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Original Article

Pathology Section

Application of Milan System for Reporting Salivary Gland Neoplasms to Evaluate the Risk of Malignancy: A Cross-sectional Study from a Tertiary Care Hospital in Southern India

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ABSTRACT

Introduction: Salivary gland tumours comprise about 3% to 6.5% of all head and neck tumours. Fine needle aspiration is used as a primary investigation to diagnose salivary gland lesions, in addition to ultrasonography and Magnetic Resonance Imaging (MRI). Due to the overlapping cytomorphology of salivary gland lesions and their heterogeneity, it is a challenge for pathologists to interpret these lesions. The Milan System for Reporting Salivary Gland Cytopathology (MSRSGC) was introduced to standardise the reporting of salivary gland cytology and estimate the risk of malignancy across different categories. To achieve uniform categorisation of salivary gland lesions and evaluate risk stratification, the present study was conducted.

Aim: To classify salivary gland lesions according to the Milan System, correlate them with histopathological follow-up wherever possible and evaluate the risk of malignancy for each category.

Materials and Methods: This cross-sectional study was conducted in the Department of Pathology at BGS Global Institute of Medical Sciences and Hospital, Bengaluru, Karnataka, India, over a period of two years, from January 2022 to December 2023. The study included 75 cases. Salivary gland cytology cases were retrieved and categorised according to the MSRSGC into six categories. The results were compared with histopathology where possible. The Risk of Malignancy (ROM) was assessed for each category. Statistical analysis was performed to calculate sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy, with histopathology considered the gold standard.

Results: A total of 75 cases of salivary gland cytology were assessed and classified according to the Milan System. The most common age group affected was between 21 years and 40 years. The male-to-female ratio was 1:1.4, indicating a female preponderance. The parotid gland was the most commonly affected salivary gland. Histopathological correlation was available in 41 cases and ROM was calculated. Two cases were placed in the Non Diagnostic category (Category I), 22 cases in the Non Neoplastic category (Category II), two cases of Atypia of Undetermined Significance (AUS) (Category III), 38 cases of Benign Neoplasm (Category IVA), one case of Salivary Gland Neoplasm of Uncertain Malignant Potential (SUMP) (Category IVB), one case suspicious of malignancy (Category V) and nine cases of Malignancy (Category VI). The risk of malignancy was calculated for Category II, Category III, Category IVA, Category IVB and Category VI as 0%, 50%, 4.54%, 100% and 100%, respectively. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy in the present study were 77.7%, 100%, 100%, 94.11% and 95.12%, respectively.

Conclusion: The Milan System for Reporting Salivary Gland Cytopathology is invaluable for the uniform reporting of salivary gland lesions. Risk stratification is helpful for further management and improves patient care.

Keywords: Fine needle aspiration, Histopathology, Salivary gland tumours

INTRODUCTION

Salivary gland lesions constitute less than 3% of the lesions in the head and neck region. An enlargement or nodular growth in the salivary glands may arise from various sources such as infections, inflammation, cystic lesions, degenerative conditions, obstructions, or both benign and malignant tumours [1]. The most commonly involved salivary glands are the parotid gland and submandibular gland, along with minor salivary glands [2].

The World Health Organisation (WHO) classification (5th Edition, 2022) of salivary gland tumours includes 15 benign tumours and 21 malignant tumours. Other categories include non neoplastic epithelial lesions and mesenchymal tumours specific to the salivary glands [3]. To differentiate these neoplastic and non neoplastic lesions, Fine Needle Aspiration (FNA) is primarily performed and has proven to be a successful diagnostic tool [4]. FNA is widely accepted as an efficient and cost-effective primary diagnostic test.

The challenges in evaluating FNA cytology of salivary gland lesions primarily arise from the overlapping cytomorphology and morphological heterogeneity of these lesions [5]. Due to the lack of uniformity in reporting salivary gland lesions, the efficacy of FNA has been limited [6]. A descriptive cytology report can make it difficult for clinicians to decide on a specific treatment plan. Therefore, to avoid unnecessary excision of salivary gland lesions and to standardise cytological reporting, the American Society of Cytopathology (ASC) and the International Academy of Cytology (IAC) formulated a risk stratification based on a classification system. The Milan System for Reporting Salivary Gland Cytopathology (MSRSGC) was introduced to reduce reporting ambiguities [7].

The MSRSGC includes six categories with explanatory notes, indicating the Risk of Malignancy (ROM) and a brief management plan for each category. The six categories of the Milan System are as follows:

1. Category I: Non diagnostic
2. Category II: Non neoplastic
3. Category III: Atypia of Undetermined Significance (AUS)
4. Category IVA: Neoplasm: Benign
5. Category IVB: Salivary gland neoplasm of Uncertain Malignant Potential (SUMP)
6. Category V: Suspicious of malignancy
7. Category VI: Malignancy [7].

The formulation of the MSRSGC reflects a collaborative effort across multiple disciplines. It offers defined categories with standard definitions and clear meanings among pathologists, treating physicians and surgeons. Uniform reporting enhances the quality and consistency of diagnosis across both national and international institutions. It emphasises risk stratification by calculating ROM, which is helpful in guiding clinicians for further management. The MSRSGC strengthens the role of FNA in patient management [8].

Although many studies have already been conducted on this topic, very few have been done in Southern India. The present study signifies that FNA is a useful diagnostic tool for preoperative evaluation and clinical management of patients. The application of the MSRSGC provides uniformity in diagnosis and improves communication with treating physicians.

The objectives of the present study were to classify salivary gland lesions based on the MSRSGC, correlate with histopathological follow-up wherever possible and evaluate the ROM for each of its categories.

MATERIALS AND METHODS

The present cross-sectional study, comprising 75 cases, was conducted over two years, from January 2022 to December 2023, at the tertiary care hospital in the Department of Pathology, BGS Global Institute of Medical Sciences and Hospital, Bengaluru, Karnataka, India, after obtaining approval from the Institutional Ethics Committee (IEC Number: BGSGIMS/IEC/App/Oct/2024/03). Informed consent was obtained for all cases followed by Fine Needle Aspiration Cytology (FNAC).

Inclusion criteria: The study included all routine cases of salivary gland swelling referred from various Departments to the Department of Pathology of the study Institute.

Exclusion criteria: Cases with damaged or lost cytologic materials were excluded.

Study Procedure

1. Category I: Non diagnostic: The non diagnostic category encompasses samples with insufficient cellularity, preservation artifacts, non mucinous contents and normal salivary gland components. FNAC samples should not be labelled as non diagnostic if they contain mucinous contents, exhibit atypical features, or contain abundant acellular matrix material. MSRSGC recommends a minimum of 60 lesional cells as the criterion for adequacy [9].

2. Category II: Non neoplastic: This category includes benign conditions such as inflammatory, reactive and metaplastic processes. Acute and chronic sialadenitis are the most common lesions in this category. Others include sialadenosis, granulomatous lesions, lymphoepithelial lesions and reactive lymph nodes. Chronic sclerosing sialadenitis (Kuttner tumour) is a benign lesion that has clinical characteristics resembling malignancy, as it presents as a painless hard mass in the submandibular gland. It is characterised by periductal fibrosis, dilated ducts and dense lymphocytic infiltration with lymphoid follicle formation [10].

3. Category III: Atypia of Undetermined Significance (AUS): AUS is reserved for lesions that exhibit morphological overlap between non neoplastic and neoplastic cases. This category includes reactive and reparative atypia, samples with low cellularity that suggest but do not definitively diagnose a neoplasm, cystic lesions with abundant mucin and/or minimal epithelial components and salivary gland lesions that are indeterminate for a lymphoproliferative disorder [11].

4. Category IV: Neoplasms: This category includes two subgroups: IVA - Neoplasm: Benign and IVB - SUMP.

- Category IVA: Neoplasm- Benign

This category is designated for cases where a benign neoplasm is diagnosed based on cytomorphologic criteria. Specific entities included in this category are pleomorphic adenoma, Warthin tumour, lipoma and schwannoma [12].

- Category IVB: SUMP

This includes lesions where morphologic features are indicative of a neoplastic process, but a specific diagnosis cannot be provided. Lesions classified as SUMP include neoplasms with limited atypical features and low-grade carcinomas.

5. Category V: Suspicious of Malignancy: The diagnosis of the suspicious for malignancy category is used when overall cytological features suggest malignancy, although not all criteria for malignancy are present. This category includes samples with limited cellularity containing a few atypical cells or samples suggestive of lymphoma, but without adequate material for immunophenotyping [13].

6. Category VI: Malignancy: This category includes aspirates that are positive for malignant lesions. Most of the neoplasms in this category are carcinomas; however, it also includes lymphomas, sarcomas and metastatic carcinomas [14].

Out of 75 cases, histopathological correlation was evaluated for 41 cases. The ROM was assessed for each category. Sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV) and diagnostic accuracy were calculated, considering histopathology as the gold standard.

STATISTICAL ANALYSIS

For statistical analysis, the data were collected and distributed according to the location, age and sex of the patients. The ROM was calculated as a percentage as follows:

$$\text{ROM} = \frac{\text{Number of malignant cases on histopathology} \times 100}{\text{Total number of cases in that category on histopathology}}$$

Cytological diagnosis were categorised into positive (malignant) and negative (benign).True Positive cases were defined as both cytology as well as histopathology reported as malignant. True Negative cases with both cytology as well as histopathology were diagnosed with benign lesions. Cases which were benign on cytology but later diagnosed as malignant on histopathological examination {Haematoxylin and Eosin (H&E)} were taken as false negatives, while cases reported as positive for malignancy on cytology but subsequently were benign on histopathological examination were classified as false positives. Sensitivity, specificity, PPV, NPV and diagnostic accuracy were calculated in the present study considering histopathology as the gold standard. The following measures were used for evaluation [15,16].

$$\text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive + False Negative}} \times 100$$

$$\text{Specificity} = \frac{\text{True Negative}}{\text{True Negative + False Positive}} \times 100$$

$$\text{Positive Predictive Value} = \frac{\text{True Positive}}{\text{True Positive + False Positive}} \times 100$$

$$\text{Negative Predictive Value} = \frac{\text{True Negative}}{\text{True Negative+ False Negative}} \times 100$$

$$\text{Diagnostic Accuracy} = \frac{\text{True Positive} + \text{True Negative}}{\text{True Positive+False Positive+True Negative+False Negative}} \times 100$$

RESULTS

The most common age group affected was between 21 to 40 years, with 29 cases, followed by the age group of 41 to 60 years with 26 cases. The 61 to 80 years age group had 16 cases, while the least number of cases were seen in individuals under 20 years of age.

A female preponderance was observed, with 44 cases being female and 31 cases being male, resulting in a male-to-female ratio of 1:1.4. The salivary gland most commonly involved in the present study was the parotid gland, accounting for a total of 54 cases, followed by the submandibular gland, which had 21 cases.

According to the MSRSGC, the distribution of cases in each category was as follows: 2 cases were classified in Category I [Non diagnostic], 22 in Category II [Non neoplastic], 2 in Category III [AUS], 38 in Category IVA [Benign neoplasm], 1 in Category IVB [SUMP], 1 in Category V [Suspicious of malignancy] and 9 in Category VI [Malignant] [Table/Fig-1].

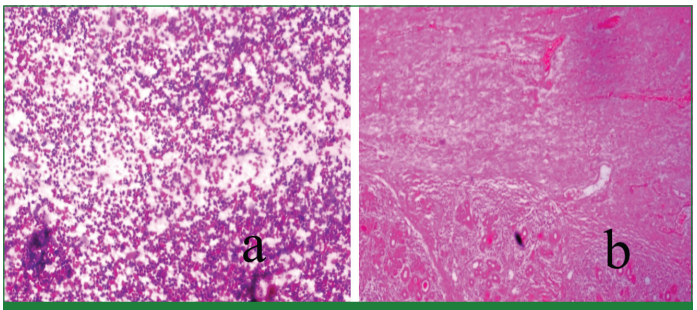
S. no.	Diagnostic category	No. of cases (%)
1.	**Category I- Non diagnostic**	02 (2.6%)
2.	**Category II- Non neoplastic**	22 (29.3%)
	Chronic sialadenitis	13
	Chronic inflammatory lesion	03
	Acute suppurative lesion	01
	Acute suppurative granulomatous inflammatory lesion	01
	Sialadenosis	02
	Lymphoepithelial lesion	02
3.	**Category III- Atypia of undetermined significance**	02 (2.6%)
	Chondromyxoid lesion with salivary gland element	01
	Mucinous cyst	01
4.	**Category IVA- Neoplasm-benign**	38 (50.6%)
	Pleomorphic adenoma	31
	Basal cell adenoma	01
	Warthin's tumour	06
	Category IVB- Salivary gland neoplasm of uncertain malignant potential	01 (1.3%)
5.	**Category V- Suspicious for malignancy**	01 (1.3%)
	Highly suspicious for atypical epithelial cell deposits with underlying keratinous degeneration	01
6.	**Category VI- malignant**	09 (12%)
	Adenoid cystic carcinoma	01
	Mucoepidermoid carcinoma	08

[Table/Fig-1]: Distribution of cases according to MSRSGC with case percentage.

Category I presented with 2 cases that yielded scanty or no material after more than one aspiration.

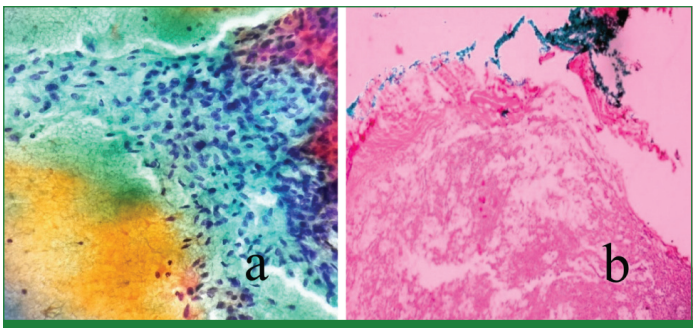
Category II included 22 cases on cytology. Out of these, 13 cases were diagnosed as chronic sialadenitis, followed by 3 cases of chronic inflammatory lesions. Two cases each of sialadenosis and lymphoepithelial lesions were observed. One case each of acute suppurative lesions and acute suppurative granulomatous inflammatory lesions was also diagnosed. Histopathological follow-up was available for 10 cases. A case diagnosed as chronic sialadenitis on cytology was confirmed as Chronic Sclerosing Sialadenitis (Kuttner tumour) on histopathology [Table/Fig-2a,b].

Category III had two cases. One case presented with a chondromyxoid lesion with salivary gland elements on cytology and was diagnosed as pleomorphic adenoma on histopathology. The second case was reported as a mucinous cyst on cytology and was diagnosed as mucoepidermoid carcinoma on histopathology.

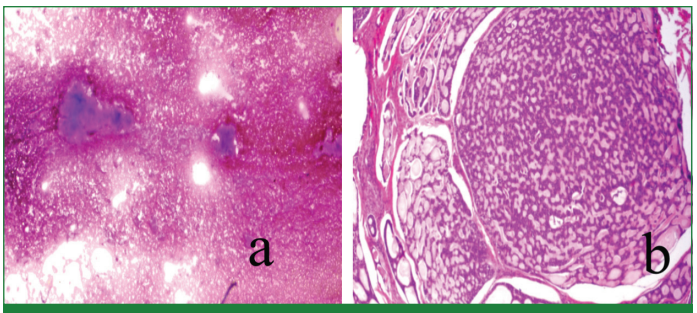


[Table/Fig-2]: a) FNA- Chronic sialadenitis (Giemsa stain, 40X); b) HPE- Kuttner tumour (Chronic sclerosing sialadenitis). Histology shows salivary glands embedded in collagenised fibrous tissue (H&E stain, 40X).

Category IV includes two subgroups: IVA - Benign Neoplasm and IVB - SUMP. Category IVA presented the majority of cases and included 38 cases. Out of these, 31 cases were diagnosed as pleomorphic adenoma, 6 cases as Warthin's tumour and 1 case as basal cell adenoma. Histopathological follow-up was available for 22 cases. Of these, 17 cases diagnosed as pleomorphic adenoma on FNAC had a concordant diagnosis on histopathology [Table/Fig-3a,b]. Four cases reported as Warthin's tumour on FNAC also had a concordant diagnosis on histopathology. However, one case reported as basal cell adenoma on FNAC had a discordant diagnosis of adenoid cystic carcinoma on histopathology [Table/Fig-4a,b]. The presence of hyaline stromal globules surrounded by epithelial cells could explain the misdiagnosis on cytology.



[Table/Fig-3]: FNA- Pleomorphic adenoma- Fibrillary chondromyxoid stroma was seen along with myoepithelial cells and ductal cells (Pap stain,100X). b) HPE- Pleomorphic adenoma- Well-circumscribed tumour showing epithelial and myoepithelial cells in myxoid stroma noted (H&E stain, 40X).

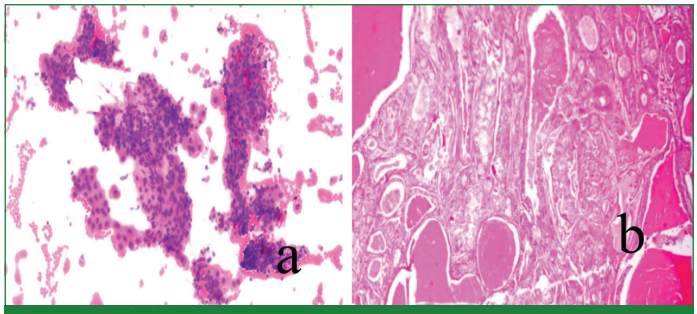


[Table/Fig-4]: FNA-Basal cell adenoma- Hyaline globules noted (H&E stain, 100X). b) HPE- Adenoid cystic carcinoma- Salivary gland tumour arranged in cribriform and tubular pattern composed of inner ductal and outer myoepithelial cells (H&E stain, 100X).

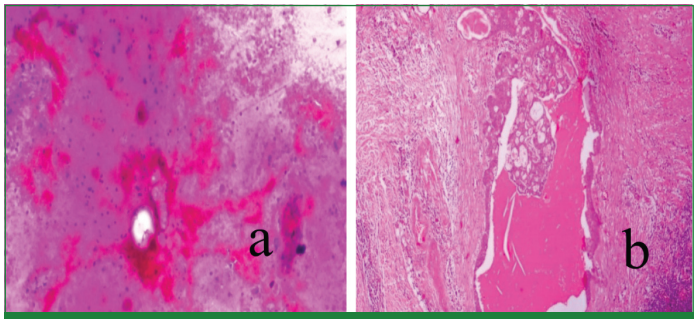
Category IVB presented only one case on cytology, which was reported as mucoepidermoid carcinoma on histopathological examination [Table/Fig-5a,b].

Category V had one case with no histopathological correlation available.

Category VI included nine cases on cytology, consisting of eight cases of mucoepidermoid carcinoma and one case of adenoid cystic carcinoma. Histopathological correlation was available for six cases, all reported as mucoepidermoid carcinoma with a concordant diagnosis [Table/Fig-6a,b]. One case diagnosed as adenoid cystic carcinoma on FNAC did not have histopathological follow-up.



[Table/Fig-5]: a) FNA- SUMP- Sheets of cells with eosinophilic cytoplasm and pleomorphic and hyperchromatic nucleus seen (H&E stain,100X). b) HPE: Mucoepidermoid carcinoma- Tumour is formed by mature squamous cells, intermediate squamous cells and mucus cells (H&E stain, 100X).



[Table/Fig-6]: a) FNA- Epidermoid cells, intermediate cells and mucocytes along with extracellular mucinsuggestive of mucoepidermoid carcinoma.(H&E stain, 100X). b) HPE- Mucoepidermoid carcinoma- Tumour is formed by mature squamous cells, intermediate squamous cells and mucus cells (H&E stain, 100X).

For histopathological correlation, 41 cases were available out of a total of 75. The ROM was calculated for these 41 cases. Of these, cytological-histopathological concordance was noted in 38 cases. Two cases showed cytological-histopathological discordance: one case of AUS (Category III) on cytology was reported as mucoepidermoid carcinoma on histopathology. The second case, interpreted as basal cell adenoma (Category IVA) on FNAC, was diagnosed as adenoid cystic carcinoma upon histopathological examination. Categorisation of FNAC cases, along with correlation with histopathology and ROM%, is depicted in [Table/Fig-7].

The ROM for Category I was not calculated as histopathological follow-up was lacking. Patients with acellular material or normal salivary gland elements did not undergo any surgical intervention and were advised for radiological correlation and follow-up.

The ROM for the non neoplastic Category II was 0%. Two cases were categorised as Category III (AUS), which on histopathology, revealed pleomorphic adenoma in one case and mucoepidermoid carcinoma in the other. The ROM in this category was 50% due to the low sampling of cases.

The ROM for benign neoplasm Category IVA in the present study was 4.54%. For Category IVB, it was 100%. ROM for Category V could not be calculated due to the absence of histopathological follow-up, while ROM for Category VI was 100%.

The calculated ROM values were 0% for Category II, 50% for Category III, 4.54% for Category IVA, 100% for Category IVB and 100% for Category VI.

Seven cases were True Positive, with zero false positives. A total of 32 cases were True Negative and 2 cases turned out to be false negatives. The sensitivity, specificity, PPV, NPV and diagnostic accuracy were calculated as follows: sensitivity 77.7%, specificity 100%, PPV 100%, NPV 94.11% and diagnostic accuracy 95.12%.

Milan system category	Primary FNA diagnosis	No. of cases	Histopathological diagnosis	No. of cases	ROM in present study
I (Non diagnostic)	Normal salivary gland tissue, acellular	02	Non traceable	-	-
II (Non neoplastic)	Chronic sialadenitis	13	Chronic Sialadenitis Chronic Sclerosing sialadenitis (Kuttner tumour)	08 01	0%
	Chronic inflammatory lesion	03	Chronic sialadenitis with lymphoepithelial lesion	01	
	Acute suppurative lesion	01	Non traceable		
	Acute suppurative granulomatous inflammatory lesion	01	Non traceable		
	Sialadenosis	02	Non traceable		
	Lymphoepithelial lesion	02	Non traceable		
III (AUS)	Chondromyxoid lesion with salivary gland elements	01	Pleomorphic adenoma	01	50%
	Mucinous cyst	01	Mucoepidermoid carcinoma	01	
IVA (Benign neoplasm)	Pleomorphic adenoma	31	Pleomorphic adenoma	17	4.54%
	Basal cell adenoma	01	Adenoid cystic carcinoma	01	
	Warthin's tumour	06	Warthin's tumour	04	
IV B (SUMP)	SUMP	01	Mucoepidermoid carcinoma	01	100%
V (Suspicious for malignancy)	Highly suspicious for atypical epithelial cell deposits with underlying keratinous degeneration	01	Non traceable		-
VI (Malignancy)	Adenoid cystic carcinoma	01	Non traceable		100%
	Mucoepidermoid carcinoma	08	Mucoepidermoid carcinoma	06	

[Table/Fig-7]: Categorisation of FNA cases and correlation with histopathology and ROM%.

DISCUSSION

Salivary gland swellings are easily accessible for FNAC and the risk of fistula formation and capsule disruption with seeding of tumour cells is very low compared to surgical biopsy. The choice between surgical or conservative treatment often depends on the FNAC diagnosis. Diagnostic difficulties arise due to the heterogeneity of many tumours and the cytomorphological overlap, which limits the accuracy of subtyping. The MSRSGC aims to categorise salivary gland lesions based on cytology while providing the Risk of Malignancy (ROM) assessment [17].

The most common age group in the present study was between 21 years and 40 years, accounting for 38.6%, followed by the age group of 41 to 60 years, which accounted for 34.6%. This is consistent with studies by Datta B et al., [1], Singh G et al., [5], Kala C et al., [18], Gaikwad VP et al., [19], Mishra S et al., [20] and Karuna V et al., [21]. A study conducted by Abilash SC et al., [22] indicated that the common age group was within the fifth decade.

The parotid gland was the most commonly involved salivary gland in the present study, with a total of 54 cases, followed by the submandibular gland, which had 21 cases. Females were affected more than males, with 44 cases being female and 31 cases being male, resulting in a male-to-female ratio of 1:1.4. This aligns with similar studies by Singh G et al., [5], Gaikwad VP et al., [19], Mishra S et al., [20] and Viswanathan K et al., [23].

The majority of cases in the present study were from the parotid gland, forming a total of 54 cases, followed by the submandibular gland with 21 cases. This finding is consistent with studies by Meenai FJ et al., [6], Bajpai D et al., [8], Kala C et al., [18] and Rohilla M et al., [24].

In the present study, there were 2 cases (2.6%) classified in Category I [Non diagnostic], where only normal salivary gland tissue was noted in one case, while the other case showed acellular material. According

to the MSRSGC, the rate of non diagnostic FNAs should not exceed 10% and preferably should be much lower. This finding is similar to studies conducted in India and aligns with findings from this study [18, 20, 21, 25, 26]. Histopathological follow-up was not available for these two cases and hence the ROM was not calculated.

The percentage of cases classified as non neoplastic in Category II was 29.3%, confirming results from studies by Datta B et al., [1], Vishwanathan K et al., [23], Jha S et al., [27] and Chen Y et al., [28]. The ROM for non neoplastic Category II was 0%, consistent with studies such as those by Datta B et al., [1], Singh G et al., [5] and Gaikwad VP et al., [19]. A study conducted by Kala C et al., [18] reported a ROM of 5% for Category II, which is consistent with the ROM of 10% as per MSRSGC [29].

The case percentage in AUS in Category III was 2.6%. This result is similar to studies by Datta B et al., [1], Meenai FJ et al., [6] and Vishwanathan K et al., [23]. The ROM was 50%, primarily due to low sampling. The ROM in the present study was higher than that recommended by MSRSGC (20%) but aligns with other literature [0-100%] [19, 24, 25, 29, 30, 31]. The ROM has not been accurately defined for this category because of the limited number of cases included, as confirmed by various studies [5, 18, 24, 30].

The present study included the maximum cases under Category IVA, accounting for 50.6% (38 cases), similar to studies conducted by Datta B et al., [1], Singh G et al., [5], Meenai FJ et al., [6], Gaikwad V et al., [19], Vishwanathan K et al., [23] and Chen Y et al., [28]. The ROM for benign neoplasm in Category IVA in the present study was 4.54%, consistent with the ROM of < 5% as per MSRSGC [29] and similar to findings from studies like Kala C et al., [18] and Viswanathan K et al., [23].

The ROM for Category IVB was 100%, with only one case reported as mucoepidermoid carcinoma on histopathology. This finding aligns with studies by Singh G et al., [5], Gaikwad VP et al., [19] and Abilash SC et al., [22]. Although the ROM according to MSRSGC [29] was 35%, different studies reported varying results ranging from 0-100%, likely due to the low sample size in this category [6,12,19,24,26,30].

Category V had one case and no histopathological correlation was available. The case percentage in the present study was 1.3%, consistent with studies conducted at various centres [23, 26, 28, 32, 33]. The ROM for Category V could not be calculated due to the absence of histopathological follow-up.

The case percentage for Category VI in the present study was 12%, consistent with studies by Datta B et al., [1], Pujani M et al., [26] and Chen Y et al., [28].

The ROM for Category VI was 100% in the present study, consistent with a ROM of >90% as per the MSRSGC [29]. This finding aligns with studies conducted by Rossi ED et al., [2], Singh G et al., [5], Gaikwad VP et al., [19], Park W et al., [31], Garg N et al., [33], Griffith CC et al., [34] and Vallonthaiel G et al., [35]. The main limiting factor for calculating ROM in various categories is the decreased number of surgical follow-ups.

The ROM was calculated for Category II, Category III, Category IVA, Category IVB and Category VI as 0%, 50%, 4.54%, 100% and 100%, respectively. The ROM in the present study was quite similar to the ROM in other studies [1, 5, 6, 8, 19].

The comparison of ROM from the present study with published literature is shown in [Table/Fig-8] [1,5,6,8,19,23,24,29-31,36]. The diagnostic accuracy of salivary gland cytological lesions according to MSRSGC in the present study was 95.12%, comparable to other studies [1, 21, 24, 26, 27, 28].

The sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) in the present study were 77.7%, 100%, 100% and 94.11%, respectively. These values were comparable with other studies [1, 18, 19, 21, 23, 24, 26, 27, 28]. The comparison of statistical data from the present study with other studies has been tabulated in [Table/Fig-9] [1,18,19,21,23,24,26-28]. The present study findings demonstrate the positive contribution of MSRSGC towards the classification and identification of salivary gland neoplasms, risk stratification and better communication with clinicians, improving the clinical management of patients.

	ROM%						
Studies	III	III	IV	AI	VB	V	VI
Baloch Z et al., [29]	25	10	20	<5	35	60	>90
Hollyfield JM et al., [36]	38	17	33	4	33	67	100
Datta B et al., [1]	0	0	50	0	50	100	50
Meenai FJ et al., [6]	25	0	50	5	100	100	90
Bajpai D et al., [8]	0	0	50	9	-	-	100
Rohilla M et al., [24]	0	17.4	100	7.3	50	-	96
Gaikwad VP et al., [19]	-	0	50	0	100	100	100
Vishwanathan K et al., [23]	6.7	7.1	38.9	5	34.2	92.9	92.3
Singh G et al., [5]	0	0	0	11.1	100	100	100
Katta R and Chaganti DP, [30]	33.33	11.1	100	6.9	50	66.6	87.5
Park W et al., [31]	19.5	6.9	0	2.4	26.2	83.3	100
Present study	-	0	50	4.54	100	-	100

[Table/Fig-8]: Comparison of ROM of present study with published literature [1,5,6,8,19,23,24,29-31,36].

Studies	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagnostic accuracy (%)
Datta B et al., 2023, Assam [1]	75	100	100	95	95.65
Kala C et al., 2019, Uttar Pradesh [18]	83.33	98.31	95.74	92.80	93.60
Gaikwad VP et al., 2020, Mumbai [19]	75	100	100	92.8	94.1
Rohilla M et al.,2017, Chandigarh [24]	79.4	98.3	96.4	89.2	91.4
Vishwanathan K et al., 2018, New York [23]	79	98	92	94	-
Pujani M et al., 2018, Haryana [26]	81.8	100	100	96.4	96.9
Karuna V et al.,2019, Uttar Pradesh [21]	85	98.14	94.44	94.64	94.59
Jha S et al., 2020, Bhubaneswar [27]	64.28	97.01	90	86.67	87.37
Chen Y et al., 2019, Taiwan [28]	70.4	99.2	90.5	96.7	80.1
Present study, 2025, Bengaluru	77.7	100	100	94.11	95.12

[Table/Fig-9]: Comparison of statistical data of present study with other studies [1,18,19,21,23,24,26-28].

Limitation(s)

The main limitation of the present study was the smaller sample size and the restricted availability of cases for histopathological follow-up. A larger number of histopathological cases would have aided in calculating ROM in all categories. Additionally, immunohistochemistry and molecular studies were not performed.

CONCLUSION(S)

The MSRSGC reflects a better reporting system than the conventional reporting system. The sensitivity, specificity and diagnostic accuracy of cytological lesions with the application of MSRSGC demonstrate better risk stratification and patient management. However, Categories III and IVB present diagnostic challenges and require extensive work-up, including histopathological examination. Due to the limited availability of histopathological cases, ROM could not be calculated for Category I and Category V. The application of ancillary studies, including histochemical, immunochemical and molecular markers, will improve the overall accuracy of salivary gland cytological lesions.

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