 2 cases were available for histopathological correlation. One patient was concordantly diagnosed as mucocele and the other one as benign lymphoepithelial cysts. The FNAC slides were reviewed, which showed plenty of cyst macrophages and degenerated epithelial cells against a myxoid background.

Mucoepidermoid Carcinoma comprise 5-10% of all the salivary gland tumours and 9/10th of these tumours occur in the parotid gland [23]. Cellular smears from well differentiated MECs usually pose no problem in their diagnosis. However, the high grade, poorly differentiated tumours may be difficult to recognize as MECs and

they may be misdiagnosed as poorly differentiated squamous cell carcinomas.

In this present study, out of 100 cases, there were 5 cases of MEC, which were diagnosed by FNAC. The smear showed 3 types of cells, epidermoid cells, intermediate cells and mucus cells against a dirty necrotic background. Two cases were available for histopathological correlation, which were concordantly diagnosed.

In the present study, 2 were diagnosed as CA ex PA cytologically. The smears which were studied showed epithelial cell clusters which revealed a prominent nuclear enlargement and atypia with clusters of benign epithelial cells and myxoid stroma. One case was diagnosed as primary lymphomas cytologically, who presented with the enlargement of the parotid glands. There was no associated lymphadenopathy or organomegaly.

One case of squamous cell carcinoma metastatic deposits was diagnosed cytologically in 60 and 70 years old male patients with a history of bilateral submandibular gland enlargement. Both presented with hoarseness of the voice and direct laryngoscopy revealed ulceroproliferative growths in their vocal cords. The smears showed pleomorphic squamous epithelial cells in clusters and singles, tadpole cells and keratin pearls against a dirty background. This patient was referred to higher centres for further management and hence a histopathological correlation was not possible. Benign tumours were more common than malignant tumours, which was similar to the findings in all other studies [11,24].

Most of salivary glands are easily accessible and there is widespread acceptance FNAC in preoperative diagnosis of salivary gland lesions [25]. In this study diagnostic accuracy of FNAC was 88% to 94%. Sensitivity and specificity was 96% and 83% respectively.

Zerpa et al. studied 93 cases of parotid gland tumors, revealing a sensitivity and specificity of 57% and 95% respectively [26]. On the other hand, Pastore et al. found a sensitivity and specificity of 83% and 93% respectively. They evaluated 357 cases of salivary gland lesions [27]. Similarly Jaenin et al. revealed 92.8% sensitivity and 93.9% specificity in a study involving 80 cases of salivary gland swellings, out of which 14 cases were of malignant salivary gland neoplasms [28]. Kim et al. found a diagnostic accuracy of FNAC to be 92% in differentiating malignant from benign salivary gland tumors [29]. Fakhry et al. evaluated 249 parotid tumors, out of which 75% were benign and 25% were malignant. The sensitivity and specificity to detect malignancy was assessed to be 80% and 89.5% respectively [30,31].

Conclusions

This present study concluded that the salivary gland dysfunction was more preponderance in young age male population. FNAC is one of the best choices for the diagnosis of salivary gland swelling in terms of high diagnostic accuracy, immediate results and lack of complications.

References

1. Rosai J. Rosai and Akerman's surgical pathology. 10th ed. Reed Elsevier India Private Limited. 2011:817-840.
2. Rashmi Jain, Ankit Jain. A cytohistopathological study to evaluate the diagnostic role of Fine-needle aspiration cytology (FNAC) in salivary gland lesions. Indian Journal of Pathology and Oncology, January-March 2017;4(1):45-51.
3. Scher RL, Oostingh PE, Levine PA, Cantrell RW, Feldman PS. Role of fine needle aspiration in the diagnosis of lesions of the oral cavity, oropharynx, and nasopharynx. Cancer 1988; 62 (12): 2602-6.
4. Baba AI, Cătoi C. Comparative oncology Bucharest: The Publishing House of the Romanian Academy 2007 Chap 18, Cancer Diagnosis 2007. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK9550/>
5. Lacob A, Zazgyva A, Ormenișan A, Mezei T, Sin A, Tulinca M. Effectiveness of fine-needle aspiration cytology in the diagnosis of lateral cervical nonthyroid tumors. Medicine (Baltimore) 2016; 95(31): e4448.
6. Speight PM, Barrett AW. Salivary gland tumours. Oral Dis 2002; 8(5): 229-40.
7. Amit A, Singh R, Sheikh S, Pallagatti S, Singla I. Pleomorphic adenoma of minor salivary gland: A case report. RSBO 2012; 9(1): 97-101.
8. Majchrzak E, Szybiak B, Wegner A, et al. Oral cavity and oropharyngeal squamous cell carcinoma in young adults: A review of the literature. Radiol Oncol 2014; 48(1): 1-10.
9. Fernandes GC, Pandit AA. Diagnosis of salivary gland tumours by FNAC. Bombay Hospital Journal 2000; 42:1 08-11.
10. Stewart CJ, MacKenzie K, McGarry GW, Mowat A. Fine-needle aspiration cytology of the salivary gland: a review of 341 cases. Diagn Cytopathol 2000; 22:139-46.
11. Zbaren P, Nuyens M, Loosli H, Stauffer E. Diagnostic accuracy of fine-needle aspiration cytology and frozen sections in primary parotid carcinoma. Cancer 2004;100: 1876-83.
12. Speight P, Barrett A. Salivary gland tumours. Oral diseases 2002; 8(5): 229-40.
13. Conley JJ. Salivary glands and the facial nerve: Grune & Stratton; 1975.
14. Dr. Nowshad. M, Dr. C.V.Rajendran. Diagnostic accuracy of fine needle aspiration cytology compared to histopathology in salivary gland swellings. IJSR 2017; 6:7.
15. W. F. McGuirt and B. F. McCabe, Significance of node biopsy before

- definitive treatment of cervical metastatic carcinoma, *Laryngoscope* 1977; 88(4): 594–597.
16. E. A. Allen, S. Z. Ali, and S. Mathew, Lymphoid lesions of the parotid, *Diagnostic Cytopathology* 1999; 21(3): 170–173.
 17. U. Schroder, H. E. Eckel, V. Rasche, G. Arnold, M. Ortmann and E. Stennert, Value of fine needle aspiration biopsy in the diagnosis of the parotid gland neoplasm, *HNO* 2000; 48(6): 421–429.
 18. Isaac U, Isaac JS, Isaac AD. Fine needle aspiration cytology of oral lesions. *Pak Oral Dent J* 2013; 33(2): 266-70.
 19. Kakoty S, Baruah TD, Babu CPG. FNAC and histopathological correlation of salivary gland lesions: An observational study. *Int Surg J* 2017; 4(7): 2148-52.
 20. Rutt AL, Hawkshaw MJ, Lurie D, Sataloff RT. Salivary gland cancer in patients younger than 30 years. *Ear Nose Throat J* 2011; 90(4): 174-84.
 21. Hafez NH, Fahim MI. Diagnostic accuracy and pitfalls of fine needle aspiration cytology and scrape cytology in oral cavity lesions. *Russ Open Med J* 2014; 3(405): 1-8.
 22. Layfield LJ, Tan P, Glasgow BJ. Fine-needle aspiration of salivary gland lesions. Comparison with frozen sections and histological findings. *Arch Pathol Lab Med* 1987; 111:346-53.
 23. Matsushita I, Takeda T, Tadao Kobayashi TK, Tanaka B, Sawaraqi I. Mucoepidermoid carcinoma of the salivary gland in pleural fluid. A case report. *Acta Cytol* 1983; 27:525-28.
 24. Hood IC, Qizilbash AH, Salama SS, Alexopoulou I. Basal-cell adenoma of the parotid. Difficulty in the differentiation from adenoid cystic carcinoma on aspiration biopsy. *Acta Cytol* 1983; 27:515-20.
 25. Rolf J. Postema, Mari-Louise F. van Velthuysen, Accuracy of fine-needle aspiration cytology of salivary gland lesions in the Netherlands cancer institute, Wiley Inter Science, 2004.
 26. Zerpa Zerpa V, Cuesta Gonzales MT, Agostini Porras G, Marcano Acuna M, EstellesFerriol E, Dalmau GJ. Diagnostic accuracy of fine needle aspiration cytology in parotid tumors. *Acta Otorrinolaringol Esp.* 2014; 65 (3):157–61.
 27. Pastore A, Borin M, Malagutti N, Di Laora A, Becati D, Delazer AL, et al. Preoperative assessment of salivary gland neoplasm with fine needle aspiration cytology and echography: a retrospective analysis of 357 cases. *Int J Immunopathol Pharmacol.* 2013; 26 (4):965–71.
 28. Jain R, Gupta R, Kudesia M, Sing S. Fine needle aspiration cytology in the diagnosis of salivary gland lesions: a study with histologic comparison. *Cytojournal.* 2013; 10:5.
 29. Kim BY, Hyeon J, Ryu G, Choi N, Baek CH, Ko YH, et al. Diagnostic accuracy of fine needle aspiration cytology for high grade salivary gland tumors. *Ann Surg Oncol.* 2013; 20(7): 2380–7.
 30. Fakhry N, Antonini F, Michel J, Penicaud M, Mancini J, Lagier A, et al. Fine needle aspiration cytology in the management of parotid masses: evaluation of 249 patient. *Eur Ann Otorhinolaryngol Head Neck Dis.* 2012; 129(3):131–5.
 31. Chakroborty B., Parvin S., Hossain M. M., & Hossain M. J. Self- Examination of Breast of the Students of Nursing College in Bangladesh. *Journal of Medical Research and Health Sciences.* 2022; 5(12): 2339–2344.