Original Article

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Aspiration Cytology Along with Histomorphological Correlation of Salivary Gland Lesions: A5 Years Retrospective Study.

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) of salivary glands is one of the most commonly done first line investigations in the head and neck region. A wide variety of benign and malignant tumors originate in the salivary glands and insufficient tumor cells make their diagnosis difficult in some patients.

The aim of this study was to evaluate the efficacy of fine-needle aspiration cytology in the diagnosis of salivary gland lesions by correlating cytological findings with histopathology.

Methods: All the FNAC slides of salivary gland lesions received at our tertiary hospital for a period of 6years from January 2013 to July 2017were reviewed retrospectively. Histopathological correlation was done for cases wherever available

Result: FNAC categorized 50% of the salivary gland lesions as neoplastic and 50% as non-neoplastic lesions. Amongst the neoplastic lesions, 64.28% were benign and 35.72%were malignant cases. Histopathological examination revealed that 66.64% of the cases were benign and 33.36% were malignant. Fine needle aspiration cytology had a sensitivity, specificity and diagnostic accuracy of 75%, 100% and 94.05%, respectively. The positive predictive value and negative predictive value were 100% and 92.75%, respectively.

Conclusion: Fine needle aspiration of the salivary gland is a safe and reliable technique in the primary diagnosis of salivary gland lesions. This study has shown that fine needle aspiration cytology has a high sensitivity, specificity and diagnostic accuracy in diagnosing salivary gland lesions. Being an rninimally invasive procedure, FNA of salivary glands continues to be an important diagnostic tool in the preoperative diagnosis of salivary gland lesions despite few pitfalls in diagnosing due to cytomorphological overlapping

Keywords: *Cytology, salivary gland, Histomorphology, cytomorphology*

Introduction

Salivary gland tumors accounts for 1-3% of neoplasms of all the head and neck neoplasms.[1,2] There are wide varieties of benign and malignant tumors which can originate in this gland and with insufficient aspirations makes their diagnosis very challenging.[3] Therefore; the prime challenge of fine needle aspiration cytology (FNAC) is differentiating benign from malignant disease, followed by typing to specific entities. The preoperative FNAC diagnosis can be used to plan the most effective therapeutic approach.

Objective

The aim of this study was to evaluate the efficacy of fine-needle aspiration cytology in the diagnosis of salivary gland lesions by correlating cytological findings with histopathology.

Materials and Methods

This was a retrospective study conducted in the Department of Pathology, in R L Jalappa Hospital and Research Centre, Karnataka, India between January 2011 and July 2017. A total of 84 patients with salivary gland lesions who had undergone preoperative FNAC and had been diagnosed by subsequent histopathological examination were included in this study.

The FNAC was performed using a 23-gauge needle attached to a 10 ml disposable syringe. Aspirates were smeared on clean slides, wet fixed or air dried and stained by Papanicolaou (PAP) and May-Grunwald-Giemsa (MGG) stains. The excised surgical specimens were fixed in 10% formalin, then routinely processed and stained by Haematoxylin and Eosin (HE) stain.

We compared the histopathological findings with the preoperative cytology of the FNAC specimens and calculated the sensitivity, specificity, positive predictive value (PPV) negative predictive value (NPV), and overall accuracy of FNAC for diagnosing benign and malignant diseases. The sensitivity and specificity of FNAC in differentiating between benign and malignant lesions were measured according to Galen and Gambino

Result

In our study, age of the patients ranged from 6-82 years with a median age of 53 years. However, most malignant

cases were seen after the age of 50. The parotid and the submandibular glands were the two most frequently involved sites in this study, each accounting for 46.5% of the cases, followed by minor salivary glands (5.2%). The sublingual gland was involved in 1 case (1.7%). Of the 48 cases diagnosed in histology as benign, most were seen in the submandibular gland (53.2%) followed by the parotid (40.4%). Most malignant cases (11 cases, 72.7%) were diagnosed in the parotid followed by submandibular gland (18.2%).

The results of FNAC were broadly categorized into non-neoplastic lesions, benign and malignant neoplasms. Of the 84 cases, 42(50%) were non-neoplastic and 42 cases (50%) were neoplastic. Also, amongst the 42 neoplastic cases, 27 cases (32.14%) were benign while 15 cases (17.86%) were non-neoplastic. Table 1 shows the FNAC diagnoses in 84 cases. In 8 cases, fluid was aspirated but a specific cytological diagnosis could not be reached. Such lesions were assessed to be benign in nature and were categorized as benign cystic lesions.

Correlation of Fine needle aspiration cytology with histopathological diagnoses: Of the 48 neoplastic cases, 28 (33.32.5%) cases were benign ad 20(23.8%) cases were malignant. There were 5 false negative cases but no false positive cases. The histopathological diagnoses are shown in Table 2.

Overall, for diagnosing salivary gland lesions (benign and malignant tumors combined), the sensitivity, specificity and diagnostic accuracy of FNAC were 75%, 100% and 94.05%, respectively. The positive predictive value (PPV) was 100% and the negative predictive value (NPV) was 92.9%.

An accurate specific lesion prediction for both benign and malignant lesions combined by FNAC was achieved in 94% (69/75) of the cases.

Benign Lesions: For benign lesions, the sensitivity, specificity and diagnostic accuracy of FNAC were 100, 75% and 94.05%, respectively. The PPV for benign disease was 92.9% and the negative predictive value (NPV) was 100%. An accurate specific lesion prediction for these lesions was achieved in 95.3% (61 cases) Table 3.

Malignant Lesions: The sensitivity, specificity and diagnostic accuracy of FNAC for diagnosing malignant salivary gland tumors were 75%, 100% and 94.05%, respectively. The positive predictive value (PPV) was 100% and the negative predictive value (NPV) was 92.9%. An accurate specific lesion prediction for these lesions was achieved in 65% (13 cases) Table 4.

TABLE 1: Fine Needle Aspiration Cytology in diagnosis of salivary gland lesions.

DIAGNOSIS		TOTAL NO OF CASES	%
Non-neoplastic	Chronic Sialadenitis	34	40.5
	Benign Cystic Lesion	8	9.5
	TOTAL	**42**	**50**
Neoplastic - Benign	Pleomorphic Adenoma	20	23.81
	Basal Cell Adenoma	2	2.38
	Warthin's	5	5.95
	TOTAL	**27**	**32.14**
Neoplastic - Malignant	Mucoepidermoid Carcinoma	5	5.95
	Adenocarcinoma	2	2.38
	Acinic Cell Carcinoma	3	3.57
	Myoepithelial Carcinoma	2	2.38
	Adenoid Cystic Carcinoma	2	2.38
	Carcinoma X Pleomorphic Adenoma	1	1.2
	TOTAL	**15**	**17.86**
GRAND TOTAL		**84**	**100**

Table 2: Histopathological diagnosis of salivary gland lesions.

DIAGNOSIS		TOTAL NO OF CASES	%
Non-Neoplastic Cases	Chronic Sialadenitis	34	40.5
	Sialadenosis	2	2.38
	TOTAL	**36**	**42.88**
Neoplastic – Benign Cases	Pleomorphic Adenoma	20	23.8
	Basal Cell Adenoma	2	2.38
	Warthin's	6	7.14
	TOTAL	**28**	**33.32**
Neoplastic - Malignant Cases	Mucoepidermoid Carcinoma	4	4.76
	Adenocarcinoma	2	2.38
	Acinic Cell Carcinoma	2	2.38
	Myoepithelial Carcinoma	4	4.76
	Adenoid Cystic Carcinoma	3	3.57
	PLGA	2	2.38
	Salivary Ductal Carcinoma	2	2.38
	Carcinoma X Pleomorphic Adenoma	1	1.2
	TOTAL	**20**	**23.8**
GRAND TOTAL		**84**	**100**

Table 3: Cytohistopathological correlation of benign salivary gland lesions.

HISTOLOGICAL DIAGNOSIS	NO OF CASES	FNAC DIAGNOSIS		
		EXACTLY CATEGORIZED	BENIGN BUT NOT EXACTLY CATEGORIZED	FALSE POSITIVE
CHRONIC SIALADENITIS	34	**34**	__	__
SIALADENOSIS	2	__	2	__
PLEOMORPHIC ADENOMA	20	**20**	__	__
BASAL CELL ADENOMA	2	**2**	__	__
Warthin's	6	**5**	1	__
TOTAL	**64**	**61**	**3**	__

TABLE 4 : Cytohistopathological correlation of malignant salivary gland lesions.

HISTOLOGICAL DIAGNOSIS	NO OF CASES	FNAC DIAGNOSIS		
		EXACTLY CATEGORIZED	MALIGNANT BUT NOT EXACTLY CATEGORIZED	FALSE NEGATIVE
Mucoepidermoid Carcinoma	**4**	4	1	__
Adenocarcinoma	**2**	2	__	__
Acinic Cell Carcinoma	**2**	2	1	__
Myoepithelial Carcinoma	**4**	2	__	2
Adenoid Cystic Carcinoma	**3**	2	__	__
PLGA	**2**	__	__	2
Salivary Ductal Carcinoma	2	__	__	1
Carcinoma X Pleomorphic Adenoma	1	1	--	--
TOTAL	**20**	**13**	**2**	**5**

Table 5: Comparison of sensitivity, specificity and diagnostic accuracy with other studies.

Various studies	No. of cases	Diagnostic accuracy	Sensitivity	Specificity	PPV	NPV
Jayaram G	53	73.6	90	--	--	--
Das D	712	91	94.6	75	--	--
Stramandinoli RT	79	82.3	68.2	87.7	68.2	87.7
Piccioni LO	176	97	81	99	93	98
Stow N	104	92.3	86.9	92.3	96.8	86.6
Postema RJ	380	96	88	99	95	97
Our study	**84**	**94.05**	**75**	**100**	**100**	**92.75**

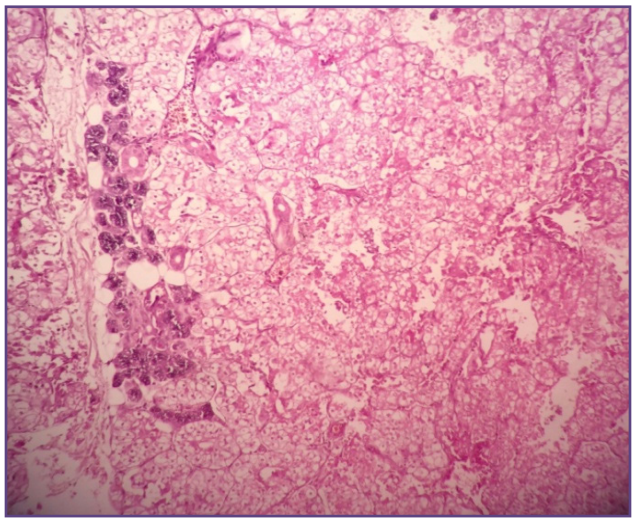

Fig. 1: Myoepithelial Carcinoma [H & E] [10X].

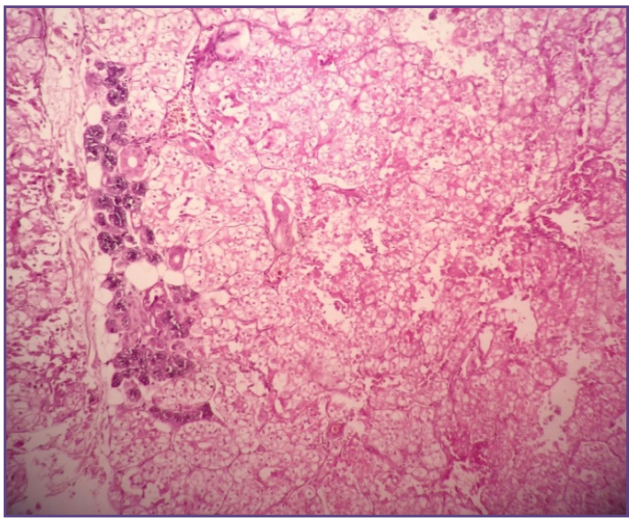

Fig. 2 : Polymorphous Low Grade Adenocarcinoma [H&E] [10X].

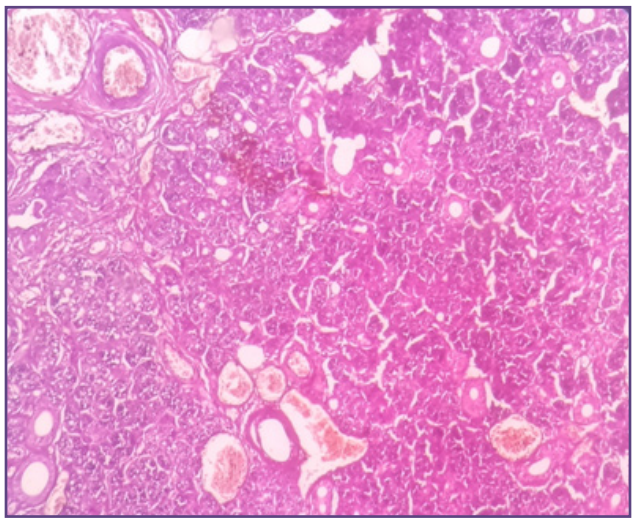

Fig. 3 : Chronic Sialadenitis [h&e] [10x].

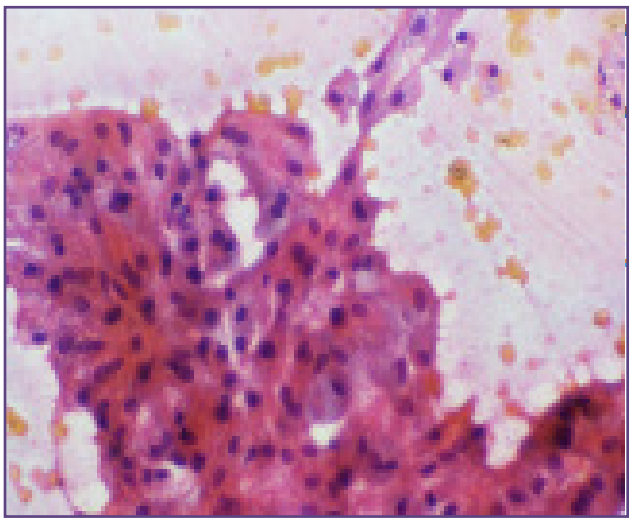

Fig. 4: Benign cystic lesion [PAP}40X.

Discussion

FNAC is a relatively safe painless procedure for the immediate preoperative diagnosis of the salivary gland lesions.[4]

In this study, the maximum number of patients presenting with salivary gland lesions and the maximum number of benign lesions were seen in the 21-30years age group. Most of the malignancies were seen in the fifth and sixth decades. Similar observations were found in other studies.[15-17] No sex preponderance was noticed in the overall incidence of salivary gland lesions in this study. Similar reports have been reported by others.[16,18]

The proportion of non-neoplastic lesions in the present study (50%) is similar to that reported by Jayaram et al[5] and Cardillo et al.[19] As in other studies, pleomorphic adenoma was also the most common salivary gland lesion in this study, followed by Warthin's tumour.[6,15,20] Amongst the malignancies, Acinic cell carcinoma, Mucoepidermoid and Polymorphous Low Grade Adenocarcinoma was more common than the others.[20] The incidence of malignant salivary gland tumours in the literature are variable. In a study by Postema et al[11] acinic cell carcinoma was most common while it was adenoid cystic carcinoma in studies by Akhter et al[15] and Stewart et al.[21]

Of the 8 cystic lesions, 2 cases each were diagnosed on histology as Polymorphous Low-Grade Adenocarcinoma and Chronic sialadenitis and a case each were diagnosed as Warthin's tumour, Pleomorphic Adenoma, Adenocystic carcinoma and Salivary Ductal carcinoma. Postema et al[11] also observed similar findings when diagnosing cystic lesions, and concluded that cytologic diagnosis of "cysts" should be interpreted with caution.

Of the 20 malignancies, 5 were misdiagnosed in cytology as benign (Table 4). Two such cases were Polymorphous Low Grade Adenocarcinoma (PLGA), which were diagnosed on cytology as a benign cystic lesion. The aspirate of the lesions yielded 2 ml of straw coloured fluid, which on microscopic examination showed foamy macrophages and few ductal cells only. The other false-negative result was reported in a case of Myoepithelial carcinoma, which was reported on cytology as a Pleomorphic Adenoma. Review of the slides showed cellular smears, comprising of epithelial cell clusters in a chondromyxoid background. The reason for low lesion prediction in typing specific malignant salivary gland lesions is due to the fact that a large number of benign and malignant neoplasms arise in the salivary glands and as there is considerable overlap of morphological features of these lesions causing diagnostic difficulties. Also, in new entities like polymorphous low-grade adenocarcinoma, cytological diagnosis is still not characterized.[14]

In our study, a high diagnostic efficacy of FNAC in diagnosing both benign and malignant lesions was achieved. Overall, for benign and malignant lesions, combined, FNAC showed a sensitivity of 75%, specificity of 100% and an overall diagnostic accuracy of 94.05%. These results were comparable to previously reported results (Table 5).[5-13]

Although a high diagnostic efficacy of FNAC in diagnosing salivary glands was achieved in this study, an accurate lesion prediction in typing specific histological lesions was achieved in 95.3% of benign lesions and only 65% of malignant lesions. A lower diagnostic accuracy of FNAC in typing specific benign lesions was observed in this study while aspirating cystic lesions (8 cases). These lesions were cytological categorized as benign cystic lesions, as no features of malignancy were seen in their respective smears.

Conclusion

FNAC of the salivary gland is a safe and reliable technique in the primary diagnosis of salivary gland lesions. Although, limitations are encountered while predicting specific lesions on cytology, especially when dealing with cystic and some malignant lesions, this study has shown that FNAC has a high sensitivity, specificity and diagnostic accuracy in diagnosing salivary gland lesions. FNAC, being a minimally invasive procedure continues to play a very crucial role in the preoperative diagnosis of salivary gland lesions in spite of varying pitfalls due to its cytomophological overlapping features.

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