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Original Article

Pathology Section

# Categorisation of Salivary Lesions According to the Novel Milan's System of Reporting Salivary Gland Cytopathology: A Retro-prospective Study

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## ABSTRACT

**Introduction:** Fine Needle Aspiration Cytology (FNAC) is an important diagnostic tool for salivary lesions, which has decreased the number of unnecessary invasive surgeries for benign conditions. But, cytopathology of salivary lesions is complex presenting with similarity in cytological features albeit with histological heterogeneity. The novel Milan's System for Reporting Salivary Gland Cytopathology (MSRSGC) is a six tiered classification, providing standard reporting terminology for salivary gland lesions in fine needle aspirates.

**Aim:** To categorise the salivary lesions cytologically based on MSRSGC and to assess its utility in simplification of routine diagnosis of salivary gland lesions.

**Materials and Methods:** A retroprospective study was conducted in a tertiary care centre over a period of five years from 2017 to 2021. All patients suspected to have salivary gland lesions were subjected to FNAC in the Department of Cytology. The cases were reported according to the MSRSGC criteria and assigned one of the categories. The statistical analysis was performed using Microsoft excel software, for calculation of descriptive statistical parameters such as measures of central tendency viz., mean, median, mode, percentage, range and ratio.

**Results:** A sample size of 82 patients with salivary gland lesions was studied. Parotid gland was most commonly involved, among others. Most of the lesions were classified as category 4a (Neoplasm benign) (39%) and category 2 (Non neoplastic) (36.6%). Non Diagnostic (ND) constituted only 2.43% while malignancies constituted 4.9%. Ambiguous categories like Salivary gland neoplasm of Uncertain Malignant Potential (SUMP) and suspicious of malignancy constituted 13.4% and 3.6%, respectively.

**Conclusion:** The introduction of MSRSGC has to a large extent standardised the reporting patterns, thereby assisting the clinicians to render improved patient care. The present study in comparison with other studies conducted worldwide, recommends the usage of MSRSGC for routine reporting.


**Keywords:** Aspiration cytology, Classification, Fine needle aspiration cytology, Reporting terminology

## INTRODUCTION

The FNAC is an important diagnostic tool for salivary gland lesions as this technique is minimally invasive, cost-effective and can be performed in a routine day care practice with minimal risk to patient. It has been shown to reduce unnecessary invasive surgeries in patients with benign conditions and to guide the clinician in deciding management strategies. However, cytological diagnosis of salivary gland lesions can be a challenge due to cytomorphological similarity of most lesions and histopathological diversity and heterogeneity [1,2]. This is even more complicated with the addition of newer entities by World Health Organisation (WHO) of salivary neoplasms. Further, procedural expertise in aspiration and experience in diagnosing these rare lesions may affect the treatment and outcome.

The MSRSGC was proposed by the American Society of Cytopathology and International Academy of Cytology as a tiered international classification scheme with an intention to provide a guide for clinical management [3,4]. The MSRSGC is a six tiered classification providing standard reporting terminology to prevent the ambiguity associated with FNAC reporting of salivary gland lesions and consists of the following categories: 1) ND; 2) Non Neoplastic (NN); 3) Atypia of Undetermined Significance (AUS); 4a) Benign Neoplasm (NB); 4b) Neoplasm: SUMP; 5) Suspicious of Malignancy (SM); 6) Malignant (M).

The current study aims to categorise the salivary lesions cytologically based on MSRGC and to assess its utility in simplification of routine diagnosis of salivary gland lesions.

## MATERIALS AND METHODS

The present retroprospective study was conducted in a tertiary care hospital laboratory attached ESIC Medical College in Telangana, India, over a period of five years from 2017 to 2021. Institutional Ethical Clearance was obtained prior to the study. Ethical clearance number: ESICMC/SNR/IEC-F0203/08-2020, version no: V0. A sample size of 82 patients was studied.

**Inclusion and Exclusion criteria:** All patients suspected to have salivary gland lesions were included in the study and subjected to FNAC in the Department of Cytology. The cases with damaged cytological materials were excluded from study.

### Study Procedure

The lesions were aspirated using 22-23 gauge needle with direct percutaneous or transoral route depending on site on lesion. Guided aspiration was performed for small sized lesions or when blind aspiration yielded no material. For large swellings, multiple sites were aspirated to avoid diagnostic error. For cystic lesions, repeat aspiration was performed from solid area under ultrasound guidance after evacuating cyst contents. In case of fluid aspiration, the fluid was centrifuged and smears were prepared from the sediment. Of all the smears prepared, half were air-dried for Leishman or Giemsa staining and the remaining was fixed immediately in alcohol for Haematoxylin and Eosin (H&E) staining. All cytology smears were retrieved and reviewed by two cytopathologists. Oral consent was routinely obtained prior to procedure.

The clinical findings including age, sex, type and site of lesions were retrieved from the records. The study was conducted after blinding

the previous diagnosis. The cases were reported according to the MSRSGC criteria and assigned one of the categories.

## STATISTICAL ANALYSIS

The statistical analysis was performed using Microsoft excel software, for calculation of descriptive statistical parameters such as measures of central tendency and dispersion viz., mean, median, mode, percentage, range and ratio.

## RESULTS

A total of 82 patients with salivary gland lesions were studied. The [Table/Fig-1] depicts the patient demographics and gender distribution. The patient's age ranged from 11-77 years old. The salivary gland lesions were predominantly reported in the age groups 31-50 years. Male to female ratio was 1.05:1. Both genders were almost equally predisposed to develop salivary gland pathology. The [Table/Fig-2] depicts that there is a slightly higher incidence of salivary gland lesion on the right side. Bilateral lesions were seen only on 7.3% of cases with females more prone to develop bilateral lesions. The [Table/Fig-3] depicts that parotid gland was most commonly involved with a slightly higher incidence on right side. The next common gland to be involved is submandibular gland with the left side more predominantly involved. The [Table/Fig-4] shows the different lesions classified under Milan's system of reporting salivary gland cytology. Most of the lesions were classified as category 4a (39%) and category 2 (36.6%). The ND constituted only 2% while malignancies constituted 4.9%. Ambiguous categories like SUMP and suspicious of malignancy constituted 13.4% and 3.6% respectively. The [Table/Fig-5] depicts the varied cytological diagnoses offered by different pathologists over a period of five years.

| Age (years) | Male n (%) | Female n (%) | Total n (%) |
|---|---|---|---|
| 11-20 | 3 (3.6%) | 2 (2.4%) | 5 (6.09%) |
| 21-30 | 6 (7.3%) | 5 (6.09%) | 11 (13.4%) |
| 31-40 | 9 (10.9%) | 15 (18.3%) | 24 (29.2%) |
| 41-50 | 13 (15.8%) | 8 (9.7%) | 21 (25.6%) |
| 51-60 | 6 (7.3%) | 7(8.5%) | 13 (15.8%) |
| 61-70 | 2 (2.4%) | 3 (3.6%) | 5 (6.09%) |
| 71-80 | 3 (3.6%) | 0 | 3 (3.6%) |
| Total | 42 (51.2%) | 40 (48.8%) | 82 (100%) |

**[Table/Fig-1]:** Patient demographics.

| Laterality | Male n (%) | Female n (%) | Total n (%) |
|---|---|---|---|
| Left | 19 (23.2%) | 18 (21.9%) | 37 (45.1%) |
| Right | 22 (26.8%) | 17 (20.7%) | 39 (47.5%) |
| Bilateral | 1 (1.2%) | 5 (6.09%) | 6 (7.3%) |
| Total | 42 (51.2%) | 40 (48.8%) | 82 (100%) |

**[Table/Fig-2]:** Laterality of lesion.

| Site | Number (%) |
|---|---|
| **Left neck (n=1)** | 1 (1.2%) |
| **Parotid gland (n=58): 70.7%** | |
| Bilateral | 4 (4.9%) |
| Left | 26 (31.7%) |
| Right | 28 (34.1) |
| **Soft palate (n=2): 2.4%** | |
| Right | 1 (1.2%) |
| Left | 1 (1.2%) |
| **Submandibular (n=21): 25.6%** | |
| Bilateral | 2 (2.4%) |
| Right | 10 (12.1%) |
| Left | 9 (10.9%) |

**[Table/Fig-3]:** Site of salivary gland involvement.

This projects the inconsistency in reporting terminologies, creating confusion for the treating clinician. Majority of lesions encountered were diagnosed to be pleomorphic adenoma (37.8%). The next most common lesions were inflammatory NN lesions reported under varied terminologies as suppurative lesions (3.7%), sialadenitis (3.7%), chronic sialadenitis (17%), parotitis (1.2%) and acute inflammation (2.4%). Malignancies constitute a small percentage of the lesions with one case of acinic cell carcinoma, three cases of LGMC, five cases of Mucoepidermoid Carcinoma (MEC). One case was reported as SUMP and one as neoplastic lesion. One upper neck swelling was suspected to be metastatic nodule from MEC and biopsy was advised however the case was lost to follow-up.

| Milan's categorisation | No. of cases n (%) |
|---|---|
| Category 1 (Non diagnostic) | 2 (2.43%) |
| Category 2 (Non neoplastic) | 30 (36.6%) |
| Category 3 (Atypia of undetermined significance) | 0 |
| Category 4a (Neoplasm-benign) | 32 (39%) |
| Category 4b (Neoplasm-Salivary gland of uncertain malignant potential) SUMP | 11 (13.4%) |
| Category 5 (Suspicious of malignancy) | 3 (3.6%) |
| Category 6 (Malignant) | 4 (4.9%) |

**[Table/Fig-4]:** Milan's categorisation.

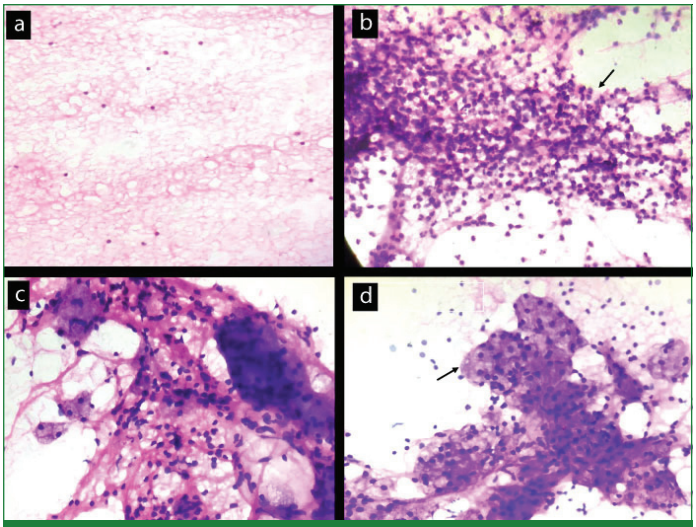
| Cytological diagnosis | Number (%) |
|---|---|
| Acinic cell carcinoma | 2 (2.4%) |
| Acute inflammation | 2 (2.4%) |
| Basal cell adenoma | 1 (1.2% |
| Benign cystic lesion | 2 (2.4%) |
| Benign lymphoepithelial lesion | 4 (4.9%) |
| Chronic sialadenitis | 14 (17%) |
| Cystic lesion | 2 (2.4%) |
| Granulomatous parotitis | 1 (1.2%) |
| Low Grade Mucoepidermoid Carcinoma (LGMC) | 3 (3.7%) |
| Metastasis from mucoepidermoid carcinoma | 1 (1.2%) |
| Monomorphoic oncocytoid neoplasm with inflammation | 1 (1.2%) |
| Mucoepidermoid carcinoma (LGMC) | 5 (6%) |
| Neoplastic lesion | 1 (1.2%) |
| Parotitis | 1 (1.2%) |
| Pleomorphic adenoma | 31 (37.8%) |
| Scant cellularity | 1 (1.2%) |
| Sialadenitis | 3 (3.7%) |
| Salivary gland neoplasm of Uncertain Malignant Potential (SUMP) | 3 (3.7%) |
| Suppurative lesion | 3 (3.7%) |
| Warthin's tumour | 1 (1.2%) |

**[Table/Fig-5]:** Cytological diagnosis.

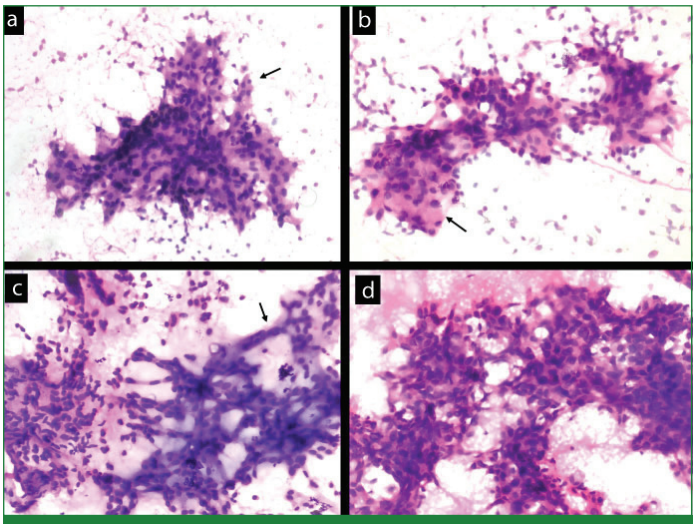
Few Microphotographs of the categorised lesions are provided in the [Table/Fig-6a-d, 7a-d, 8a-d].

## DISCUSSION

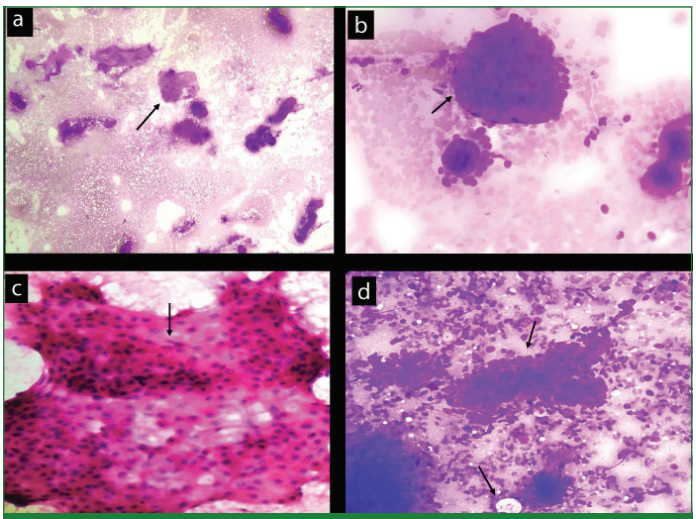
Salivary gland neoplasms account for 2-6.5% of all head and neck neoplasms, with 80% originating in parotid gland and can be diagnosed using the rapid, inexpensive, minimally invasive and safe FNAC procedure [5]. The FNAC can differentiate between neoplastic and non neoplastic lesions and help in guiding the therapy, obviating the need for surgery in one-third of patients with non neoplastic disease. However, diagnostic challenges are galore due to the histological diversity, morphological overlap between benign and low grade tumours, wide diagnostic spectrum, heterogeneity of cellular elements within same tumour and rarity of tumours with lack of familiarity for the pathologist [6]. The MSRSGC aims to categorise salivary gland lesions based on cytology while furnishing the ROM [4].



**[Table/Fig-6]:** a) Category 1: Non diagnostic (ND) (H&E stain, 40X); b) Category 2: Non neoplastic (Acute suppurative lesion) (H&E stain, 40X); c) Category 2: Non neoplastic (Chronic sialadenitis) (H&E stain, 40X); d) Category 2: Non neoplastic (Sialadenosis) (Leishman stain, 40X).



**[Table/Fig-7]:** a) Category 4a: Benign neoplasm- Warthins tumour, exhibiting oncocytic epithelium and lymphocytes in background (H&E stain, 40X); b) Category 4a: Benign neoplasm- Warthins tumour, exhibiting oncocytic epithelium thrown into papillary fronds and lymphocytes in background (H&E stain, 40X); c) Category 4a: Benign neoplasm- Pleomorphic adenoma, with chondromyxoid ground substance (H&E stain, 40X); d) Category 4B: Salivary gland neoplasm of uncertain malignant potential (SUMP), composed of tissue fragments exhibiting mild nuclear atypia and overcrowding (H&E stain, 40X).



**[Table/Fig-8]:** a) Category 5: Suspicious of Malignancy, multiple tissue fragments scattered in scanner magnification (Leishman stain, 10X); b) Category 5: Suspicious of malignancy, exhibiting 3 dimensional clusters of atypical cells bearing dense basement membrane material (Leishman stain, 40X); c) Category 6: Malignant, moderately pleomorphic cells in large 2D sheets and clusters, favouring acinic cell carcinoma (H&E stain, 40X); d) Category 6: Malignant, highly pleomorphic cells exhibiting increased atypia of ductal cells and few scattered muciphages, favouring Mucoepidermoid carcinoma (Leishman stain 40X).

In the present study, patients were predominantly affected in the 3rd and 4th decades of life in concordance with other studies from India [7-10]. This is in contrast to studies done worldwide where mean age group was in 6th decade [11,12]. This variation might be due to higher incidence of non neoplastic inflammatory lesions in younger age group.

There was a slight male predominance noted, similar to studies by Kala C et al., and Katta R and Chaganti DP [10,13]. Majority of the lesions were involving parotid gland (70.7%) as compared with various other studies [7]. Recommended adequacy as per MSRSGC is a minimum of 60 lesional cells and rate of non diagnostic aspirates to be less than 10% [4]. In the present study, only 2.43% cases were ND due to the routine practice of rapid on-site evaluation technique and guided aspiration in cystic lesions, decreasing the turn-around time and increasing diagnostic efficacy. This was in concordance with other studies done worldwide ranging from 1.1-7.7% [14].

The predominant MSRSGC category in the present study was category 4A: Neoplasm-benign (39%); Pleomorphic adenomas being the predominant cytological diagnosis, in agreement with studies by various authors [7,9,11]. This is in contrast to study by Kala C et al., and Maleki Z et al., where the non neoplastic category (Category 2) was predominant [10,15]. Category 2 (non neoplastic) was the second commonest and constituted 36.6% of the lesions with varied terminologies of cytological diagnosis being rendered, as acute and chronic sialadenitis, parotitis, granulomatous parotitis and suppurative lesions. This double-edged sword created confusion for the treating physician while determining the aetiology and chronicity.

The next most common category was category 4B (SUMP). This category included lesions that are diagnostic for a neoplasm and where a definite entity could not be diagnosed or where a malignancy could not be ruled out. Basal cell neoplasms, low grade carcinomas, oncocytic tumours, cellular pleomorphic adenomas and neoplasms with atypical features were included in this category [14]. A 13.4% of lesions were categorised at SUMP in contrast with studies by Gaikwad VP et al., (1.27%) and Kala C et al., (2%) [7,10]. In various other studies, it varied from 1.7-12% [7,11]. The higher incidence noted in the present study could be due to our institute being a tertiary care hospital catering to referrals from primary care centers. Category 6 (Malignancy) constituted 4.9% of cases in contrast to study by Gaikwad VP et al., (13.92%) and Kala C et al., (15%) [7,10]. Various other studies reported a range of 2.5-26.6% [11]. This stark variation could be due to the varied footfall depending upon the presence of oncology services. Ambiguous categories like category 3 and 5 were least encountered in the present study.

### Limitation(s)

This study is limited by lack of histopathological correlation and evaluation of risk of malignancy owing to inability to follow-up cases for subsequent surgery in a newly established medical college. Further studies are intended in the future with establishment of a full-fledged oncology setup presently.

## CONCLUSION(S)

Cytological diagnosis of salivary gland lesions being rare and heterogenous poses a diagnostic challenge to the pathologist, requiring experience and familiarity with the lesions. The introduction of MSRSGC has to a large extent standardised the reporting patterns, obviating the limitations and diagnostic difficulties, while assisting communication between the pathologist and clinician, leading to improved patient care. Further, the problem of low grade malignancies and AUS has been dealt with the inclusion of category 3, 4B and 5. The present study in comparison with studies worldwide recommends the usage of MSRSGC for routine reporting.

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