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ORIGINAL ARTICLE

Validity and Accuracy of FNAC in the Diagnosis of Pleomorphic Adenoma of Salivary Gland: A Clinico-pathological Study

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ABSTRACT

Objective: The first objective of the study was to analyze frequency of pleomorphic adenoma with reference to site involvement (i.e., parotid, submandibular, sublingual and minor salivary glands). Second objective was to determine sensitivity and specificity of Fine needle aspiration cytology (FNAC) for diagnosis of pleomorphic adenoma considering histopathology report as gold standard

Patients and Methods: This cross sectional study of pleomorphic adenoma of salivary glands was conducted at the Department of otolaryngology, Capital Hospital, Islamabad over a period of 5 years from May 1st, 2007 to April 30th 2012. This study included 50 diagnosed cases of pleomorphic adenoma, of either gender above 30 years of age. Cases who had already received treatment and those in which histopathology reports were not available were excluded from the study. Clinical data included parameters like age and sex distribution, site/ gland involvement, FNAC and histopathology reports were collected. Data was tabulated and analyzed using Microsoft Excel Worksheet. Qualitative data was presented by frequency and percentage and quantitative was calculated as mean ± SD. Variables specially studied included frequency of site involvement, and sensitivity and specificity of FNAC.

Results: This study included a total of 50 patients, out of which 20 (40%) were males and 30 (60%) were females with a male female ratio of 1:1.5. Age range was 30 to 50 years with mean age of 37.92 ± 6.26 years. Sites involved were, parotid in 24 (48%) patients, submandibular in 12 (24%) patients, and minor salivary glands in 14 patients (28%). FNAC done for diagnosis, had a sensitivity and specificity of 87.5% and 40% respectively with an accuracy rate of 78%.

Conclusion: FNAC is highly sensitive for the diagnosis of pleomorphic adenoma and should be performed in all such cases without undermining the importance of imaging studies.

Key words: Fine needle aspiration cytology, Pleomorphic adenoma, Salivary glands

Author`s Contribution	Address of Correspondence	Article info.
[1,2]Conception, synthesis, planning of research and manuscript writing Interpretation and discussion Data analysis, interpretation and manuscript writing, Active participation in data collection.	*Ghulam Saqulain* *Email: ghulam_saqulain@yahoo.com*	*Received: October 17, 2017* *Accepted: January 6, 2017*

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Introduction

Among the Head and Neck malignancies, salivary gland tumors account for around 3-6 %.[1] It is commonly seen in fifth and sixth decades in both genders.[2] Pleomorphic adenoma (PA) being the commonest benign salivary gland tumour,[3,4] is characterized by long quiescent periods with short growth spurts and has a clinically benign course.[5] It is a morphologically complex tumor having both epithelial and myoepithelial elements in mucopolysaccharide stroma and has a false capsule. FNAC based pre-operative diagnosis improves surgical outcome.[6] It is best treated by parotidectomy, since enucleation has a high recurrence rate. The commonest

site of involvement is usually the parotid gland followed by submandibular gland.[4,7] Pleomorphic adenomas may rarely become malignant after several years of growth. The purpose of the study was to analyze pleomorphic adenoma of salivary glands in our setup with reference to age and sex distribution, frequency of site involvement (i.e., parotid, submandibular, sublingual and minor salivary glands) and sensitivity and specificity of FNAC for diagnosis of the condition. This study will contribute to local data and by comparing it with international data, it will help the clinicians in early detection leading to a better outcome.

Patients and Methods

This cross sectional study was conducted at department of Otorhinolaryngology, Capital Hospital Islamabad from 1st May 2007 to 30th April 2012. Both male and female patients, more than 30 years of age with pleomorphic adenoma were included in the study. Patients who had already received treatment and those who did not have histopathology reports were excluded from the study. Medical record charts of these patients were reviewed to obtain history and other clinical data. Parameters specially noted were age and sex of patients, site/ gland involved, FNAC and histopathology reports. Data were collected, tabulated and analyzed using Microsoft Excel Worksheet. Gender was presented by frequency and percentage. Age of presentation was mentioned by mean ± SD. Area of involvement (i.e., parotid, submandibular, sublingual or minor salivary gland) was represented by frequency and percentage. Results of FNAC and histopathology were presented by frequency and were cross tabulated. Sensitivity and specificity of FNAC keeping histopathology as gold standard were calculated. Following formulas were used to calculate accuracy, sensitivity, specificity, and likelihood of positive and negative test results.

Accuracy= True positive (TP) + True negative (TN)/ TP+ TN+ False positive (FP)+ False negative (FN)
Sensitivity= TP/TP+FN; **Specificity**= TN/TN+FP;
Positive predictive value= TP/TP+FP × 100
Negative predictive value=TN/TN+FN × 100
Likelihood of positive test result = sensitivity/1-specificity
Likelihood of negative test result=1-sensitivity/specificity.

Results

Out of total 50 cases of pleomorphic adenoma, there were 20(40%) males and 30 (60%) females. Male to female ration was M:F= 1:1.5. Their age ranged from 30 to 50 years with mean age of 37.92 ± 6.26 years. (Table 1) illustrates the frequency distribution of site involvement, where parotid gland is on the top of the list. Histologic evaluation with FNAC and post-operative histopathologic confirmation was done in all patients. (Table 2) shows cross tabulation of FNAC and post-operative histopathology test results. Histopathological result reveal nests and tubules of epithelial and myoepithelial cells with chondromyxoid (Figure1).

Table 1: Sites of origin of Pleomorphic Adenoma (n=50)

S. No	Site Involvement	Number of cases (n)	Percentages (%)
1	Parotid Gland	24	48
2	Submandibular Gland	12	24
3	Sublingual	0	0
4	Minor Salivary Glands	14	28

Table 2: Cross tabulation of Histopathology and FNAC results

		Histopathology Result n(50)		
		Positive	Negative	Total
FNAC Result	Positive	35	6	41
	Negative	5	4	9
Total		40	10	50

Table 3: Evaluation of FNAC results

Test	Percentage (%)
Sensitivity	87.5
Specificity	40
Likelihood of positive test result	2.24
Likelihood of negative test result	2.16
Positive Predictive Value (PPV)	85.36
Negative Predictive Value (NPV)	44.44
Accuracy	78

Statistical analysis showed that FNAC had a high sensitivity along with medium specificity (Table 3).

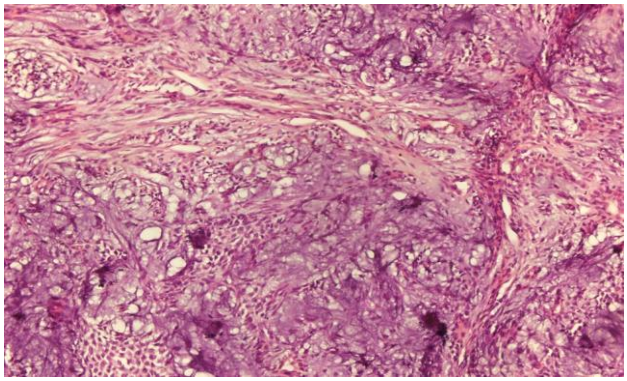

Figure1: Micrograph revealing nests and tubules of epithelial and myoepithelial cells with chondromyxoid background. (H&E: 100X)

Discussion

Among head and neck neoplasms, salivary glands tumours are the most heterogeneous pathologies. They constitute around 3% of head and neck tumours, 60 to 90% being benign and pleomorphic adenoma being the commonest.[8-11] Arshad AR et al, in a twelve-year study of 97 cases of parotid tumours reported 75% as benign of which 80% were pleomorphic adenomas.[12] Out of 50 patients of pleomorphic adenoma, included in this study female preponderance was seen with 20 males (40%) and 30 females (60%), with a male to female ratio of 1: 1.5.Similarly most studies report female preponderance with slight variation with a male-to-female ratio of 1:1.1 by Zaman et al,[8] 1: 1.3 by Memon et al,[11] 1: 1.8 by Bobati et al.[10] In contrast some studies show male preponderance.[1,13] The age of presentation in our study varied between 30 to 50 years with mean age of 37.92 ± SD 6.26 years which is in conformity to most studies like Gill et al, reported median age of 34 years,[13] Luksic et al, 50 years[14] and Bouaity et al, 44 years.[7] Pleomorphic adenomas usually have a unilateral presentation, however, rarely may be seen bilaterally.[15]

However, no case of bilateral pleomorphic adenoma was noted in our study. The commonest site of involvement is usually the parotid,[4,8,13,14,16] followed by submandibular glands [4] with minor salivary gland, reported as second commonest site by some.[8,14] In this study Parotid gland was most common gland involved in 48% (24 patients) followed by minor salivary glands of palate in 28% (14 patients) and submandibular gland 24%(12 patients) including a rare case of pleomorphic adenoma of minor salivary tissue in the par pharyngeal space. A similar picture is reported by Lusic et al,[14] Gbotolorun also reported palate as the commonest site of minor salivary benign tumour,[17] though other sites are also reported.[18] Also in a local study done over 8-year period, including 379 cases, parotid was the commonest site (82.85%) and five cases of minor salivary gland tumours were reported.[13] Computed tomography scanning is the gold standard imaging for determination of site, size, shape, extent, margins and relationship to neighboring structures[19], however, according to Bouaity et al, MRI is methodology of choice for assessment of benignity and malignancy.[7] In spite of available imaging techniques, the diagnosis of pleomorphic adenoma requires histologic confirmation. FNAC is simple and cheap tool to diagnose pleomorphic adenoma.

A study carried out by Abid et al recommends that FNAC is a reliable procedure for initial evaluation in benign lesions with specificity of 83.33%.[20] FNAC under ultrasound guidance is also recommended by the specialty associations involved in head and neck cancer patients in UK.[2] In this study the statistical analysis showed that sensitivity and specificity of FNAC was 87.5% and 40% respectively. The PPV was 85% and NPV was 44% with accuracy rate of 78%. In a study by Piccioni et al, comprising 176 cases, the sensitivity and specificity of FNAC was even higher than our study i.e., 81% and 99% and PPV and NPV were 93% and 98% respectively with accuracy rate of 83%.[6] Mamoon N et al in their study concluded that cystic changes in malignancy and overlapping cytological features of some tumours can cause misdiagnosis on FNAC.[22] Different authors have worked on FNAC on individual glands as well. Ali et al, in their study on parotid lesions compared preoperative FNAC with final histopathology and found correlation of results in 86% and concluded that FNAC was quite accurate in differentiating of benign from malignant parotid lesions.[23]

Similarly, Lee et al, in their study found the diagnostic accuracy of FNAC in pleomorphic adenoma of submandibular gland, diagnosed pleomorphic adenoma in 25 of the 29 cases with 85.7% sensitivity and accuracy of 82.8% and recommended FNAC as initial evaluation

investigation for submandibular masses.[24] Gahine et al, have advocated repeated aspirations with multipole sampling from different parts of the lesion so as to avoid misdiagnosis, and recommend a diagnostic approach in which presence of 3-dimensional cohesive clusters of ductal cells, background plasmacytoid myoepithelial cells and dense fibrillary brightly metachromatic stroma with partially obscured entrapped myoepithelial cells is necessary.[25] However, imaging studies have their own importance with MRI being imaging study of choice for masses with suspicion of malignancy.[26]

Conclusion

In our setup, pleomorphic adenoma is more common in females. The commonest site being parotid. In all such cases presenting with non-inflammatory swellings of the area, pleomorphic adenoma should also be considered in the differential diagnosis. FNAC is highly sensitive for the diagnosis of pleomorphic adenoma and should be performed in all such cases without undermining the importance of imaging studies.

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