



To Correlate The Cytological Findings Of Different Salivary Gland Lesions With Histopathology

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background- Fine needle aspiration cytology in coexistence with clinical and radiological evaluation forms the best base, possible for selection of effective management. Histopathological examination is gold standard technique for establishing the final diagnosis and sub typing of salivary gland lesions.

Aim-To correlate the cytological findings of different salivary gland lesions with histopathology. To explore the diagnostic accuracy of FNAC by comparing with subsequent histopathology.

Material And Methods-

Study Type & Site: Hospital based study, carried out in Department of Pathology, MGUMST, and Jaipur.

Study Population: All the patients coming Mahatma Gandhi Hospital, Jaipur with salivary gland swellings

Study Assessment: FNAC findings of various salivary gland lesions were studied.

Relevant investigations were obtained and all the surgically resected biopsies and specimens were processed as per the standard guidelines and protocol. All the sections were studied under H & E staining .Special staining like mucicarmine and PAS were done in needed cases. Histopathological typing of tumours were done according to the WHO classification of salivary gland tumours and correlation between cytological diagnosis and histopathological diagnosis was done.

Results- Out of these 48 cases, 20 were cytological diagnosed as Pleomorphic adenoma & 14 were later confirmed on histopathology. 3 cases, reported as Warthin's tumor on cytology & later confirmed by histopathology. 2 cases, reported as Mucoepidermoid carcinoma on cytology were confirmed by histopathology. One case reported as Adenoid cystic carcinoma on cytology was confirmed the same by histopathology. Among the non-neoplastic lesions, 8 were reported as Benign cystic lesions, 4 were later reported as Mucus retention cysts, 4 cases were reported as Chronic Sialadenitis & rest 2 cases were not available on histopath .6 cases were reported as Chronic Sialadenitis on cytology, 3 were confirmed on histopathology, remaining 3 were not available for histopath. Among the 5 unsatisfactory smears, two were reported as pleomorphic adenoma, one was found to be a metastatic squamous carcinoma and 2 were not available for histopath.

Conclusion- The sensitivity and specificity of FNAC for Pleomorphic adenoma was 87.5% and 100% respectively. The PPV was 100%, the NPV was 90% and the accuracy was 94.1%. For Warthin's tumour and malignant tumours all the parameters were 100% because the cytological findings correlated with the histopathological findings. The sensitivity and specificity of FNAC for non-neoplastic lesions was 100% and 78.2% respectively.

Keywords: FNAC, SALIVARY GLAND, HISTOPATHOLOGY

Introduction

Salivary gland lesions form about 2-6.5 % of all head and neck neoplasm in adults.⁽¹⁾ They encompass a heterogeneous group of disorders and are broadly classified into neoplastic and non- neoplastic lesions. Salivary glands are exocrine organs which are responsible for production and secretion of saliva and consists of the parotid, submandibular, sublingual, and the minor glands which are numerous in number and distributed throughout the mouth and oropharynx⁽¹⁾

The present study describes the use of fine-needle aspiration (FNA) cytology in the diagnosis of the lesions.⁽²⁾

Cytology can clearly differentiate between non-neoplastic and neoplastic lesions, and also specific and non-specific inflammations. Thus, it provides a particular direction for therapeutic management of the patient. FNAC is a important tool for staging of salivary gland lesions with variable specificity and sensitivity.⁽³⁾

Cytological examination is a functional tool for evaluating suspicious salivary glands lesions as it is cheap, with minimum morbidity, rapid turnaround time, high specificity and sensitivity.

FNAC in coexistence with clinical and radiological evaluation forms the best base possible for selection of effective management. But histopathological examination is **gold standard** technique for establishing the final diagnosis and sub typing of salivary gland lesions.⁽⁴⁾

The present study was undertaken to evaluate and analyze salivary gland lesions by FNAC and correlate the FNA findings with histopathology. Diagnostic accuracy, specificity and sensitivity were also evaluated. Diagnostic pitfalls of FNAC of salivary lesions were identified and the possible ways to correct the misdiagnosis were suggested.⁽⁵⁾

Fine-needle aspiration cytology is found to be a reliable sensitive and specific technique for the diagnosis of most of the salivary gland lesions. FNAC should be always be advised as an initial

investigation for all salivary gland lesions in combination with other investigations.⁽⁶⁾

WHO classification of tumors of salivary glands

Malignant Tumors

1. Mucoepidermoid carcinoma
2. Adenoid cystic carcinoma
3. Acinic cell carcinoma
4. Polymorphous adenocarcinoma
5. Clear cell carcinoma
6. Basal cell adenocarcinoma
7. Intraductal carcinoma
8. Adenocarcinoma, NOS
9. Salivary duct carcinoma
10. Myoepithelial carcinoma
11. Epithelial- myoepithelial carcinoma
12. Carcinoma ex pleomorphic adenoma
13. Secretory carcinoma
14. Sebaceous adenocarcinoma
15. Carcinosarcoma
16. Poorly differentiated carcinoma
17. Lymphoepithelial carcinoma
18. Squamous cell carcinoma
19. Oncocytic carcinoma
20. Sialoblastoma

Benign Tumors

1. Pleomorphic adenoma
2. Myoepithelioma
3. Basal cell adenoma
4. Warthin tumour
5. Oncocytoma
6. Lymphadenoma
7. Cystadenoma
8. Sialadenoma papilliferum
9. Ductal papillomas
10. Sebaceous adenoma
11. Canalicular adenoma and other ductal adenomas

Non-Neoplastic Epithelial Lesions

1. Sclerosing polycystic adenosis
2. Nodular oncocytic hyperplasia
3. Lymphoepithelial sialadenitis
4. Intercalated duct hyperplasia

Benign Soft Tissue Lesions

1. Haemangioma
2. Lipoma/sialolipoma
3. Nodular fasciitis

Haematolymphoidtumours

Extranodal marginal zone lymphoma of mucosa-associated lymphoid tissue(MALT lymphoma).

Materials And Methods

Study Duration: January 2020 to June 2021

Study Site: Department Of Pathology, Mahatma Gandhi Medical College And Hospital, Jaipur

Study Population: All the patients coming Mahatma Gandhi Hospital, Jaipur with salivary gland swellings

Study Technique: Correlation between the FNAC findings and subsequent histopathological outcome.

Sample Size: Time bound study. All the specimens coming to pathology department fulfilling the inclusion criteria will be taken in this study.

Study Design: Hospital based observational study conducted after obtaining permission from institutional ethics committee

Study Assessment:

FNAC findings of various salivary gland lesions will be studied

Reports of relevant investigations like X-ray, MRI, CT and Ultrasonography will be obtained.

All the surgically resected biopsies and specimens will be preserved in 10% Formalin.

In this study adequate number of sections will be taken from different sites according to the size of the specimen as per the standard protocol.

All the sections will be studied by routine paraffin sectioning and Haematoxylin and eosin staining and special staining like mucicarmine and PAS will be done if required.

Histopathological typing of tumours will be done according to the WHO classification of salivary gland tumours

The cytological diagnosis is then correlated with the histopathological diagnosis.

Inclusion Criteria:

1. Patients from all age groups are included
2. Patients from both sexes are included
3. All benign and malignant lesions

Exclusion Criteria:

Patients who underwent FNAC only and not histopathological examination. Selection of cases was done as all patients with salivary gland swellings. Method of data collection: A detailed clinical history and relevant investigations obtained from the patient’s case files and other relevant sources. Cytology and Histopathology reports from the dept. of pathology and all the details were documented and recorded in the case record form.

Observation And Results

The study was conducted over a period of two years from January 2020 to June 2021 in the department of pathology, Mahatma Gandhi Medical College and Hospital, Jaipur. During this period a total of 48 FNAC samples were received from the patients who presented with salivary gland swellings to the Mahatma Gandhi Hospital.

Out of the 48 cases, 27 were cytologically diagnosed as salivary tumors (Neoplastic) accounting for 56.2 % and 16 were diagnosed as tumor-like lesions (Non-neoplastic) accounting for 33.3%.

5 samples were acellular, hemorrhagic aspirates and were deemed inconclusive. Out of the

48 cases for whom FNAC aspirates were received, 34 of them had subsequent histopathology done and hence the reports were made available for the same which enabled correlation study.

On histopathological scrutiny of the 34 cases, 22 were diagnosed as salivary tumors, 12 were diagnosed as tumor like lesions.

Table 2: Gender Wise Distribution Of Cases

Sex	No. of case (N)	Percentage (%)
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Male	29	60.4
Female	19	39.6
Total	48	100

The above table shows gender wise distribution of cases. It was concluded that out of the 48 cases, majority were male (60.4 %).

Graph no.1: Gender wise distribution of cases

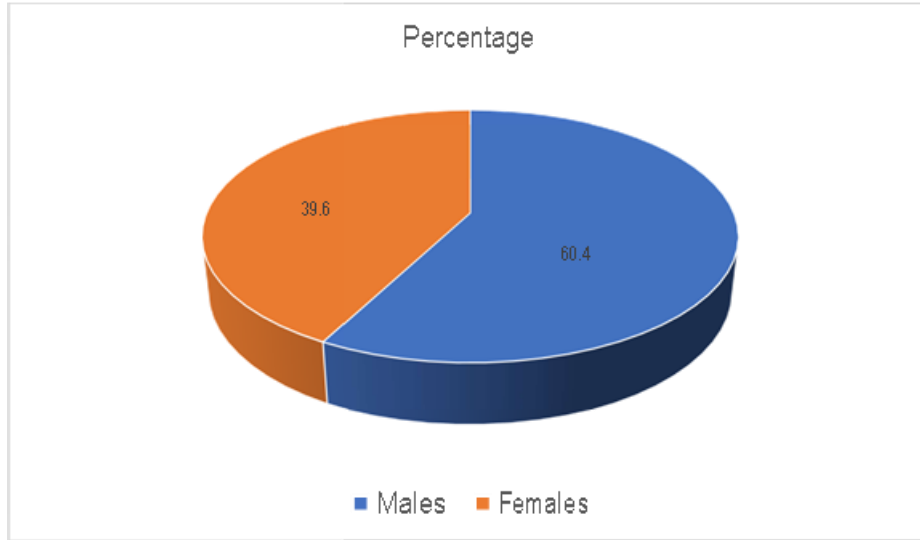


Table 3: Age Wise Distribution Of Patients Who Presented With Salivary Gland Lesions And Underwent FNAC Procedure.

Age group (yrs)	No. of patients	Percentage (%)
0-20	7	14.6
21-40	15	31.2
41-60	18	37.5
>60	8	16.7
Total	48	100

The above table shows the distribution of patients according to age. It was observed that majority of patients were in the age group of 41-60 years (37.5%) followed by 21-40 years (31.2%).

Graph 2: Age Wise Distribution Of Patients

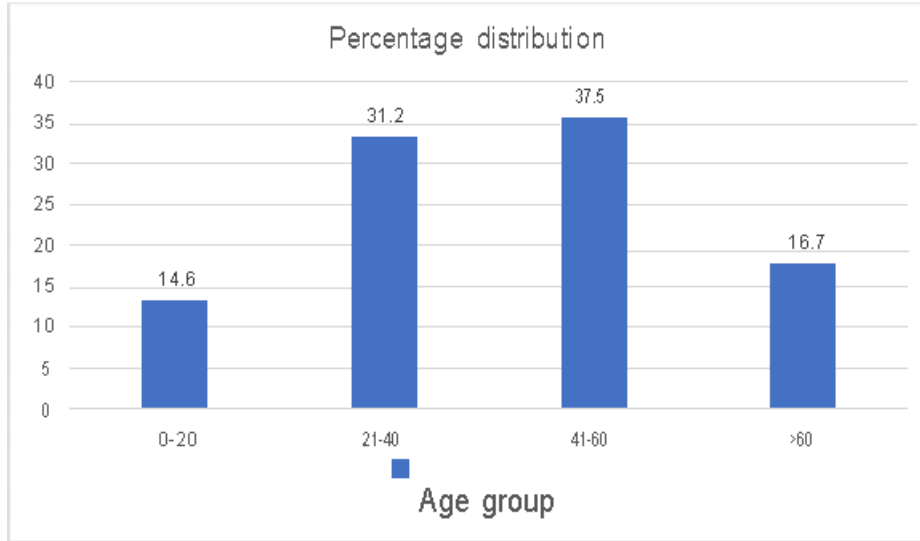


Table 4: Distribution Of Cases According To The Site Of Lesion

Location (Salivary gland)	No. of cases	Percentage (%)
Parotid gland	35	72.9
Submandibular gland	12	25
Minor Salivary gland	1	2.1
Total	48	100

The above table shows the distribution of cases according to the location of the salivary gland lesion. Most of the lesions were located in the parotid gland (72.9%)

Graph 3: Distribution Of Cases According To The Site Of Lesion

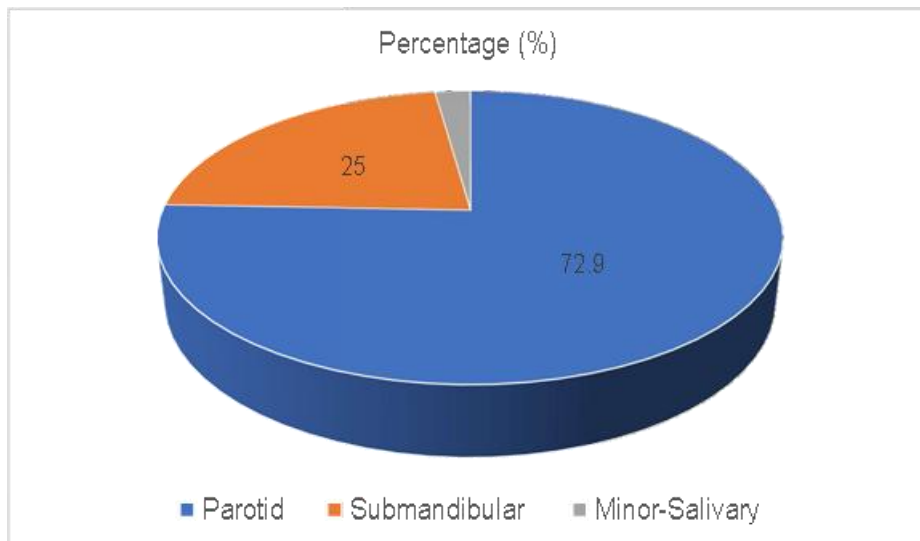


Table 5: Distribution Of Neoplastic Lesions (Tumors) By Cytological Diagnosis:

FNAC Diagnosis		No. of cases	Percentage (%)
Benign	Pleomorphic Adenoma	20	74.1
	Warthin tumor	3	11.1
Malignant	Mucoepidermoid carcinoma	2	7.4
	Adenoid cystic carcinoma	1	3.7
	Adenocarcinoma	1	3.7
Total		27	100

The above table shows the distribution of salivary gland neoplasms (tumors) among the cases. Benign neoplasms accounted for 85.2% cases and malignant 14.8%. Pleomorphic Adenoma was the most common tumor noted at 74.1%, followed by Warthin tumor at 11.1%. Among the malignant neoplasms, mucoepidermoid carcinoma was the commonest, occurring in 7.4% of the cases.

Graph 4: Distribution Of Neoplastic Lesions By Cytological Diagnosis

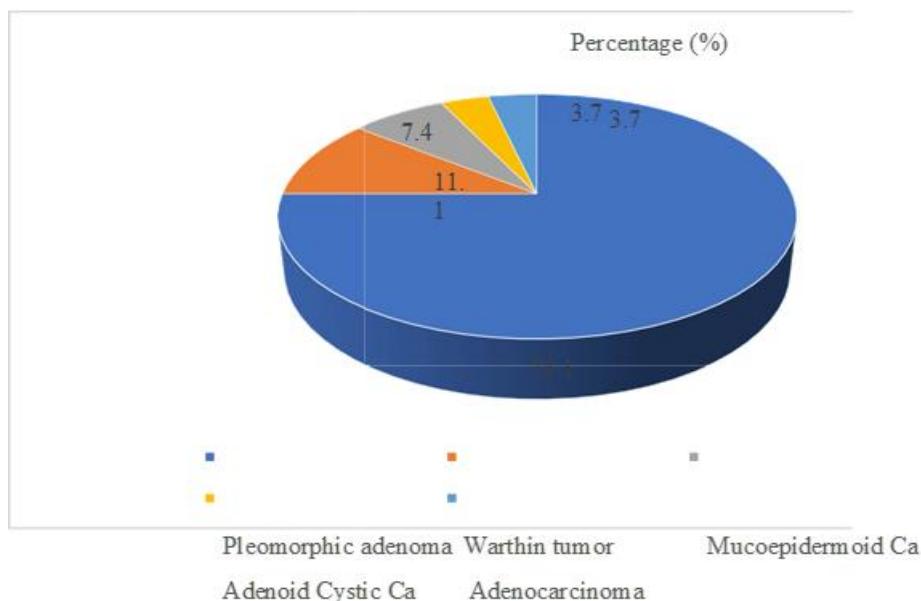


Table 6 : Distribution Of Neoplastic Lesion According To Location Of Salivary Gland

Sr.No.	Neoplastic lesions	Parotid	Submandibular	Minor
1	Pleomorphic adenoma	16	4	0
2	Warthin tumor	3	0	0
3	Mucoepidermoid CA	2	0	0
4	Adenocystic carcinoma	0	0	1

5	Adenocarcinoma	1	0	0
	Total	22	4	1

The above table shows the distribution of neoplastic lesions according to the location of the salivary gland. Most of the lesions were located in the parotid gland (61.5%) followed by Submandibular gland (15.4%).

Graph 5: Distribution Of Neoplastic Lesions According To Location Of Salivary Gland

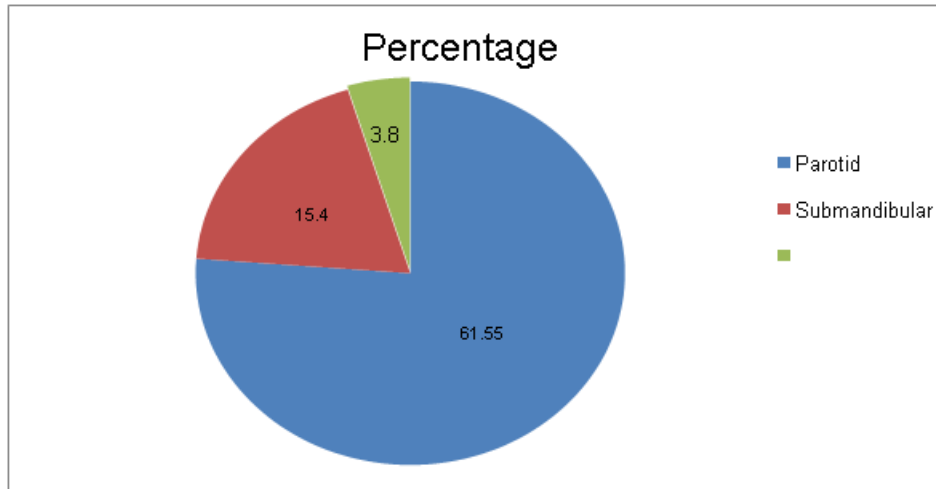


Table 7: Distribution Of Non-Neoplastic Salivary Gland Lesions By Cytological Diagnosis

Lesion	No. of cases	Percentage (%)
Benign cystic lesion	8	50
Chronic sialadenitis	6	37.5
Abscess	2	12.5
Total	16	100

The above table shows the distribution of non-neoplastic salivary gland lesions. Out of the 16 cytologically diagnosed cases, most of them Chronic sialadenitis (37.5) were classified as benign cystic lesion (50%), followed by

Graph 6: Distribution Of Non-Neoplastic Lesions By Cytological Diagnosis

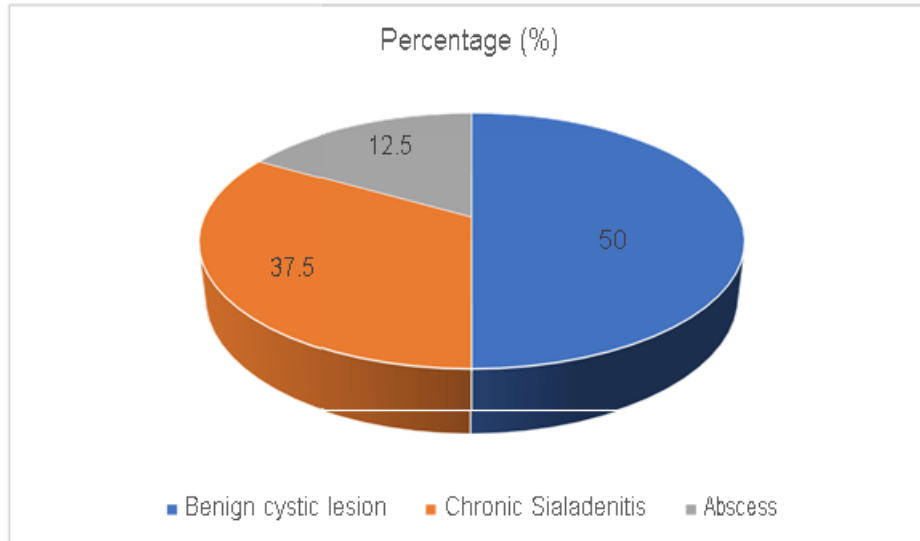


Table 8: Gender Distribution Of Cases According To Cytological Diagnosis

Cytological diagnosis	Male	Female	Total
Pleomorphic adenoma	9	11	20
Warthin tumor	2	1	3
Malignant epithelial neoplasm	2	0	2
Adenoid cystic carcinoma	1	0	1
Adenocarcinoma	1	0	1
Benign cystic lesion	5	3	8
Chronic sialadenitis	4	2	6
Abscess	1	1	2
Unsatisfactory	4	1	5
Total	29	19	48

The above table shows distribution of patients according to gender and the cytological diagnosis. It was noted that the incidence of Pleomorphic adenoma was more in females compared to males with a ratio of 1.22:1. All other lesions were more common among men.

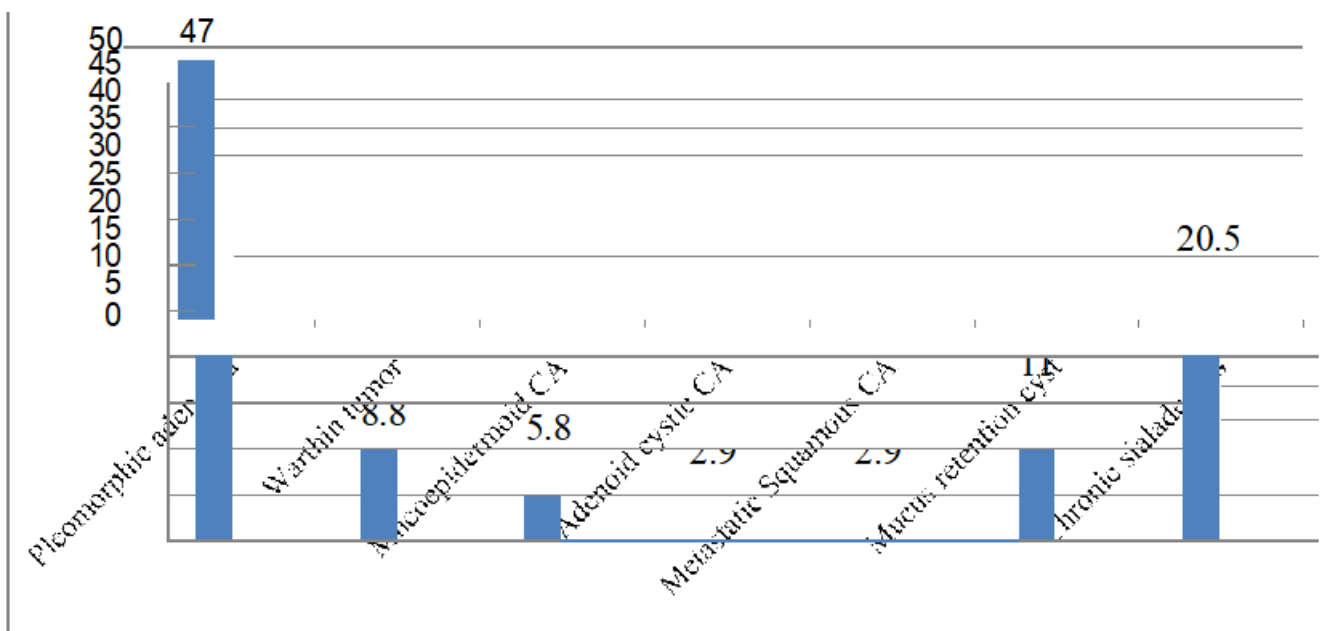
Table 9: Distribution Of Cases According To Histopathological Diagnosis

Histopathological diagnosis	No. of cases	Percentage (%)
Pleomorphic Adenoma	16	47.1
Warthin tumor	3	8.8
Mucoepidermoid carcinoma	2	5.9

Adenoid cystic carcinoma	1	2.9
Metastatic Squamous carcinoma	1	2.9
Mucus retention cyst	4	11.8
Chronic Sialadenitis	7	20.6
Parotid abscess	0	0
No specific pathology	0	0
Total	34	100

The above table shows the distribution of cases according to the histopathological diagnosis. Neoplastic lesions were most common and accounted for 67.6 %. Overall the most common lesion was Pleomorphic adenoma with an incidence of 47.1 %. Among the malignant tumors the most common was Mucoepidermoid carcinoma (5.8%). Among the non-neoplastic lesions, Chronic sialadenitis was the commonest (20.5 %).

Graph 7: Distribution Of Cases According To Histopathological Diagnosis



Correlation between cytological and histopathological diagnosis

In the present study, out of the 48 cases for whom FNAC aspirates were received, 34 of them underwent surgeries and subsequent histopathology specimens were received which enabled correlation study.

Out of these 48 cases, 20 were cytologically diagnosed as Pleomorphic adenoma. Among them 14 were subsequently confirmed on histopathology. Among the rest of the 6 cases histopathology was not available.

3 cases, which were reported as Warthin’s tumor on cytology were later confirmed by histopathology.

2 cases, which were reported as Mucoepidermoid carcinoma on cytology were confirmed by histopathology. One case reported as Adenoid cystic carcinoma on cytology was confirmed to be the same by histopathology.

Among the non-neoplastic lesions, 8 were reported as Benign cystic lesions, 4 of which were later confirmed on histopathology and reported as Mucus retention cysts , 4 cases were reported as Chronic Sialadenitis and remaining 2 cases were not available on histopathology .

6 cases were reported as Chronic Sialadenitis on cytology, 3 were confirmed on histopathology, remaining 3 were not available for histopathology

Among the 5 unsatisfactory smears, two were reported as pleomorphic adenoma, one was found to be a metastatic squamous carcinoma and 2 were not available for histopathology.

Statistical Analysis

Table 10: Statistical Analysis For Pleomorphic Adenoma By FNAC

FNAC	Histopathological Diagnosis		Total
	Positive	Negative	
Positive	14	00	14
Negative	02	18	20
Total	16	18	34

Sensitivity: 87.5% PPV: 100% Accuracy: 94.1%

Specificity: 100% NPV: 90%

The above table shows the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of FNAC for Pleomorphic adenoma. It was observed that sensitivity was 87.5% and specificity was 100%

Out of the 34 cases, 3 were reported as Warthin’s tumor on cytology. Later they were confirmed by histopathology. Thus yielding 100% for all measures of diagnostic accuracy.

4 out of 34 cases were reported as malignant (2 malignant epithelial neoplasm and 1 adenoid cystic carcinoma and 1 metastatic squamous cell carcinoma) on cytology. All of them were confirmed by histopathology. Thus once again yielding a value of 100% on all measures of diagnostic accuracy.

Table 11: Statistical Analysis For Non-Neoplastic Lesions By FNAC

FNAC	Histopathological Diagnosis		Total
	Positive	Negative	
Positive	11	5	16
Negative	0	18	18
Total	11	23	34

Sensitivity: 100% PPV: 68.7% Accuracy:85.3%

Specificity: 78.2 % NPV: 100%

The above table shows the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of FNAC for non-neoplastic lesions. It was observed that sensitivity was 100% and specificity was 78.2%.

Abbreviations

FNAC	Fine Needle Aspiration Cytology
H&E	Hematoxylin & Eosin
HIV	Human Immunodeficiency Virus
PA	Pleomorphic Adenoma
DCIS	Ductal Carcinoma in-situ
DPX	Dibutylphthalate Polystyrene Xylene
PPV	Positive Predictive value
NPV	Negative Predictive value
WT	Warthin Tumor
WHO	World Health Organization
MALT	Mucosa associated lymphoid tissue
HPF	High Power Field

Figure 1: (Giemsa Stain, 40X) Photomicrograph showing Pleomorphic Adenoma

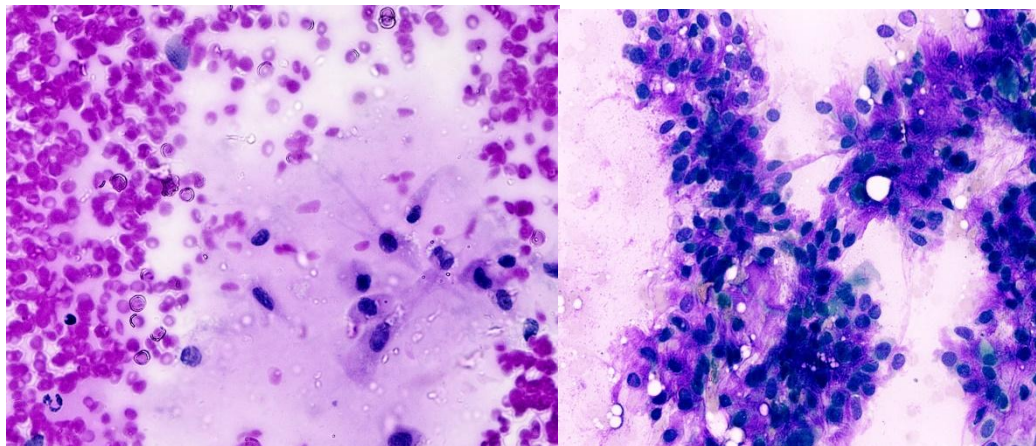


Figure 2: (Giemsa stain, 40X) Photomicrograph showing Warthin tumor on

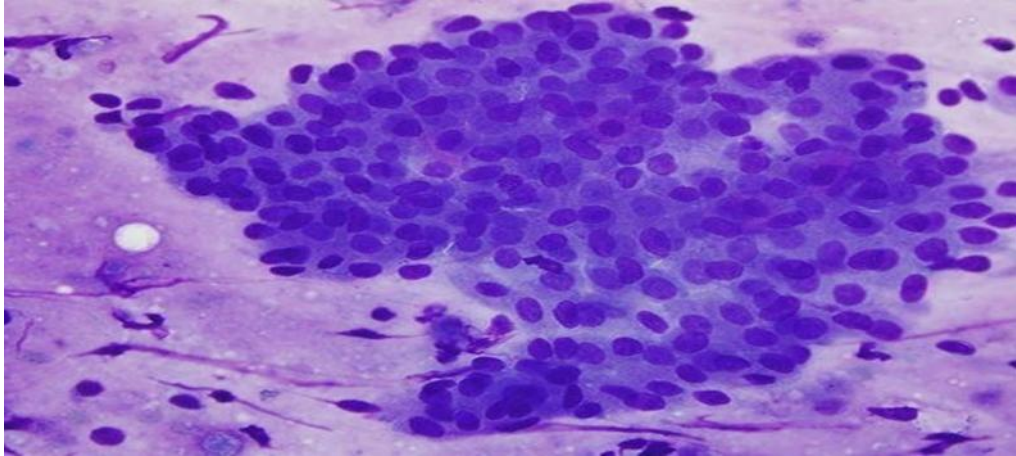


Figure 3: (Giemsa, 40X) Photomicrograph showing Parotid Abscess on FNAC

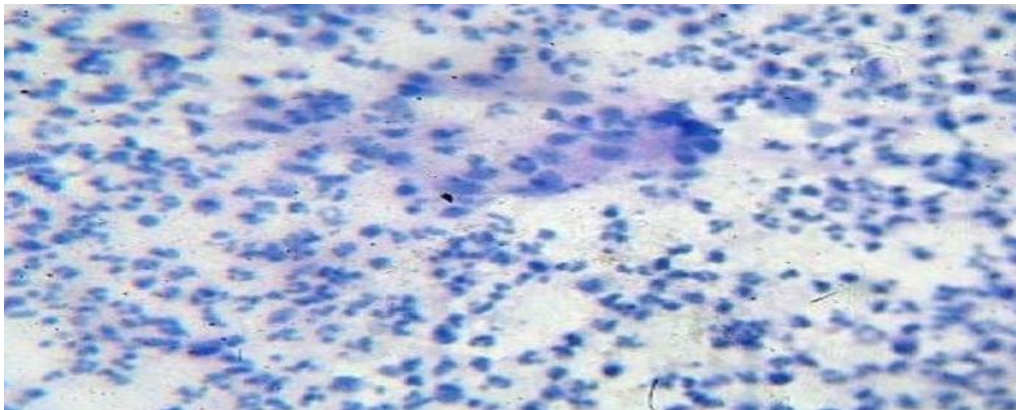


Figure 4: (H&E, 4X) Photomicrograph showing Pleomorphic Adenoma

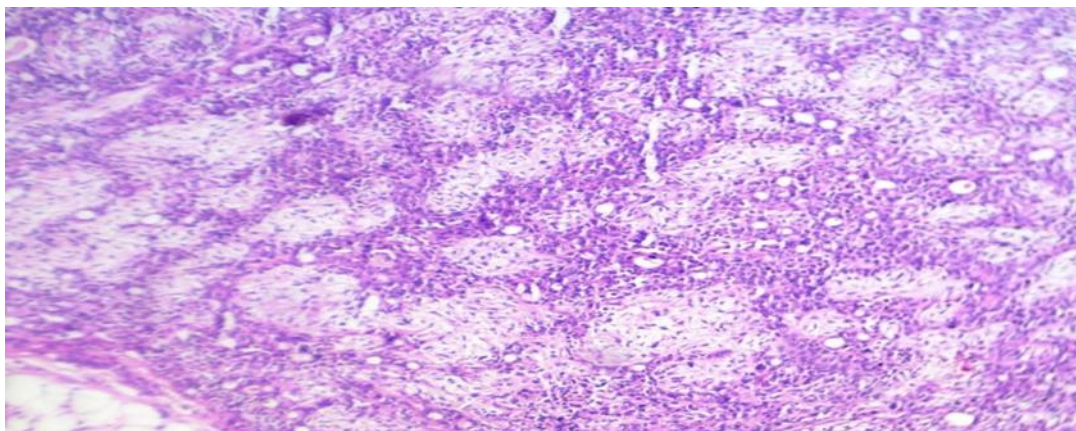


Figure 5: (H&E, 40X) Photomicrograph showing Pleomorphic Adenoma

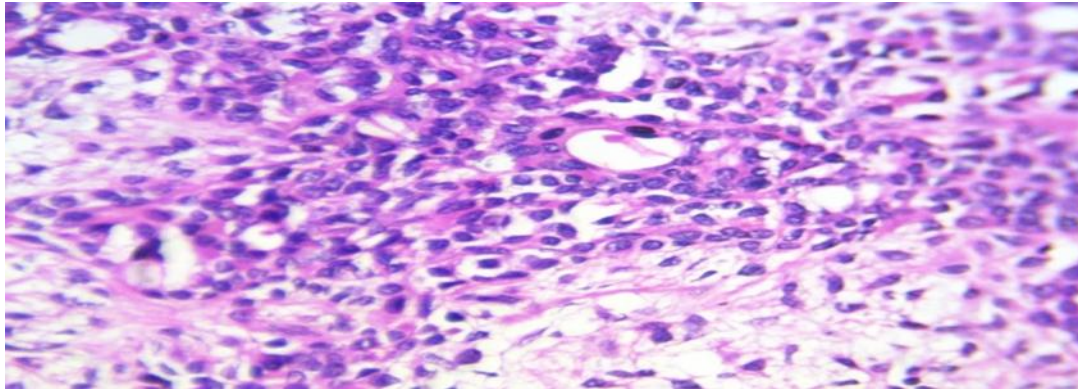


Figure 6:(H&E, 10X) Photomicrograph showing Mucoepidermoid Carcinoma

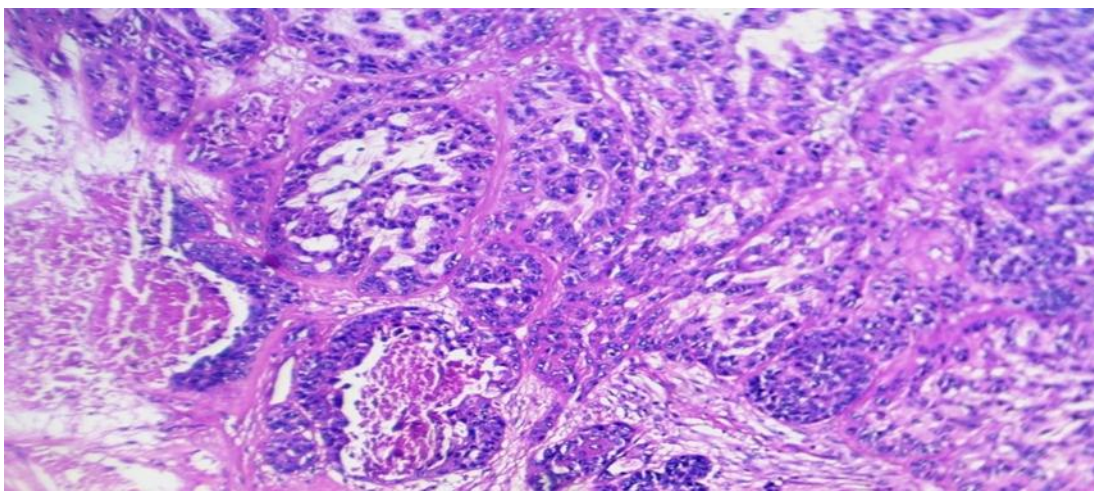


Figure 7: (H&E, 10X) Photomicrograph showing Warthin tumor

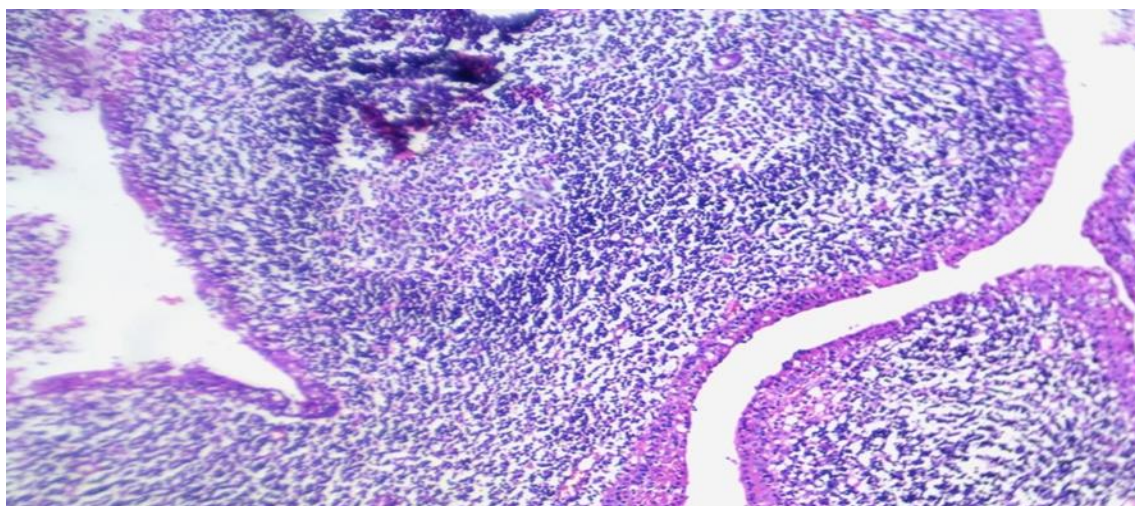


Figure 8 : (H&E, 40X) Photomicrograph showing Mucus retention cyst

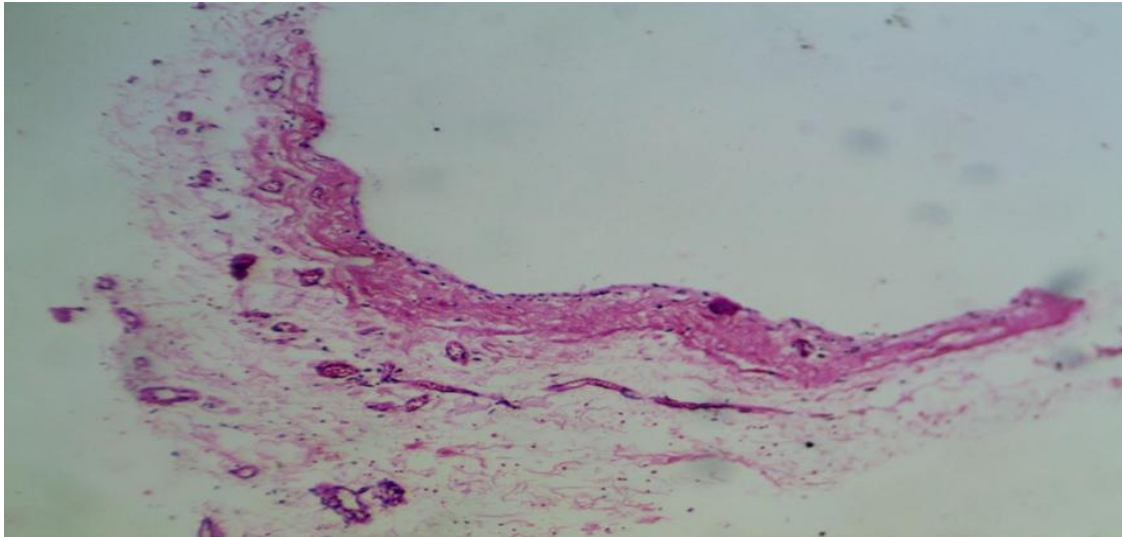
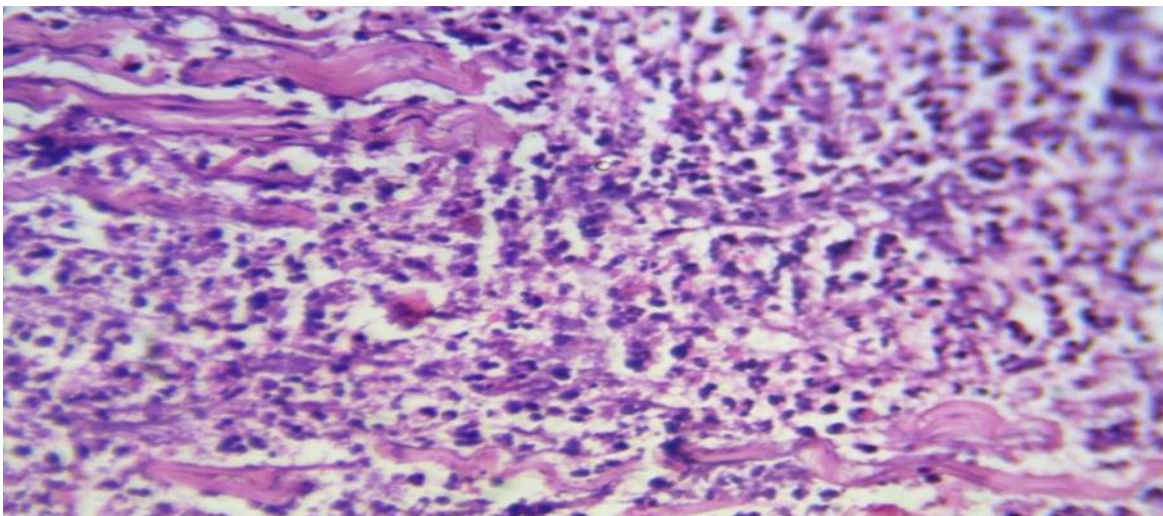


Figure 9 : (H&E, 40X) Photomicrograph showing Parotid Abscess



Discussion

In the recent years FNAC is becoming a widely recognized practical and useful technique in the diagnosis of salivary gland lesions. The technique is fast, simple and cost effective. No expensive instruments are needed. The cytological conclusion is rapid and excludes the need for surgical procedures. Moreover it is relatively safe and well tolerated by most of the patients.

The present study was conducted to elicit the diagnostic accuracy of FNAC for salivary gland lesions, by comparing the cytological diagnoses with that of histopathological diagnoses and in turn can detect parameters like sensitivity, specificity, positive

predictive value (ppv) and negative predictive values (npv).

Age Incidence

Most cases in our study were in the age group of 41-60 years which was followed by 21-40 yrs. He Y et al⁷ and Jayaram et al⁸ in their studies concluded higher incidence of cases in the 6th decade.

Mean age of incidence for benign and malignant tumors was 42.2 years and 59.7 years respectively. This almost correlated with the study of AFIP registry⁹ which showed 46.1 years and 47.1 years as the average age for benign and malignant tumors respectively.

Sex Incidence

In the present study there is a male preponderance with a Male:Female ratio of 1.52:1. Similar results were seen in studies by Das DK et al¹⁰ and Anjali et al¹¹ which also showed male preponderance. Although the incidence of particularly Pleomorphic adenoma was higher in females. The incidence of other neoplastic and non-neoplastic lesions were higher in males.

Anatomical Distribution

In the present study, most of the salivary gland tumors are found in the parotid region (72.9%) followed by submandibular region (25%). Only one case (2.1%) was found in the minor salivary glands.

This is comparable to other studies done. For eg a in the study by Boccato P et al¹² the incidence of salivary gland lesions were higher in the parotid at 87.63% , followed by submandibular at 10.11% and minor salivary glands at 2.26%.

In the study conducted by Das DK et al¹⁰ the incidence of lesions in the Parotid and submandibular region were 45.37% and 48.17% respectively.

Pleomorphic Adenoma

Pleomorphic adenoma was the most common lesion in our study. It was the most common benign lesion also. The criteria that were used to diagnose pleomorphic adenoma were varying combinations of epithelial and mesenchymal elements and a chondromyxoid background.

On gross, pleomorphic adenoma presented as a well circumscribed lesion with a fairly smooth surface. The cut surface the tumor showed tan grey to white areas with myxo-chondroid zones. Few of them showed cartilaginous areas and few showed cystic changes.

Histopathologically, tumors are composed of variable epithelial, myoepithelial and stromal components giving rise to a mixture of patterns. The stroma is typically myxoid, chondroid or myxochondroid.¹³

In our study the incidence of pleomorphic adenoma among neoplastic lesions was 75%. This is comparable to a study done at Seth GS Medical college, Bombay¹⁴ which had an incidence of 64%. Another study by Stewart CJR et al¹⁵ showed the incidence of pleomorphic adenoma to be 55%.

Another notable finding in our study was that the incidence of pleomorphic adenoma was higher in females compared to males with a Male: Female ratio of 1:1.22. This was correlating with the study done by Everson et al¹⁶ which had a M:F ratio of 1:1.9.

The sensitivity of FNAC in diagnosing pleomorphic adenoma in our series is 87.5% while the specificity is 100%. In the study by Viguer et al¹⁷ the sensitivity and specificity were 92.6% and 98.4% respectively. The reason for slightly lower sensitivity in our study was due to 2 false negative cases.

Sampling and interpretation errors are the main cause behind this. This can be removed by adequate sampling and aspirations from multiple sites. The cytological variations in reporting pleomorphic adenoma must be considered in order to avoid important errors in reporting salivary gland lesions.

Warthin tumor

Out of the 48 cases, 3 were diagnosed as Warthin tumor based on cytology. all 3 were confirmed to be Warthin tumor on histopathology with a diagnostic accuracy of 100%.

The incidence of Warthin tumor in our study was 11.1% among the neoplastic lesions. In the study by Jesus Souza et al¹⁸ the incidence of Warthin tumor was 8% and in the study done at Seth GS Medical college, Bombay¹⁴ the incidence was only 1%.

Malignant tumors

Out of the total 48 cases, 4 were diagnosed as malignant tumors on cytology. They included two cases of mucoepidermoid carcinoma and 1 each of adenocarcinoma and adenoid cystic carcinoma. Out of these 4, for 3 cases (2 mucoepidermoid carcinoma and 1 adenoid cystic carcinoma) subsequent histopathological specimens were received which enabled correlative study. All 3 of them were confirmed by histopathology, yielding a value of 100% on all measures of diagnostic accuracy.

Among the neoplastic lesions, mucoepidermoid carcinoma was the commonest, accounting for 7.4% of all tumors. One case each of adenoid cystic carcinoma and adenocarcinoma were noted accounting for 3.7% each. In the study done at Seth GS Medical college, Bombay¹⁴ the incidence of Mucoepidermoid carcinoma was 5% of all tumors. In the study by Jesus Souza et al¹⁸ the incidence of

Mucoepidermoid carcinoma was 11%. One case was diagnosed as Adenocarcinoma on cytology but subsequent histopathology specimen was not received.

Non-Neoplastic Lesions

In total, out of the 48 cases, 16 were diagnosed cytologically as non-neoplastic or tumor like lesions. Most of them were classified as benign cystic lesions (50%), followed by Chronic Sialadenitis (37.5%). The remaining 12.5% cases were diagnosed as parotid abscess.

Out of these 16 cases, 10 of them received subsequent histopathological specimens which enabled correlative study. Out of the 8 cases that were diagnosed as Benign cystic lesions on cytology, 2 were later confirmed on histopathology as mucus retention cysts, 4 cases turned out to be chronic Sialadenitis and for two cases histopathology specimen were not received.

The 6 cases that were diagnosed as chronic Sialadenitis on cytology. Out of 6 cases 3 cases were confirmed as same on histopathology, one case was diagnosed as metastatic squamous carcinoma and for two cases histopathology specimen were not received.

2 cases which were given as abscess on cytology, histopathology was not available.

In our study the overall incidence of non-neoplastic lesions on the basis of cytology was 33.3%, out of which the commonest was benign cystic lesion. In the study by Boccato P *et al*¹² the incidence of non-neoplastic lesions was 30%. In the study by Jayaram *et al*⁸ the incidence of non-neoplastic lesions was 27.53%.

In our study the overall sensitivity and specificity of FNAC in diagnosing non-neoplastic lesions is 100% and 78.2% respectively.

Out of the 48 cases, 5 of them were reported as unsatisfactory and repeat aspirates were not received. For 2 out of these 5 cases were found to be pleomorphic adenoma, one case as Metastatic squamous cell carcinoma and for 2 subsequent histopathological specimens were not received in our department.

Conclusions

The present prospective study was conducted to study the efficacy of Fine Needle Aspiration Cytology (FNAC) in the early diagnosis of salivary gland lesions. We did this by correlating the cytological findings with that of the histological findings. Histopathology is considered the gold standard for establishing the final diagnosis and staging of salivary gland lesions.

Induction of FNAC diagnosis of salivary gland lesions by Stewart *et al* gained popularity as a reliable and economically effective tool of diagnosis. The added advantages of avoidance of fistula formation, tumor implantation and recurrence following capsular disruption, which are common with incisional or core needle biopsy makes it a perfect tool for early and initial assessment.

The study revealed the following points

1. It was observed that out of the total 48 cases, majority were male (60.4%).
2. Majority of the patients with salivary gland lesions were in the age group of 41-60 years (37.5%) followed by 21-40 years (31.2%)
3. 27 were cytologically diagnosed as salivary tumors (Neoplastic) accounting for 56.2%
4. 16 were diagnosed as tumor-like lesions (Non-neoplastic) accounting for 33.3%.
5. Among the neoplastic lesions, most were benign and accounted for 85.1 % cases
6. Remaining 14.9% were malignant tumors.
7. Pleomorphic Adenoma was the most common benign tumor and the most common tumor overall accounting for an incidence of 74.1%.
8. The second most common benign tumor was Warthin tumor at 11.1%.
9. Among the malignant neoplasms, Mucoepidermoid carcinoma was the commonest, occurring in 7.4% of the cases.
10. 5 FNAC samples were acellular, hemorrhagic aspirates and were deemed inconclusive
11. Among the non-neoplastic lesions, most were classified as benign cystic lesion (50%), followed by Chronic sialadenitis (37.5%).
12. Most of the tumors were located in the parotid gland (72.9%)
13. Submandibular gland lesions accounted for 25%
14. Only one case involved the minor salivary gland, which was a case of Adenoid cystic carcinoma

15. The incidence of Pleomorphic adenoma was higher in females compared to males with a ratio of 1.22:1.
16. All other neoplastic and non-neoplastic lesions were commoner among men.
17. The sensitivity and specificity of FNAC for Pleomorphic adenoma was 87.5% and 100% respectively.
18. The PPV was 100%, the NPV was 90% and the accuracy was 94.1%
19. For Warthin tumor and malignant tumors all the parameters were 100% because the cytological findings correlated with the histopathological findings.
20. The sensitivity and specificity of FNAC for non-neoplastic lesions was 100% and 78.2% respectively.

FNAC can be utilized for the initial evaluation of salivary gland swellings, even in the outpatient set up. It is also cheap and minimally invasive.

It helps the clinician not only in the early detection of lesions but also in formulating an early plan of treatment.

Technological advancement has added widely to the burden of healthcare costs and facilities like ultrasound, sialography, CT sialography and immune markers are available to support the diagnosis of salivary gland tumors. The continued and accelerated use of the FNA cytology has reduced the costs and has released significant resources for alternate uses, a matter, that the pathologist can feel justifiably proud of.

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