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RESEARCH ARTICLE

"A Comparative Evaluation of Fine Needle Aspiration Cytology and Histopathological Examination in Diagnosis of Salivary Gland Neoplasm in a Tertiary Care Hospital of Raipur City (C.G.) India"

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Abstract

Introduction-Salivary gland neoplasms have been the object of intense curiosity for many centuries. They are a morphologically and clinically diverse group of neoplasm, which may present significant diagnostic and management challenges. These neoplasms can be approached by fine needle aspiration cytology and in many instances; a correct definitive diagnosis can be rendered. FNAC can provide accurate tissue diagnosis and distinguish between benign and malignant neoplasm. The current study was undertaken to study the cytomorphological features of the various salivary gland neoplasm and assess the diagnostic accuracy of FNAC by comparing it with the histopathology.

Material and Methods- The present prospective study was carried out in 45 patients with salivary glands neoplasm who were attended or admitted in Department of ENT and Surgery, Dr B.R.A.M. Hospital, Pt. J.N.M. Medical College, Raipur (C.G.) India during study period December 2012 to August 2014. Ultrasonography and fine needle aspiration cytology was done in all patients suspected of having salivary gland neoplasm. Histomorphology was assessed on routine H & E stained paraffin sections and the final histopathological diagnosis was compared with the FNAC findings to assess the accuracy of cytodiagnosis. Data was compiled in MS excel and checked for its completeness, correctness and then it was analyzed**.**

Results- Maximum incidence of benign tumor was found at the age group of 41-50 yrs (17.77%), 21-30 yrs age group (13.33%) followed by 31-40 yrs (11.11%). Out of 45 cases, 60% were diagnosed as benign and 40% as malignant neoplasms. Histology was available in 41 cases and results were found to be similar in (88.8%) in benign neoplasms, whereas 31.11% similarity found between FNAC and histopathological examination.

Conclusion- The overall diagnostic accuracy of FNAC was found 85.37%.Fine needle aspiration cytology is an important diagnostic tool in evaluating salivary gland neoplasm, considering the results and experiences of the present study.

INTRODUCTION

Salivary gland neoplasms have been the object of intense curiosity for many centuries. They are a morphologically and clinically diverse group of neoplasms, which may present significant diagnostic and management challenges. They represent about 3% of all the neoplasms of head and neck.

The etiological agents of salivary gland neoplasms remain unclear. Whilst most other head and neck cancers are strongly related to smoking and drinking, these do not play a role in the salivary glands. Some studies have found that a diet rich in vitamin C and low in cholesterol may be effective in preventing salivary gland neoplasm. On the other hand, possible risk factors include therapeutic radiation for other head and neck cancers, occupational exposures in rubber manufacturing and woodworking, and also employment at hairdressers or beauty shops. History of previous cancers, related to Epstein-Barr virus, immunosuppression, and radiation were also associated with an increased risk of salivary gland cancer. In a Swedish study, the risk of salivary gland cancer was increased 4 fold in Hodgkin's lymphoma patients. HIV infection was also found to increase the risk of salivary gland neoplasms. **[1]**

Histologically, these neoplasms represent the most heterogeneous group of neoplasms of any tissue in the body. Although almost 30 histological types of epithelial neoplasms of salivary gland exist, some are exceedingly rare. Neoplasms can occur in both the major and minor salivary glands. Benign neoplasms are more common than malignant neoplasms. Benign neoplasms occur mainly between second and third decade of life, while the malignant neoplasms occur in sixth and seventh decades of life.

For making diagnosis of these neoplasms, a good history and a skillful examination is necessary. Almost all neoplasms presents as swelling at the region of involved gland.

These neoplasms can be approached by fine needle aspiration cytology and in many instances; a correct definitive diagnosis can be rendered. FNAC can provide accurate tissue diagnosis and distinguish between benign and malignant neoplasm.Fine needle aspiration cytology (FNAC) has become a well-established technique in the preoperative diagnosis of head and neck neoplasm including the major and minor salivary glands. It is one of the most valuable tests available in the initial assessment of the patient who presents with a mass in the head and neck region or where a recurrence is suspected after previous treatment. Its popularity comes from the ease of performance, low morbidity and rapid diagnosis. It has some edge over an incisional biopsy and frozen section. FNAC is a simple, quick, useful and reliable procedure. Wide sampling of the lump is possible. This procedure takes only 5-10 minutes and result could be available after 15-20 minutes. FNAC also has a reported sensitivity of 65% to 85% and a specificity of 90% to 100%. **[2]** However, a highly qualified cytologist and a well-trained procurer of specimen are required for correct interpretation.

With this background, the present study was undertaken to study the cytomorphological features of the various salivary gland neoplasm and to assess the diagnostic accuracy of FNAC by comparing it with the Histopathological findings.

MATERIAL & METHODS

The present prospective study was carried out in 45 patients with salivary glands neoplasm who were attended or admitted in Department of ENT and Surgery, Dr B.R.A.M. Hospital, Pt. J.N.M. Medical College, Raipur (C.G.) India during study period December 2012 to August 2014. Ethical considerations were met through institutional ethical committee.

The history was elucidated as per predesigned proforma and the presenting chief complaints were noted in chronological order. Complete haemogram and blood bio-chemistry were done for all patients. Radiological investigations like X-ray chest and computed tomographic scanning was done in specific cases. Ultrasonography and fine needle aspiration cytology was done in all patients suspected of having salivary gland neoplasm.

Local examination of the swelling was done carefully. A clear explanation of the procedure ensured the patient's consent and cooperation. FNAC was performed using a 10cc syringe and 20-22 no needle. At least six smears were made per patient whenever possible, out of which two were air-dried to be stained with May-Grunwald-Giemsa stain and rest of the smears were immediately fixed in 95% ethyl alcohol to ensure fixation. In fixed smears, staining was done with Papanicolaou and Haematoxylin-eosin stains (H & E).

Inclusion Criteria

All the patients diagnosed as salivary gland neoplasm by cytology.

Exclusion Criteria

Patient with salivary gland swelling of inflammatory origin.

Histopathological examination was done in those cases who underwent surgical excision of the neoplasm. Out of 45 cases, in 41 cases surgical biopsies were performed. Histomorphology was assessed on routine H & E stained paraffin sections and the final histopathological diagnosis was compared with the FNAC findings to

assess the accuracy of cytodiagnosis. Data was compiled in MS excel and checked for its completeness, correctness and then it was analyzed**.**

RESULTS

Table No. – I. Age and sex wise distribution of cases

Variable	Benign		Malignant		Total of Cases
	No.	%	No.	%	
Age in years					
0-10	0	0	1	2.22	1
11-20	5	11.11	1	2.22	6
21-30	6	13.33	1	2.22	7
31-40	5	11.11	4	8.88	9
41-50	8	17.77	5	11.11	13
51-60	3	6.66	2	4.44	5
61-70	0	0	4	8.88	4
71 and above	0	0	0	0	0
Total	27	60	18	40	45
Sex					
Male	16	61.53	10	38.46	26
Female	11	57.89	8	42.10	19
Total	27	60	18	40	45

Maximum incidence of benign tumor was found at the age group of 41-50 yrs (17.77%), 21-30 yrs age group (13.33%) followed by 31-40 yrs (11.11%). Maximum incidence of malignant tumor was found at the age group of 41-50 yrs (11.11%).

Out of 45 cases, 60% were diagnosed as benign and 40% as malignant neoplasms. Amongst male 16 (61.53%) cases had benign lesion and 10 (38.46%) cases had malignant neoplasm. In female 11 (57.59%) were benign while 8 (42.10%) had malignant tumors. **(Table-I)**

Table No. – II. Age wise distribution of Benign and Malignant Neoplasms

Histological Types	Age in years								
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71 & above	Total
Benign Neoplasms									**27**
Pleomorphic adenoma	0	4	5	4	6	2	0	0	21
Monomorphic adenoma	0	0	0	0	1	0	0	0	1
Benign cystic lesion	0	1	1	1	1	0	0	0	4
Oncocytoma	0	0	0	0	1	0	0	0	1
Malignant Neoplasms									***18***
Mucoepidermoid carcinoma	1	1	0	4	1	2	4	0	13
Adenoid cystic carcinoma	0	0	1	1	3	0	0	0	5

The benign and malignant neoplasms of salivary gland were distributed in different age group according to the histological type. Maximum cases of pleomorphic adenoma i.e. 6 cases (31.57%) were found in age group 41-50 yrs followed by age group of 21-30 yrs i.e. 5 cases (26.31%). Mucoepidermoid carcinoma contribute 72.2% in malignant neoplasms group, out of which 4 cases (30.7%) were found in age group 31-40 and 61-70 yrs followed by 2 case (15.38%) in age group 51-60. Adenoid cystic carcinoma contribute 27.77%, out of which maximum (60%) seen in age group 41-50. **(Table-II)**

Table No. – III. Sex wise distribution of Benign and Malignant Neoplasms

Neoplasm	Total	Male	Female

	Cases	%	Cases	%	Cases	%
Benign						
Pleomorphic adenoma	21	77.77	13	61.9	8	38
Monomorphic adenoma	1	3.7	1	100	0	0
Oncocytoma	1	3.7	0	0	1	100
Benign cystic lesion	4	14.81	2	50	2	50
Total	27		16		11	
Malignant						
Mucoepidermoid carcinoma	13	72.2	8	61.53	5	38.46
Adenoid cystic carcinoma	5	27.77	2	40	3	60
TOTAL	18		10		8	

In this study, 27 (60%) were found benign out of series of 45 cases after histopathological examination. The maximum number of benign neoplasms were confirmed as Pleomorphic adenoma i.e. 21 (77.7%), followed by benign cystic lesion 4 (14.8%) and monomorphic adenoma and onocytoma were found in equal no. of cases.

Out of 21 case of pleomorphic adenoma (61.9%) male and (38.09%) female followed by 4 benign cystic lesion out of which male female ratio was found to be 50%.

Among in malignant tumors group, mucoepidermoid carcinoma contributes maximum of 72.2%, out of which 61.53% in male and 38.46% in female followed by adenocystic carcinoma 27.77%. **(Table-III)**

Table No. – IV. Comparative analysis of FNAC and Histopathological Diagnosis of salivary gland neoplasm

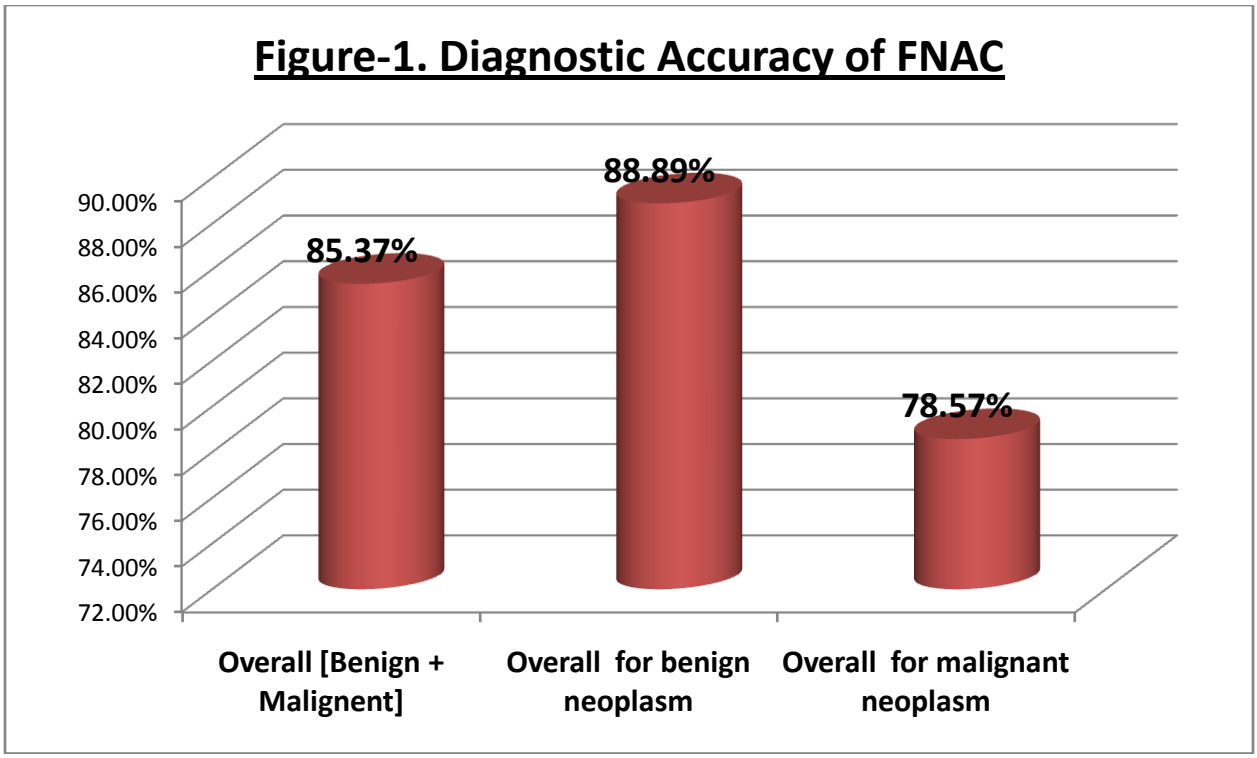
Cytological Diagnosis		**Histopathological Diagnosis**			
		Concordance		**Discordance**	
		N	**%**	**N**	**%**
Benign salivary gland neoplasm	27	24	88.88	3	12.5
Malignant salivary gland neoplasm	14	78.57	61.11	3	21.42
Total	**41**	**35**		**6**	

Histology was available in 41 cases and results were found to be similar in (88.8%) in benign neoplasms, whereas 31.11% similarity found between FNAC and histopathological examination. Discordance was found more in malignant (21.42%) as compared to benign lesion aspirate. **(Table-IV)**

Table– V. Diagnostic Accuracy of FNAC

Accuracy	**No.**	**Percentage**
Overall [Benign + Malignent]	35/41	85.37%
Overall for Benign neoplasm	24/27	88.89%
Overall for Malignant neoplasm	11/14	78.57%

Out of 45 cases, in 41 cases surgical biopsies were available for histopathological correlation. Diagnostic accuracy of FNAC for benign and malignant neoplasms was 88.89% and 78.57% respectively. **(Table-V, Figure-1)**



DISCUSSION

Salivary gland neoplasms can show a striking range of morphological diversity between different tumour types and sometimes within an individual tumour mass, in addition, hybrid tumours, differentiation and the propensity for some benign tumours to progress to malignancy can confound histopathological interpretation. These features, together with the relative rarity of a number of the tumours, can sometimes make diagnosis difficult, despite the abundance of named tumour entities.

Salivary gland neoplasms are uncommon, corresponding to approximately 3% to 10% of neoplasms of the head and neck region. **[3]**

In this study, salivary gland neoplasm distributed according to their nature as benign and malignant. The benign tumor constitutes about 60% and malignant tumor constitutes about 40%. We found in the English literature a predominance of benign salivary gland neoplasms (60% to 80%) compared with malignant neoplasms (20% to 40%), which is similar to our findings.[4] Analyzing a group of 1021 Slovakian patients with salivary gland neoplasms, observed that the frequency of benign neoplasms (74%) was higher than that of malignant neoplasms (26%).**[5]**

In the current study, benign neoplasms were seen in higher incidence in 5th decade i.e. in the age group 41-50, followed by fourth decade, which is consistent with the study made by Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro **[6]** where the average age in year was 47.7, 41.38 and 44 respectively, and inconsistent with the study made by Eveson JW, Cawson RA, where the incidence of benign tumor was higher in 55 yrs of age. **[3]**

In this study malignant neoplasms were seen in higher incidence in 5th decade i.e. in the age group 41-50,which is consistent with study made by Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro **[6]**, where the average age in year was 48.8 and 45.20 respectively .

In this study, among the benign neoplasms majority (i.e. 8 cases) of pleomorphic adenoma is the age group 41-50 yr, followed by second, third and fourth decade. The study is consistent with one of the study on Salivary gland neoplasms **[7],** where pleomorphic adenoma is most commonly seen with a mean age of 49.4yrs.it is inconsistent with one of the study Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro, where majority of pleomorphic adenoma is seen 39 yrs of age. **[6]**

In this study among the malignant neoplasms, mucoepidermid carcinoma was mostly seen in the age group of 31-40 followed by 61-70. It is consistent with the study made by Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro **[8]** where, Mucoepidermoid carcinoma (MEC) is commonly seen in 37.92yrs. It is inconsistent with the study made by **[9, 7]** where MEC was commonly seen in 51.3 and 70 yrs of age respectively.

In this study, adenocystic carcinoma was commonly seen with the age of 40.5 yrs, it was consistent with the study made by Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro **[6]**, and it was inconsistent with the other study **[9, 7]**, where the mean age was 54.7, 60 yrs respectively.

In this study sex distribution in different age group was appreciated, male patients with higher incidence in patients in the fifth decade (31.11%), this study was consistent with study made by Jaafari-Ashkavandi Z, Ashraf MJ, Moshaverinia M **[10]**, where the mean age group was 41.8±16.7 and study made by Wahiduzzaman M, Barman N, Rahman T, Uddin ME, Islam MT, Bhuiyan MZR **[11]** , where the highest incidence of neoplasms were found in 5^{th} decade (26%) of life. In this study female patients with the salivary gland neoplasm was with in higher incidence in third decade which is consistent with one of the study, Salivary gland neoplasms were distributed in male and female cases. **[7]** In this study male contributing 57.77% and female population constitutes 42.22% of salivary gland neoplasm, with male female ratio of 1.36:1. This study was consistent with the study made by [10, **11]** were the male female ratio was 1.02:1.

In the current study, benign tumor constitutes 60% and malignant tumor constitutes 40%, slight male predominance was noted in both benign and malignant neoplasms, which is consistent with study made by Jaafari-Ashkavandi Z, Ashraf MJ, Moshaverinia M, where benign salivary gland tumor constitutes more in male than female. [10]

In this study, maximum number of benign neoplasm was contributed by Pleomorphic adenoma i.e. 21 cases (77.7%), followed by benign cystic lesion 4 cases (14.8%) and monomorphic adenoma 3.7%, which is consistent with the study made by **[4, 5, 6,10]** where the pleomorphic adenoma contributes 80% of the benign tumor and monomorphic adenoma contributes 2.4%.In another study on Salivary gland neoplasms, pleomorphic adenoma contributes 79% of the total benign neoplasms which is also consistent with our study. **[7]**

In this study, male to female ratio of pleomorphic adenoma was 1.6:1; it is not consistent with the study made by Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro **[6]**, where the male to female ratio of pleomorphic adenoma was 1:2.

In this study mucoepidermoid carcinoma contributes majority of the malignant neoplasm i.e. 72.2%, followed by adenoid cystic carcinoma 22.22%, it is consistent with the study made by Vargas Pablo Agustin, Rene Gerhard, Vergilius JF Arauso Filho and Ines Viera De Castro, **[8]** where the mucoepidermoid carcinoma contributes 52%, followed by adenoid cystic carcinoma 20%. This study was inconsistent with the other studies **[12, 7, 10]** where majority of the malignant neoplasm was contributed by adenocystic carcinoma followed by mucoepidermoid carcinoma.

In this study cyto histological correlation was done, it shows that 100% correlation was seen between FNAC and histopathological examination in 85.36% cases and different finding in histopathogy and FNAC was seen in 14.64% of cases. Study is consistent with previous studies. **[13, 14, 15, 16, 17]**

CONCLUSION:

The overall diagnostic accuracy of FNAC in the present study was 85.37%. FNAC is gaining popularity in the pre-operative diagnosis of salivary gland neoplasm and in detecting malignancy in its early stages. This also helps to plan the therapeutic strategy. To conclude, fine needle aspiration cytology is an important diagnostic tool in evaluating salivary gland tumors, considering the results and experiences of the present study.

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