ORIGINAL RESEARCH PAPER

Pathology

"CYTOMORPHOLOGICAL STUDY OF VARIOUS SALIVARY GLAND LESIONS AND EVALUATION BY MILAN SYSTEM FOR REPORTING SALIVARY GLAND CYTOPATHOLOGY IN TERTIARY CARE CENTRE"

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is a well-established technique that plays a critical role in preoperative diagnosis of any salivary gland mass lesions. Because of heterogeneity of salivary gland lesions and cytomorphology overlap, a uniform 6 tier Milan System for Reporting Salivary Gland Cytopathology (MSRSGC) helps standardize reporting systems and may aid in better communication between clinicians and pathologists and guide the clinical management of patients. **Aims:** We aimed to study the utility of FNAC in the diagnosis of salivary gland lesions and also study the cytomorphological features of various salivary gland lesions using Milan system classification. **Methods and Material:** We performed a retrospective analysis of salivary gland lesion FNAC in cytopathology department, tertiary care center from January 2018 to May 2019. All the cases of salivary gland aspirates were classified into six diagnostic categories according to the Milan system of reporting salivary gland cytology (MSRSGC) as follows: Category 1: Non-diagnostic (ND); Category 2: Non-neoplastic (NN); Category 3: Atypia of undetermined significance (AUS); Category 4a: Neoplasm: benign (NB), Category 4b: Neoplasm: salivary gland neoplasm of uncertain malignant potential (SUMP); Category 5: suspicious of malignancy (SM); and Category 6: Malignant (M). **Results:** A total of 54 cases of salivary gland aspirates were classified using the Milan system as non-diagnostic 2 cases (3.7%), non-neoplastic 12 (22.22%), atypia of undetermined significance 1 (1.85%), neoplasm 32 (59.3%), suspicious for malignancy 1 (1.86%), and malignancy 6 (11.1%). Pleomorphic Adenoma (23 cases; 43%) was the most common benign salivary gland lesions and Mucoepidermoid Carcinoma (3 cases; 5.6%) was most common malignant lesion. Parotid gland (38 cases; 70.4%) was the most commonly involved in benign and malignant tumors. Commonly affected age group by benign salivary gland lesion was 31-40 years and those with malignant salivary gland lesion was 21-30 years. **Conclusions:** The MSRSGC helps pathologists to standardize reporting leading to better clinical and surgical management.

INTRODUCTION:

The main purpose of fine-needle aspiration cytology (FNAC) in salivary gland lesions is to identify the lesion as salivary gland origin, categorize as benign or malignant, and further subtype them as low-grade or high-grade malignancy. [1,2] To bring uniformity in reporting, handful of experts met in Milan in September, during 2015 European Congress of Cytology, and the Milan System for Reporting Salivary Gland Cytopathology (MSRSGC) was actualized. The American Society of Cytopathology and the International Academy of Cytology were supportive of development of the Milan System. [2,3] This standard and uniform reporting system will provide universal reporting protocol and better understanding of lesion in relation to their clinical management. [4]

MATERIALS AND METHODS:

We performed a retrospective analysis of salivary gland lesion FNAC in our department from January 2018 to May 2019. All indoor and outdoor patients irrespective of age and sex presenting with salivary gland swelling referred to cytology section for FNAC in our hospital. Demographic data and radiologic findings were retrieved from the case records. FNAC was done by the trained cytopathologist using 23 G needle. Ultrasound guided (USG) FNAC wherever required was carried out. The material was spread on slide and 50% were fixed in 90% ethanol for haematoxylin and eosin (H and E) stain and Papanicolaou stain and 50% were air-dried for Giemsa stain. A total of 54 cases of salivary gland aspirates were evaluated. All these cases of salivary gland aspirates were classified into six diagnostic categories according to the Milan system of reporting salivary gland cytology (MSRSGC) as follows: Category 1: Non-diagnostic (ND); Category 2: Non-neoplastic (NN); Category 3: Atypia of undetermined significance (AUS); Category 4a: Neoplasm: benign (NB), Category 4b: Neoplasm: salivary gland neoplasm of uncertain malignant potential (SUMP); Category 5: suspicious of malignancy (SM); and Category 6: Malignant (M).

RESULTS:

We performed a retrospective analysis of salivary gland lesion FNAC in our department from January 2018 to May 2019. A total of 54 cases of salivary gland aspirates were evaluated and classified using the Milan System for Reporting Salivary Gland Cytopathology (MSRSGC) as MSRSGC category I; Non-diagnostic 2 cases (3.70%), MSRSGC category II; Non-neoplastic 12 cases (22.22%), MSRSGC category III; Atypia of undetermined significance 1 case (1.85%), MSRSGC category IV; Neoplasm 32 cases (59.26%), MSRSGC category V; Suspicious for malignancy 1 case (1.85%), and MSRSGC category VI; Malignancy 6 cases (11.11%). Neoplasm (MSRSGC IV) contributed to majority of cases accounting 32 cases (59.3%) followed by non-neoplastic lesions (MSRSGC II) contributed to 12 cases (22.2%). (Table 1)

Table 1: Distribution of salivary gland lesion according to Milan System of reporting Salivary gland cytopathology and sex wise (n=54)

Category of the Milan System of reporting Salivary gland cytopathology	Diagnosis	Male	Female	No and % of cases	No & % of total cases according to category
I. Nondiagnostic or Unsatisfactory	Unsatisfactory for evaluation	0	2	2 (3.7%)	2(3.7%)
II Non-Neoplastic	Sialadenitis	6	4	10 (17.88%)	12(22.22%)
	Sialadenosis	1	0	1(1.85%)	

	Chronic reactive hyperplasia	1	0	1(1.85%)	
III. Atypia of Undetermined Significance	Atypia of Undetermined Significance	1	0	1 (1.85%)	1(1.85%)
IV. Neoplasm	Basal cell adenoma	1	0	1(1.85%)	32(59.3%)
	Warthin tumor	1	0	1(1.85%)	
	Pleomorphic adenoma	12	11	23(43%)	
	SUMP (Salivary gland neoplasm of Uncertain Malignant Potential)	4	3	7(13%)	
V. Suspicious for Malignancy	Suspicious for Malignancy	1	0	1(1.85%)	1(1.86%)
VI. Malignant	Mucoepidermoid Carcinoma	2	1	3(5.6%)	6(11.1%)
	Acinic Cell Carcinoma	1	1	2 (3.7%)	
	Adenoid cystic carcinoma	0	1	1(1.85%)	
Total		31	23	54	54

In present study, 31 (57.40%) males and 23 (42.60%) females were affected in salivary gland lesions and M: F ratio was 1.3:1. Male preponderance were seen in all category. (Table 1)

Salivary gland neoplasm can occur in any age group. In the present study, the lesions were seen in the age group of 16-79 years and most commonly affected age group in salivary gland lesions was 31-40 years of age. Commonly affected age group by benign salivary gland lesion was 31-40 years and those with malignant salivary gland lesion was 21-30 years. Most common non neoplastic lesion in present study was Sialadenitis which had highest cases in 31-40 years age group. (Table 2)

Table 2: Age wise distribution of various salivary gland lesions (n=54)

Category	Subcategorization	11-20	21-30	31-40	41-50	51-60	61-70	70-80	total
I. Nondiagnostic	Unsatisfactory for evaluation	0	0	0	1	1	0	0	2
II Non-Neoplastic	Sialadenitis	0	2	4	2	1	1	0	10
	Sialadenosis	0	0	1	0	0	0	0	1
	Chronic reactive hyperplasia	0	0	0	0	1	0	0	1
	Total	0	2	5	2	2	1	0	12
III. Atypia of Undetermined Significance		0	0	0	1	0	0	0	1
IV. Neoplasm	Basal cell adenoma	0	0	1	0	0	0	0	1
	Warthin tumor	0	0	0	0	0	1	0	1
	Pleomorphic adenoma	0	5	8	2	5	3	0	23
	SUMP (Salivary gland neoplasm of Uncertain Malignant Potential)	1	1	1	2	1	1	0	7
	Total	1	6	10	4	6	5	0	32
V. Suspicious for Malignancy		0	0	0	0	0	0	1	1
VI. Malignant	Mucoepidermoid Carcinoma	1	2	0	0	0	0	0	3
	Acinic Cell Carcinoma	0	0	0	0	1	1	0	2
	Adenoid cystic carcinoma	0	0	0	0	0	1	0	1
Total		2	10	15	8	10	8	1	54

Most common benign tumor in present study was Pleomorphic adenoma which had highest cases in 31-40 years age group. Cytologically, the smears in pleomorphic adenoma showed epithelial cells admixed with ovoid myoepithelial cells and chondromyxoid stroma.

Most common malignant tumor in present study was Mucoepidermoid Carcinoma which had highest cases in 21-30 years age group. (Table 2) Cytologic smears of Mucoepidermoid Carcinoma were sparsely cellular and showed cohesive clusters of intermediate cells in a background of mucus, debris and inflammatory cells. The cytologic smears of adenoid cystic carcinoma showed small uniform epithelial cells with hyperchromatic nuclei and coarse chromatin adhering to hyaline stromal globule.

Out of 54 cases of salivary gland lesions in present study, the common site of salivary gland lesions was parotid gland (38 cases; 70.4%), submandibular glands (15 cases; 27.75%) and minor salivary glands (1 case; 1.85%) in decreasing frequency. Parotid gland was the most commonly involved by TMSRSGC category I, III, IV, V, and VI in present study. Submandibular gland was most commonly involved by non-neoplastic lesions (TMSRSGC category II) in present study. (Table 3)

Table 3: Site wise distribution of Milan system category of salivary gland lesions (n=54)

Site	Category I	Category II	Category III	Category IV	Category V	Category VI	Total
Parotid gland	2	5	1	23	1	6	38 (70.4%)
Submandibular Gland	0	7	0	8	0	0	15 (27.75%)

Minor Salivary Gland	0	0	0	1	0	0	1(1.85%)
TOTAL	2	12	1	32	1	6	54

DISCUSSION:

Fine needle aspiration cytology (FNAC) is a simple, worldwide accepted, painless, quick, safe, easily accessible, repeatable, minimally invasive and cost-effective method for pre-operative diagnosis of salivary gland tumors hence can be recommended as first line investigation. [1] FNAC is a popular method for evaluating salivary gland tumors due to its superficial location, ease of accessibility and high diagnostic accuracy. [5] The usefulness of FNAC as primary diagnostic procedure was studied here into patient with different types of salivary gland lesions over a time period from January 2018 to May 2019.

Out of 54 cases of salivary gland lesions, neoplastic lesions (MSRSGC IV) contributed to majority of cases in present study and accounting 32 (59.3%) cases which was in concordance with studies conducted by Pujani M et al. [6] and Katta R et al. [8] Second highest 12 (22.2%) cases were of non-neoplastic lesions (MSRSGC II), which was in concordance with studies conducted by Pujani M et al. [6] and Katta R et al. [8], whereas Mishra S et al. [7] non-neoplastic lesions (55.4%) were most common than neoplastic lesions (26.9%). It may be due to differences in practice patterns, patient demographics and the heterogeneity of salivary gland lesions.

Third most common cases were of malignant lesion (MSRSGC VI) with 6 (11.1%) cases, which were in concordance with studies conducted by Pujani M et al. [6], Mishra S et al. [7] and Katta R et al. [8]

Most common benign neoplasm found was pleomorphic adenoma and most common malignant neoplasm was mucoepidermoid carcinoma in our study which was in concordance with Pujani M et al. [6], Mishra S et al. [7] and Katta R et al. [8].

There were 1(1.85%) case of MSRSGC category III, which was in concordance with studies by Pujani M et al. [6] and Katta R et al. [8]. This was well within the goal of proposed MSRSGC system to keep FNACs cases labelled as category III to <10% [35]. (Table 4)

Table 4: Comparison of salivary gland according to Milan system with different study

Category of the Milan System of reporting Salivary gland cytopathology		Pujani M et al. (2019)	Mishra S et al. (2019)	Katta R et al.– (2019)	Present study
I. Nondiagnostic		7(4.6%)	3 (2.5%)	3 (4.3%)	2 (3.7%)
II Non-Neoplastic		63(42%)	66 (55.4%)	9(13%)	12(22.22%)
III. Atypia of Undetermined Significance		3 (2%)	Nil	1 (1.4%)	1(1.85%)
IV. Neoplasm	Total	67(44.6)	32 (26.9%)	45(65.1%)	32(59.3%)
	Basal cell adenoma	4 (2.7%)	1 (0.84%)	3 (4.3%)	1(1.85%)
	Warthin tumor	9 (6%)	5 (4.2%)	3 (4.3%)	1(1.85%)
	Pleomorphic adenoma	52 (34.67%)	24 (20.2%)	34 (49.28%)	23 (43%)
	Other	0	0	3(4.3%)	0
	SUMP	2(1.3%)	2(1.7%)	2 (2.8%)	7 (13%)
V. Suspicious for Malignancy		2(1.3%)	3(2.5%)	3(4.3%)	1(1.86%)
VI. Malignant	Total	8(5.3%)	15 (12.6%)	8 (11.6%)	6(11.1%)
	Mucoepidermoid Carcinoma	2(1.3%)	8 (6.72%)	4(5.8%)	3 (5.6%)
	Acinic Cell Carcinoma	1 (0.7%)	1 (0.84%)	0	2 (3.7%)
	Adenoid cystic carcinoma	1 (0.7%)	3 (2.5%)	0	1(1.85%)
	Other	4	2 (1.68%)	4(5.8%)	0
Total		150	119	69	54

The most common age group affected in present study was 31-40 years age group. Similar findings were observed by Pujani M et al. [6] and Mishra S et al. [7] while Katta R et al. [8] had 40-50 years age group. The earlier presentation in our study may be due to health awareness in our study group or may be due to different sample size, different geographical factors. M:F ratio was 1.3:1 in present study. Similar findings were observed by Pujani M et al. [6] and Katta R et al. [8] (table 5)

Table 5: Comparison of salivary gland swellings according to age and sex

Study series	Age group with maximum no. of cases	M:F ratio
Pujani M et al. (2019)	31-50 years	1.4:1
Mishra S et al. (2019)	31-40 years	1:1
Katta R et al.– (2019)	40-50 years	1.15:1
Present study	31-40 years	1.3:1

In our study parotid gland was the most commonly involved gland followed by submandibular gland and minor salivary glands in descending order which was in concordance with the other studies shown above. (Table 6)

Table 6: Site wise distribution of salivary gland tumors compared with other studies

Study name	Parotid (%)	Submandibular (%)	Minor salivary gland(%)
Pujani M et al. (2019)	63%	34%	3%
Katta R et al.– (2019)	67%	21%	12%
Our study	70.4%	27.75%	1.85%

CONCLUSIONS:

FNAC is a simple, quick, minimally invasive and cost-effective method for evaluating suspicious salivary gland lesions. Cytology can distinguish nonneoplastic from neoplastic and benign from malignant lesions. The MSRSGC helps pathologists to standardize reporting leading to better clinical and surgical management.

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