

Cytomorphological features of salivary gland lesions based on the Milan system of reporting in a tertiary care center



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ABSTRACT

Background: Fine-needle aspiration cytology (FNAC) of the salivary glands is a well-established technique that aids in pre-operative identification of abnormalities and to distinguish between neoplastic and non-neoplastic salivary gland lesions. Milan system for reporting of salivary gland cytology uses a standardized tiered system for categorization of salivary gland lesions. **Aims and Objectives:** The present research was aimed to study the prevalence of various salivary gland lesions cytologically and classify them based on the Milan system. **Materials and Methods:** The current retrospective descriptive study was done in the Department of Pathology, Shyam Shah Medical College, Rewa, M.P. A total of 57 FNAC slides were retrieved, re-examined, and re-classified according to the Milan system. **Results:** In the present study, a total of 57 cases of salivary gland lesions were included and categorized under the Milan system of salivary gland cytology. 5.3% of the smears in our study were non-diagnostic (Category I). The most common category was IVa comprising benign neoplastic lesions with 36.8%. Non-neoplastic lesions (Category II) were seen in 24.6% cases, whereas 14% of the lesions belonged to category IVb (suspicious for malignancy). Malignant lesions (Category VI) comprised 8.8% of all the cases. **Conclusion:** The most common and least common category of salivary gland lesion was Category IVa and Category IVb, respectively. The adoption of Milan classification system for reporting salivary gland FNAC is a critical step in categorizing these lesions for risk stratification and enhancing the communication among clinicians and pathologists, the ultimate result being improved patient care and management.

Key words: Fine-needle aspiration cytology; Milan system; Salivary gland

INTRODUCTION

Salivary gland neoplasms account for about 6.5% of the lesions sampled in the head and neck, with about 40% of these being malignant.¹ The diagnosis of these lesions is based on the clinical history and examination, various imaging modalities comprising ultrasonography and/or magnetic resonance imaging, followed by fine-needle aspiration cytology (FNAC).²⁻⁴ It is a safe and cost-effective method for examining salivary gland abnormalities before surgery. It aids clinical management by identifying

neoplastic and non-neoplastic lesions, determining the malignant potential of the lesions, and providing prognostic information as well as a sample for ancillary testing such as molecular research.⁵ Information thus obtained is an invaluable aid in proper clinical and surgical management.⁶ Despite the above-mentioned advantages, there are some drawbacks, such as lack of architecture to assess invasion, the heterogeneity and significant cytomorphologic overlap across salivary gland lesion, and the ever-expanding list of head and neck tumors.⁷ Salivary lesions remain, however, one of the most challenging entities in cytopathology,

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mainly due to the diversity of histologic subtypes and the often overlapping morphologic features of the lesions.^{8,9} Previously, FNAC diagnosis of salivary gland lesions were frequently descriptive and lacked clarity for therapy guidance. To standardize terminology, the Milan system for reporting salivary gland cytopathology (MSRSGC) was designed, which provides a systematic means of reporting salivary gland FNAC samples. It provides crucial categorization and can improve communication between cytopathologists, between surgeons and cytopathologists and eventually provide risk stratification according to the category. This information may be used to improve preoperative counselling.²

Aims and objectives

To study the prevalence of the various salivary gland lesions and to classify them according to the MSRSGC.

MATERIALS AND METHODS

The present study was a retrospective descriptive study done in the Department of Pathology, Shyam Shah Medical College and Associated Hospitals for 1 year from January 2021 to December 2021 after obtaining ethical approval from the Institutional Ethical Committee. Departmental cytological records were checked for salivary gland lesions which were reported during the above-mentioned period. These accounted for a total of 57 cases, for which the demographic along with clinical details and FNAC slides were retrieved from the department archives, re-examined, and classified according to the MSRSGC which is a six-tiered system¹⁰ with the following categories:

1. Category I – Non-diagnostic (ND)
2. Category II – Benign/non-neoplastic (NN)
3. Category III – Atypia of undetermined significance (AUS)
4. Category IV
 - IVa – Benign neoplasm (NB)
 - IVb – Neoplasm of uncertain malignant potential (SUMP)
5. Category V – Suspicious for malignancy (SFM)
6. Category VI – Malignant lesion (M).

The MSRSGC stratifies salivary gland lesions based on the risk of malignancy (ROM). The estimated ROM for Category I is 25%, Category II is 10%, Category III is 20%, Category IVa is <5%, Category IVb is 35%, Category V is 60%, and for Category VI is 90%.

All the details were entered on Microsoft Excel and analyzed. Frequency counts (percentages) were calculated for demographic variables, site of lesion, and the category of lesion as reported.

RESULTS

A total of 57 patients with salivary gland swellings were included in our study. Age of all the patients ranged from 7 years to 69 years with maximum incidence in the 5th decade. Predominantly, the salivary gland lesions were seen in males with 61.4% (35/57) of the total cases and a male-to-female ratio of 1.59:1. Most of the patients presented with swelling in the parotid region followed by sub-mandibular region with 70.17% (40/57) and 26.33% (15/57), respectively. Minor salivary gland lesions were seen in 3.5% (2/57) of the cases (Table 1).

According to Milan system for reporting of salivary gland cytopathology, 5.3% (3/57) of the smears in our study were ND (Category I). NN lesions comprised 24.6% (14/57), whereas 7% (4/57) cases revealed few atypical features categorized under Category III (AUS). Category IV classified as NB (IVa) and SUMP (IVb) comprised 36.8% (21/57) and 3.5% (2/57), respectively. About 14% (8/57) of the cases were categorized as SFM (Category V) and 8.8% (5/57) of the cases were classified as malignant salivary gland lesions (Category VI) (Table 2).

Among the neoplastic salivary gland lesions, NBs comprised 80.8% (21/26) of the cases and malignant neoplasms comprised 19.2% (5/26) of cases. Among the NBs, pleomorphic adenoma was the most common lesion (Figure 1) with 53.9% (14/26) of cases followed by Warthin's tumor with 15.5% (4/26) and lipoma, and basal cell adenoma and myoepithelioma with 3.8% (1/26) cases

Table 1: The frequency and distribution of all the patients based on the age of presentation, sex, and site of the swelling

(a) Age distribution of all patients		
Age group	Number of patients	Percentage
<10	5	8.8
11–20	12	21.1
21–30	5	8.8
31–40	8	14.0
41–50	15	26.3
51–60	5	8.8
>60	7	12.3
Total	57	100
(b) Sex distribution of all the patients		
Gender		
Male	35	61.4
Female	22	38.6
Total	57	100
(c) Site of swelling		
Site		
Parotid	40	70.17
Sub-mandibular	15	26.33
Minor salivary glands	2	3.5
Total	57	100

each. Among the malignant neoplasms, mucoepidermoid carcinoma was the most common lesion (Figure 2) with 11.5% (3/26) cases and adenoid cystic carcinoma was seen in 7.7% (2/26) cases (Table 3).

DISCUSSION

FNAC is a safe, accurate, and cost-effective method for evaluation of salivary gland swellings and can help in management of the patient by providing nature of the lesion. The technique is minimally invasive, rapid, and cost-effective and can be used efficiently in the outpatient setting. Milan system provides a six-tiered system with uniform terminology for better communication between clinicians and pathologists and also stratifies patients according to the ROM to improve the overall management of the patients.¹¹

In the present study, 57 patients presenting with salivary gland swellings were subjected to FNAC and the results were interpreted based on the Milan system for reporting of

salivary gland cytopathology. 5.3% of all the cases belonged to Category I, that is, were ND. This result was in accordance with similar studies done by Rohilla et al.,¹² in 2017 and Katta and Chaganti¹³ in 2019 with 1.06% and 4.3%, respectively, in Category I. However, studies done by Wu et al.,¹⁴ in 2019, Dubucs et al.,¹⁵ in 2019, and Singh et al.,¹⁶ in 2021 observed higher percentage of cases belonging to ND category. This difference may be due to the variation in the techniques of FNAC or may account to the higher sample size in the above-mentioned studies.^{14,15} In accordance with the previous studies, the prevalence of non-neoplastic lesions (Category II) was 24.6% in the present study.^{12-14,17} In the present study, the percentage of cases in Category III was more in comparison with the other studies. Benign lesions (Category IVa) of salivary gland comprised the most common category in the present study with 36.8% cases which are in agreement with most of the similar studies done previously.¹²⁻¹⁷ Hence, most of the salivary gland

Table 2: Categorization of all the lesions based on Milan system for reporting of salivary gland cytopathology

Category	Number of samples	Percentage
Category-I: ND	3	5.3
Category-II: NN	14	24.6
Category-III: AUS	4	7.0
Category-IV		
IV-a: NB	21	36.8
IV-b: SUMP	2	3.5
Category-V: SFM	8	14.0
Category-VI: M	5	8.8
Total	57	100

Table 3: Frequency of neoplastic lesions of salivary gland

Neoplastic lesions	Number of samples	Percentage
Benign		
Pleomorphic adenoma	14	53.9
Warthin's tumor	4	15.5
Basal cell adenoma	1	3.8
Lipoma	1	3.8
Myoepithelioma	1	3.8
Total	21	80.8
Malignant		
Mucoepidermoid carcinoma	3	11.5
Adenoid cystic carcinoma	2	7.7
Total	5	19.2
Total	26	100

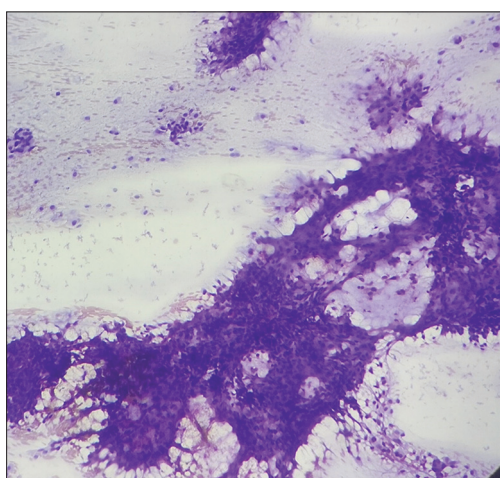


Figure 1: A 32-year-old male, fine-needle aspiration cytology of swelling in the parotid region – showing benign ductal epithelial cells, myoepithelial cells and fibrillary stroma – Category IVa (Milan system for reporting of salivary gland cytology) – Neoplastic Benign- Pleomorphic adenoma (H&E stain; ×40)

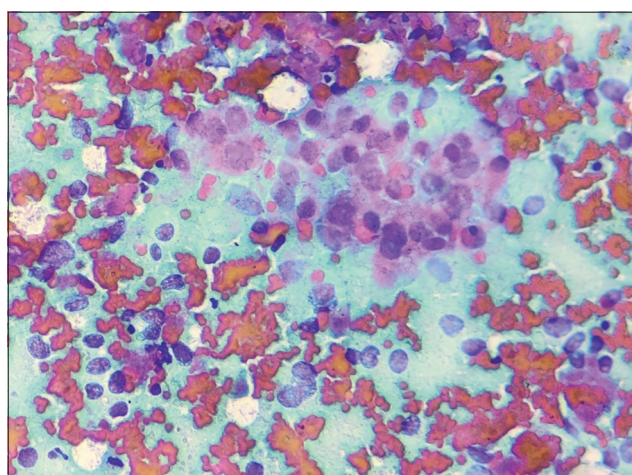


Figure 2: A 67-year-old male, fine-needle aspiration cytology of the swelling in the submandibular region – showing clusters of highly pleomorphic tumor cells having abundant eosinophilic cytoplasm with nuclear overlapping along with singly scattered tumor cells in hemorrhagic background – Category VI (Milan system for reporting of salivary gland cytology) – Malignant salivary gland lesion (Pap stain; ×40)

Table 4: Comparison of types of salivary gland lesions with their respective frequencies in various studies

Study and year	Sample Size	Category I (%)	Category II (%)	Category III (%)	Category IVa (%)	Category IVb (%)	Category V (%)	Category VI (%)
Rohilla et al., ¹² 2017	94	1.06	24.5	2.1	43.6	2.1	0	26.6
Katta and Chaganti, ¹³ 2019	69	4.3	13	1.4	62.3	2.8	4.3	11.6
Wu et al., ¹⁴ 2019	1560	18.8	21.5	3.8	37.2	5.9	1.2	11.4
Dubucs et al., ¹⁵ 2019	328	25.6	8.2	1.2	44.2	4.6	4.9	11.3
Singh et al., ¹⁶ 2021	123	18.7	31.7	0.81	39.8	1.6	1.6	5.6
Jha et al., ¹⁷ 2021	292	10.6	27.4	0.68	48.9	0.3	4.4	7.5
Present Study, 2021	57	5.3	24.6	7.0	36.8	3.5	14	8.8

lesions fall under Category IVa of the Milan system. The percentage of cases under SUMP (Category IVb) in our study was in concordance with other studies.¹²⁻¹⁶ However, in the study conducted by Jha et al.,¹⁷ the percentage is less with 0.8%. Since these lesions are having uncertain malignant potential, regular follow-up and appropriate surgical management is required for these cases. In the present study, the percentage of cases under Category V (SFM), suspicious of malignancy was 14% which was higher in comparison with other studies. Since the ROM is higher in these cases, appropriate surgical management should be done. 8.8% of the cases were reported as malignant in the present study classified into Category VI. The prevalence of malignant salivary gland lesions was similar to that observed by previous researchers.¹³⁻¹⁷ However, Rohilla et al.,¹² in a similar study, reported a relatively higher prevalence of malignant salivary gland lesions. This difference may be due to the prevalence of malignant lesions in different geographical regions (Table 4).

Limitations of the study

The drawback of the present study was the loss of follow-up by the patients for surgical management resulting in lack of histopathological correlation.

CONCLUSION

The most prevalent salivary gland lesions according to our study belonged to Category Iva, whereas Category IVb was the least prevalent category. A unified and standardized tiered system like the MSRS GC aids in classifying these lesions according to the risk and provides for a better communication and helps in guiding management. Milan system is also beneficial in categorizing difficult cases with overlapping features.

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