Journal Of Medical Science And Clinical Research
IGM Publication   An Official Publication Of IGM Publication

Original Article

The Milan System for Reporting Salivary Gland Cytopathology: Assessment by Recategorization and Predicting Risk of Malignancy: An Experience from a Tertiary Health Care from North India

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Abstract

Introduction: *Fine needle aspiration (FNA) is an essential and most widely practiced procedure in a cytology laboratory.FNA of salivary gland also cannot point out a particular diagnosis exactly with 100% surety. To bring uniformity to the reporting of salivary gland FNAC, the American Society of Cytopathology and the International Academy of Cytology proposed an international classification scheme, the Milan System for Reporting Salivary Gland Cytopathology (MSRSGC).*

Materials and Methods: *In the present study, 255 cases of salivary gland lesions were studied by fine-needle aspiration cytology in pathology department of a Tertiary care hospital of North India, between July 2018 to September 2020. The study is a prospective observational study with the aim to study the incidence of various salivary gland lesions after recategorization by the Milan's system and to correlate the the FNA findings with histology were ever available and calculate the Risk of Malignancy(ROM).*

Results: *The distribution of cases according to MSRSGC shows 31(12.15%) patients in Category 1,Non diagnostic .Majority of the cases,107(41.96%), were in Category 2 Non-Neoplastic salivary gland lesion. In Category 3,Atypia of undeterminate significance (AUS) 4 (1.56%)patients were categorized.Category 4 a benign salivary gland tumor had 84 cases (32.94%).Among the benign lesions pleomorphic adenoma accounts for 69patients (84.14%),Warthin tumour accounts for 11(13.41%)cases and 2(2.43%) case was intraparotid schwannoma .While the Category 4b Salivary gland neoplasm of uncertain malignant potential (SUMP) had 2 (2.38%)cases.7 (2.74%) cases were categorized under Category 5. In category 6 malignant lesion were 22 cases (8.62%). The majority of 22 malignancy cases are Carcinoma Ex Pleomorphic Adenoma, which is 8 cases and accounts for36.36%,followed by Mucoepidermoid carcinoma 12 cases(54.54%) and 1 case(4.54%) each of Adenocystic carcinoma and Acinitic cell carcinoma.. The ROM after histopathological correlation for Caterogy I was 14.2%, Category 2 was 13%,Category 3 was 0%,Category 4a was 4%,Category 4b was 0%, Category 5 was 100% and Category 6 was 100%.*

Conclusion: *Milan system of classification (MSRSCG) of salivary gland can be an effective and reliable tool for reporting. It can effectively predict the risks of Malignancy and help in effective management of the salivary gland tumours.*

Keywords: *Milan System, Salivary Gland, FNA, Risk of Malignancy.*

Introduction

Fine needle aspiration (FNA) is an essential and most widely practiced procedure in a cytology laboratory.Thesalivary gland FNA can effectively differentiate a benign or malignant diagnosis from 81% to 98%[1]

FNA test of salivary gland shows a range of sensitivities and specificities depending upon a variety of factors, including the technical experience of the person performing the FNA, quality of material aspirated,quality of the cytological preparations, the experience of the reporting cytopathologist, morphologic heterogeneity of the lesion, and presence of a cystic component[2,3]   The reported overall sensitivity of salivary gland FNA in most series ranges from 86% to 100%, and the specificity ranges from 90% to 100%[4,5]. Inspite of the popularity and ease of performing a FNAit has its limitations to differentiate between an inflammatory lesion and a neoplasm, or a benign neoplasm and a well-differentiated malignancy . FNA of salivary gland also cannot point out a particular diagnosis exactly with 100% surerity.To bring uniformity to the reporting of salivary gland FNAC, the American Society of Cytopathology and the International Academy of Cytology proposed an international classification scheme, the Milan System for Reporting Salivary Gland Cytopathology (MSRSGC)[6].

The objective of the MSRSGC is to provide better communication between clinicians and between institutions to improve overall patient care. The MSRSGC consists of six diagnostic categories, including a "Nonneoplastic" category and a "Neoplasm" category that is split into "Benign" and "Salivary Gland Neoplasm of Uncertain Malignant Potential (SUMP)."The evidence-based system derived from the literature which also correlates diagnostic categories with ROM and clinical management strategies[7,8,9]

This study intends to share the experience of a tertiary care center in North India, to reclassify the salivary gland lesions into the categories as proposed by the MILAN system and to determine the risk of malignancy (ROM) for individual categories by histopathological corelations.

Materials and Methods

In the present study,255 cases of salivary gland lesions were studied by fine-needle aspiration cytology in pathology department of a Tertiary care hospital of North India, between July 2018 to September 2020. Patients with salivary gland lesions detected clinically and Radiologically in outpatients and inpatient departments of associated hospitals were referred for aspiration.

The study is a prospective observational study with the aim to

1. Study the incidence of various salivary gland lesions after recategorization by the Milan's system.
2. To correlate the the FNA findings with histology were ever available and calculate the Risk of Malignancy(ROM).

All FNA procedures were performed by trained cytopathologists to ascertain the adequacy of the material. For palpable lesions the FNA was performed in the departmental procedure room while for non palpable salivary gland swelling ultrasonography guided aspirations were performed. The slides were reviewed at lease by two expert pathologists and the cases were recategorized into the 6 categories laid down by MSRSGC. They are as follows: category I: nondiagnostic (ND), category II: nonneoplastic (NN), category III: atypia of undetermined significance (AUS), category IVA: neoplasm-benign (NB), category IVB: neoplasm-salivary gland neoplasm of uncertain malignant potential (SUMP), category V: suspicious for malignancy (SM), and category VI: malignant. The criteria laid down for categorization by MSRSGC were strictly adhered to. The histopathological data and follow-up of both biopsy and resection specimens were included. Histopathology was considered as the gold standard, and based on the presence and absence of malignancy, ROM was calculated.

Results

The present study comprises 255 cases of fine needle aspiration cytology of salivary gland lesions encountered in the pathology department of the hospital from January 2019 to March 2021. The maximum number of cases were observed in the age group 21 to 40 years,113 patients (44.3%), followed by 41 years to 60 years,82 cases (32.15%) while rest 60 cases (23.52%) were > 60 years. Majority of cases occurred in the young adult in the age group of 21 to 60 years. Males comprised of 132 patients (51.76%) while 123 (49.2%) were female patients.

The distribution of cases according to MSRSGC shows **(Table 1)** 31 (12.15%) patients in Category 1, Non diagnostic. Majority of the cases, 107 (41.96%), were in Category 2 Non-Neoplastic salivary gland lesion . In Category 3,Atypia of undeterminate significance (AUS) 4 (1.56%) patients were categorized. Category 4 a benign salivary gland tumor had 84 cases (32.94%). Among the benign lesions pleomorphic adenoma accounts for 69 patients (84.14%), Warthin tumour accounts for 11(13.41%)cases and 2(2.43%) case was intraparotid schwannoma. While the Category 4b Salivary gland neoplasm of uncertain malignant potential (SUMP) had 2 (2.38%)cases.7 (2.74%) cases were categorized under Category 5.In category 6 malignant lesion were 22 cases (8.62%). The majority of 22 malignancy cases are Carcinoma Ex Pleomorphic Adenoma, which is 8 cases and accounts for 36.36% ,followed by Mucoepidermoid carcinoma 12 cases (54.54%) and 1 case (4.54%) each of Adenocystic carcinoma and Acinitic cell carcinoma.

Table 1: Distribution of cases according to MSRSCG system

| Category	No of cases	%tage
1. 1.Non diagnostic	31	12.15%
2.Non neoplastic	107	41.96%
3.Atypia of undetermined significance	4	1.56%
4.Neoplasm	84	32.94%
A.Benign	82	32.15%
.Pleomorphic Adenoma	69	84.14%
.Warthin Tumor	11	13.41%
.IntraparotidSwannoma	1	2.43%
B. Salivary gland Neoplasm of Uncertain Malignant Potential (SUMP)	2	2.38%
6.Suspicious for malignancy	7	2.74%
7.Malignant	22	8.62%
Total (n=255)	255	100%

In the study of 255 cases of fine needle aspiration cytology of salivary gland lesions 90 cases underwent Histopathological correlation. The ROM after histopathological correlation for Caterogy I was 14.2%, Category 2 was 13%, Category 3 was 0%,Category 4a was 4%, Category 4b was 0%, Category 5 was 100% and Category 6 was 100% **(Table 2).**
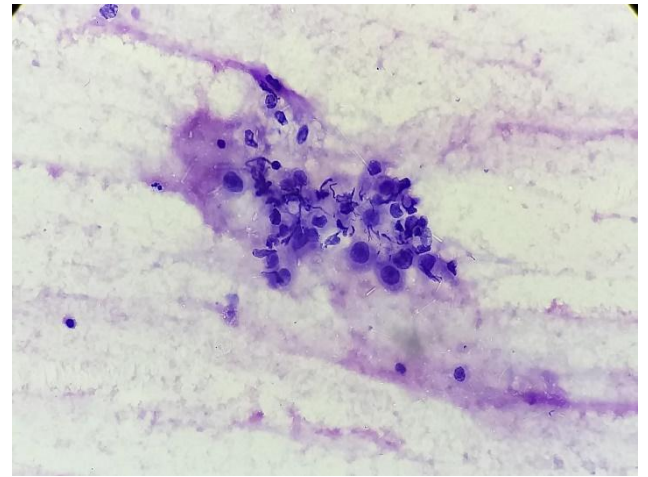
Table 2: Histopathological Correlation and Risk of Malignancy(ROM)

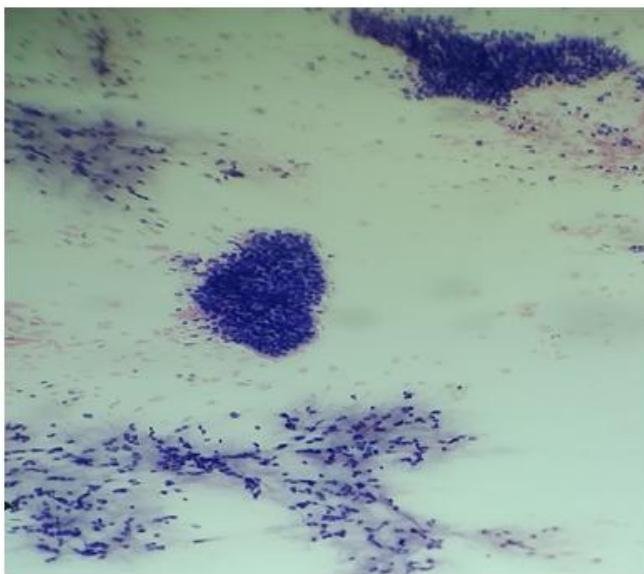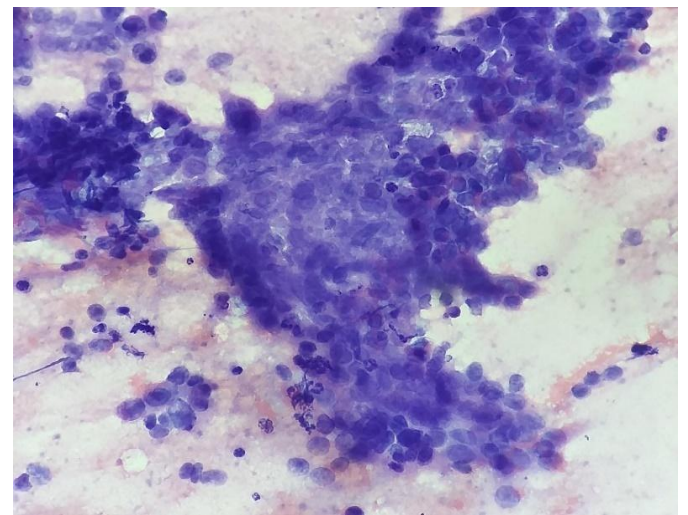| Category	Category 1	Category 2	Category 3	Category 4a	Category 4b	Category 5	Category 6
No of Patients	31	107	04	82	02	7	22
Number of Histology Corelated	07	15	01	43	02	02	20
Malignancy	01	02	0	02	0	02	20
Percentage	14.2%	13%	0	4%	0	100%	100%
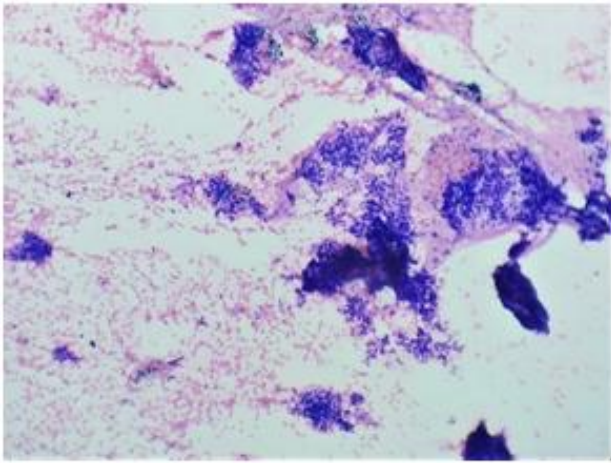
Figure 1
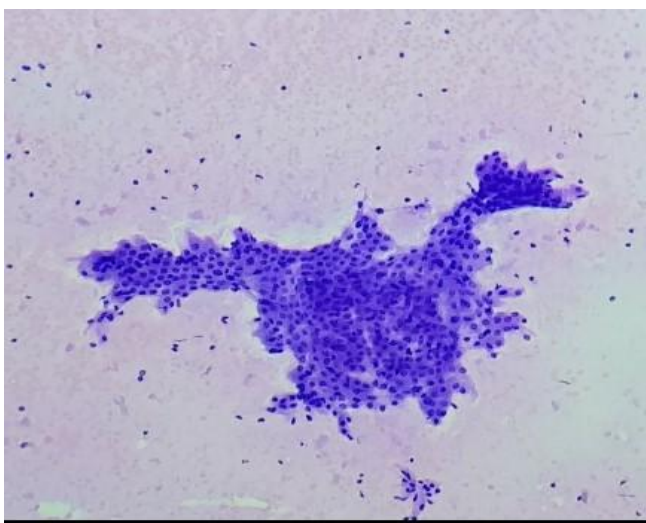Category 2: Chronic Sialadenitis

Figure 4
Category 6:Mucoepidermoid Carcinoma.
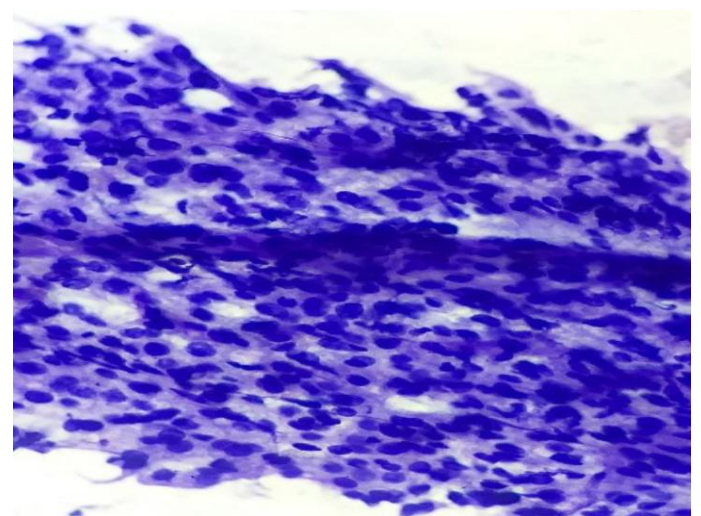

Figure 2:
Category 4a :Pleomorphic Adenoma

Figure 5
Category 6 Carcinoma Ex Pleomorphic Adenoma.

Figure 3
Category 4A:Warthin's Tumour

Figure 6
Category 6:Acinic Cell Carcinoma

Discussion

Benign salivary aspirates constituted a significant number of the cases in this study, as stated in a previous study by[10] .Oncompairing the number of salivary gland lesion accordind to age and sex distribution,highest number of cases were observed in age group 21-40 yrs followed by 40-60 yrs. A study[11] shows that salivary gland tumors has maximum in 3rd to 6th decade. One of the study conducted drom North India [12] shows that largest number of cases are seen in age group 21-40 years(46%) followed by 41 -60 years (27%) is in similar with our study. The male to female ratio is almost similar,according to many other studies salivary gland lesions are equally distributed among male & female. Similar studies were found which corelated with our findings[8,12,13]

Most common gland involved in current study is parotid gland(61.23%) followed by sub mandibular gland(34%) and minor salivary glands accounts for (4.7%) of cases.According to MSRSCG (2018) 20–25% in the parotid gland, 40–50% in the submandibular gland, and 50–81% in the sublingual and minor salivary glands. It is important to note that ROM is higher in minor salivary gland. Study by Rossi et al [8] also shows that parotid was the most common gland involved,according to him parotid (61.3%) and sub-mandibular (35.7%), minor salivary glands (3%).

In present study all the cases were classified to respective catagories by using six tire Milan system(MSCSCP) and cytologically interpreted . Category-I In the study 21 cases were Non diagnostic (12.15%)aspirates.Category-II Non neoplastic (41.96%); category- III [AUS] (1.56%); category- IV Neoplasm (32.94%) which further sub-divided in to cat- IVA Benign (32.15%) & cat- IVB SUMP (2.38%); category-V Suspicious for Malignancy (2.74%); category-VI Malignant] (8.62%).Similarstudies was also obtained by Rohila et al (2017 [8] ND-2.2%,NN-55.8%, remaining 40.4% are neoplastic among which 23.9% are malignant .(Kala et al, 2019)[12]

ND-6.1%, NN-38.2%, AUS-2.7%, BN-33.4%, SUMP-2%, SFM-2.4%, M-15% (Pukhrambam et al, 2019)[13] ND-1.4%, NN-52.9%, AUS-8.6%, BN-28.9%, SUMP-3%, SFM-3%, M-7.6% also reported similar results in with the study.

In present study majority of cases found in non neoplastic (category II) followed by Neoplastic Benign (category IVA).Innon neoplastic majority of cases were chronic sialoadenitis. In Benign Neoplastic category majority of cases were pleomorphic adenoma (84.14%) of total followed by Warthin's tumor (13.14%).In similar studies by Baloch and Jha et al [4,14] pleomorphic adenomas (PA) account for about 50% of all salivary gland neoplasms; Warthin tumor (WT) isthe second most common benign tumor.

In a study by Jha et al 2020[14] on 292 patients of salivary gland using Milans system the follow up biopsy was available in 34.39%.The ROM for Categor1 was 42.86%,Category 2 26.67%, Category 3 100%, Caterory 4a 10.17%, Caterory 5 71.42% and category 6 100%.The seems to be in concordance with the result of our study where ROM in catergory 5 and 6 are 100%.The study has its limitations like less number of histological follow up hence lessnumber of correlation with the FNA specimen.

Conclusions

Milan system of classification (MSRSCG) of salivary gland can be an effective and reliable tool for reporting .It can effectively predict the risks of Malignancy and help in effective management of the salivary gland tumours.

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