

Original Research Article

Cyto-histological correlation of salivary gland lesions- a prospective study in a tertiary care institute

Soma Negi¹, Kavita Mardi¹, Shivani Sood^{2*}, Neelam Gupta⁴, N. K. Mohindroo⁵,
Muninder Kumar⁶, Ramesh Azad³, Ashish Chaudhary⁷, Gunjita Negi⁸

¹Department of Pathology, ²Department of Immuno Haematology and Blood Transfusion, ³Department of Oto-rhino-Laryngology Indira Gandhi Medical College, Shimla, Himachal Pradesh, India

⁴Department of Pathology, Maharishi Markande University, Solan, Himachal Pradesh, India

⁵Department of Oto-rhino-laryngology, Principal, Y. S. Parmar Medical College, Nahan, Himachal Pradesh, India

⁶Department of Radiotherapy, Dr. Rajendra Prasad Government Medical College, Tanda, Himachal Pradesh, India

⁷Department of Pathology, Pt. Jawahar Lal Nehru Government Medical College and Hospital, Chamba, Himachal Pradesh, India

⁸Third year MBBS, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

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*Correspondence:

Dr. Shivani Sood,

E-mail: shivanisood343@rediff.com

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) has an essential proven role in diagnosing most of the common and benign salivary gland lesions. However, limited cellularity and morphological heterogeneity of the lesion can pose diagnostic challenges. The present study was conducted in a tertiary care centre over a period of one year with an objective to study the cyto-morphological features of salivary gland lesions and correlate cytological findings with histopathology.

Methods: The study was carried out over a period of one year from January 2014 to December 2014. FNA specimens obtained from 78 patients were analyzed. Of these, only 51 patients underwent biopsy or surgery and their specimens were subjected to histopathological examination. Validation of cytological diagnosis was done on the basis of histopathological diagnosis.

Results: A total 78 patients with salivary gland lesions were subjected to FNAC. Non neoplastic lesions constituted 19 cases (25%) and benign lesions constituted 46 cases (80.70%). Malignant lesions constituted 11 cases (19.30%). Two cases were inconclusive due to inadequate aspirated material. Overall sensitivity, specificity and diagnostic accuracy were 95.98%, 99.20% and 98.09% respectively.

Conclusions: FNAC continues to be an accurate diagnostic technique in the hands of an experienced cytopathologist. It is a highly sensitive and specific technique for rapid diagnosis of most of the salivary gland swellings.

Keywords: Cyto-histological correlation, FNAC, Salivary glands

INTRODUCTION

Fine needle aspiration cytology (FNAC) is a minimally invasive technique offering great help to physicians aiming at diagnosis of various palpable swellings of body like that of breast, salivary gland and lymph nodes. It is particularly useful in salivary glands swellings as core

needle biopsy has possible risk of causing a fistula/tumor implantation through disrupted capsule. Salivary gland swellings can arise from a number of etiologies including inflammatory processes, cysts or tumors. Lesions mimicking salivary gland tumors can arise in tissue close to the gland, such as lymph nodes, soft tissue and skin.¹ Clinical examination can be inaccurate in distinguishing

between salivary gland tumor and inflammatory process.² Thus, a mass in salivary gland region presents a diagnostic challenge with regards to its site of origin, histological behaviour, and tissue diagnosis. FNAC helps in planning the therapeutic management of the patient.³

This study was conducted in the department of pathology IGMC, Shimla to study the spectrum of salivary gland lesions, correlate cytology findings with histopathology and to find out the diagnostic accuracy, sensitivity and specificity of FNA in evaluation of salivary gland lesions.

METHODS

This prospective study was conducted in the Department of Pathology, Indira Gandhi Medical College, Shimla from January 2014 to December 2014. The samples for cytological and histopathological examination were collected from indoor/outdoor patients with salivary gland swelling attending the department of ENT, IGMC Shimla. FNA specimens obtained from 78 patients were analyzed. Of these, only 51 patients underwent biopsy or surgery and their specimens were subjected to histopathological examination. Validation of cytological diagnosis was done on the basis of histopathological diagnosis.

Ethical clearance was taken from the hospital ethical clearance committee.

Inclusion criteria

The indoor and outdoor patients of all ages with salivary gland lesions.

Exclusion criteria

Inability to provide written informed consent.

Giemsa staining was done for cytology samples and haematoxylin and eosin staining for tissue sections. Special stains were used if indicated.

Validation of cytological diagnosis was done on the basis of histopathological diagnosis.

The sensitivity, specificity, positive predictive value, negative predictive value and accuracy of FNA in diagnosing salivary gland lesions were calculated. SPSS software system was used for data analysis.

RESULTS

A total 78 patients with swelling in the salivary gland region were subjected to FNAC. 51 patients were subsequently operated and subjected to histopathological examination.

Age of the patients ranged from 11 years to 80 years with the mean age being 42.7 years. 45 cases (57.69%) were

males and 33 cases (39.74%) were females. The male to female ratio was 1.3:1.

A total 53 (67.94%) cases involved parotid gland, 19 cases (24.35%) involved submandibular gland, 1 case (1.28%) involved sublingual gland and 5 cases (6.41%) involved minor salivary glands.

Among the 78 cases, 19 cases (24.35%) were non neoplastic and 57 cases (73.07%) were neoplastic. 2 (2.56%) cases were inadequate for opinion due to scant representative material.

Of the 19 non-neoplastic salivary gland lesions, sialadenitis was the most common lesion that constituted 9 (47.36%) cases followed by 4 cases (21.05%) of sialadenosis, 3 (15.78%) cases of chronic nonspecific reactive hyperplasia (intra-parotid LN) and 2 (10.25%) cases of non- neoplastic cysts.

All 9 cases of sialadenitis involved the sub mandibular gland. Sialadenosis was encountered equally in the parotid and submandibular gland (n=2 each) and 1 (5.26%) case each of non-neoplastic cyst was seen in parotid gland and minor salivary gland. Chronic nonspecific reactive hyperplasia was seen in parotid gland accounted for 10.52% (2 out of 3 cases) and submandibular 5.26% (1 out of 3 cases). Only one case (5.26%) of abscess was seen in parotid gland.

Out of the 57 neoplastic lesions diagnosed on FNAC, 46 (80.70%) cases were benign and 11 (19.30%) cases were malignant.

In the present study, out of 46 benign tumors, 35 cases (59.64%) were of pleomorphic adenoma. Most of them involved the parotid gland followed by submandibular gland. 10 cases (17.54%) were of Warthin's tumor, 8 cases involving parotid gland and two cases involving submandibular gland. One case (1.75%) of basal cell adenoma was also seen in parotid gland.

Pleomorphic adenoma most commonly affected patients less than 50 years of age. However, Warthin's tumor affected patients in the age group of 41-80 years. In contrast, malignant tumors were observed in patients older than 50 years.

Mucoepidermoid carcinoma was the most common malignant tumor, constituting 4 (7.01%) cases. 3 cases involved parotid gland and 1 case involved minor salivary gland.

Adenocarcinoma was diagnosed in 3 (5.45%) cases. Parotid gland was involved in 2 cases and submandibular gland in 1 case.

Acinic cell carcinoma was observed in 2 (3.50%) cases, one in parotid gland and other in submandibular gland.

Table 1: Cytohistological correlation of non-neoplastic lesions (n=7).

| FNAC findings | No. of patients | Histopathological findings | No. of patients |
|----------------------------|-----------------|----------------------------|-----------------|
| Sialadenitis | 5 | Sialadenitis | 5 |
| Non-neoplastic cyst | 2 | Mucocoele | 1 |
| | | Lymphoepithelial cyst | 1 |
| Total | 7 | | 7 |

Table 2: Cytohistological correlation of neoplastic lesions (n=44).

| FNAC findings | No. of cases | Histopathological finding | No. of cases |
|--|--------------|--------------------------------------|--------------|
| Pleomorphic adenoma | 26 | Pleomorphic adenoma | 24 |
| | | Schwannoma | 1 |
| | | Mucoepidermoid carcinoma | 1 |
| Warthin's tumor | 7 | Warthin's tumor | 7 |
| Basal cell adenoma | 1 | Basal cell adenoma | 1 |
| Mucoepidermoid carcinoma | 4 | Papillary cystadenoma | 1 |
| | | Mucoepidermoid carcinoma | 2 |
| | | Squamous cell carcinoma | 1 |
| Adenocarcinoma | 2 | Adenocarcinoma | 1 |
| | | Mucoepidermoid carcinoma | 1 |
| Non-Hodgkins lymphoma(infiltration) | 1 | Non hodgkins lymphoma (infiltration) | 1 |
| Adenoid cystic carcinoma | 1 | Adenoid cystic carcinoma | 1 |
| Acinic cell carcinoma | 2 | Acinic cell carcinoma | 2 |
| Total | 44 | | 44 |

One case of adenoid cystic carcinoma was seen involving the minor salivary gland.

One case of non-Hodgkin's lymphoma (infiltration) was observed in parotid gland.

Two smears were non-diagnostic due to scant representative cell material.

51 patients underwent biopsy/surgery. Histopathological examination revealed that 7 (13.72%) patients had non-neoplastic lesions, 34 (66.66%) patients had benign lesions, 10 (19.60%) patients had malignant lesions.

FNA findings were correlated with histopathology in operated cases. The accuracy of FNAC for detection of benign and malignant lesions was evaluated using histopathology as the gold standard test. The results were interpreted as shown in Table 1 and 2.

All 5 cases of sialadenitis correlated with histopathology. 2 cases of non-neoplastic cysts were reported on FNAC, later on diagnosed as mucocoele and the other as lymphoepithelial cyst on histopathology. Thus, the 7 cases reported as non-neoplastic lesions on cytology correlated with histopathology.

On correlation of FNAC with the histopathology results, it was found that FNA had a sensitivity of 95.98%, specificity of 99.20%, positive predictive value of

96.96%, negative predictive value of 97.35%, false negative rate of 4.04% and accuracy of 98.09%.

DISCUSSION

The salivary gland system is involved by a variety of non-neoplastic and neoplastic lesions. Non-neoplastic lesions include infection (mostly viral, sometimes bacterial), sialolithiasis, mucocele and extravasation cysts.⁴ HIV associated salivary gland disease, hepatitis C virus associated sialadenitis, drug associated salivary gland disease, granulomatous sialadenitis, nonspecific reactive changes, necrotizing sialometaplasia, Sjogren's syndrome and Mikulicz syndrome are other non-neoplastic salivary gland lesions.

Neoplastic lesions include benign and malignant tumors. Benign tumours most commonly include pleomorphic adenoma, Warthin tumour, oncocytomas etc., while malignant tumours include mucoepidermoid carcinoma, adenoid cystic carcinoma and acinic cell carcinoma etc. Salivary gland tumours elicit considerable medical interest because of their multifaceted clinical presentation, varied histological appearance and the associated difficulties predicting their prognosis.⁵

All these lesions have also been reported in ectopic salivary gland sites, such as the neck, nose, cervical lymph nodes and the parapharyngeal spaces.⁶ Lesions mimicking salivary gland tumours can arise in tissues close to the salivary glands, such as lymph nodes, soft

tissue and skin.⁷ Clinical examination of the glands can be inaccurate in distinguishing between salivary gland tumors, inflammatory process or enlarged nodes. Thus, a mass in the region of the salivary gland presents a diagnostic challenge with regard to its site of origin, histological behaviour and the tissue diagnosis.^{8,9}

In our study, the age of the patients ranged from 11-80 year with mean age of 42.7 years which is comparable to the studies conducted by Vaidya et al and Singh et al.^{2,10}

Out of 78 patients, 45 (57.69%) were male 33 (42.30%) were female. The male: female ratio was 1.3:1. Similar results were seen in studies conducted by Kumar et al, Raval et al and Gandhi et al.¹¹⁻¹³

In the present study, non-neoplastic lesions accounted for 25% cases. Studies conducted by Singh et al and Gandhi et al showed a higher incidence of non-neoplastic lesions. Neoplastic lesions accounted for 75% cases in our study which is comparable with the studies conducted by Singh et al and Gandhi et al.^{2,13}

In our study, sialadenitis was the most common non neoplastic lesion accounting for 9 (47.36%) cases. All cases involved the submandibular gland. Similar findings were reported by Jain et al in their study.¹⁴ Singh et al and Gandhi et al have found a higher proportion of sialadenitis (83%) in their studies, the difference could be explained by the smaller sample size in the present study (n= 76) in comparison to their studies (n=96) and (n=90).^{2,13}

Sialadenosis accounted for 4 (21.05%) cases in our study which is also consistent with the findings observed by Jain et al.¹⁴ 1 case (5.26%) of abscess was seen in our study while Gandhi et al found 3 cases (8.3%).¹³

Chronic nonspecific reactive hyperplasia (intra parotid) was seen in 3 cases in our study which has not been reported in any of these studies.

In present study out of the 57 neoplastic cases, 46 cases (80.70%) were benign and 11 cases (19.29%) were malignant. Results are consistent with the studies conducted by Singh et al who found 47 (78.33%) benign and 13 (21.66%) malignant case and Gandhi et al who found 42 (77.77%) benign and 12 (22.22%) malignant cases.^{2,13}

In the present study, the neoplastic lesions most commonly involved parotid gland accounting for 45 (78.94%) cases followed by 7 (12.28%) cases in submandibular gland. Sengupta et al and Gandhi et al found involvement of parotid gland and submandibular glands in 146 (84.88%) and 17 (9.88%) and 56 (62.22%) and 24 (26.67%) cases respectively.^{13,15}

The sub lingual gland involvement was seen in only 1 (1.75%) case which is consistent with observation by

Gandhi et al.¹³ However, Sengupta et al and Gandhi et al observed a higher rate of minor salivary gland involvement, 10 (5.81%) cases and 8 (8.89%) cases respectively.^{13,15} The higher rate could be due to the larger sample size studied by them.

In the present study, pleomorphic adenoma was the most common benign lesions accounting for 35 (76.08%) cases, involving most commonly the parotid gland. 10 (21.74%) cases of Warthin's tumor were seen. 8 cases were seen involving the parotid gland and 2 cases involving submandibular gland. This corroborated well with the findings of Gandhi et al who also found 33 (78.57%) cases of pleomorphic adenoma in their study. They also found 8 (19.04%) cases of Warthin's tumor, all involving the parotid gland only.¹³

In the present study, pleomorphic adenoma was the most common benign tumor accounting for 61.40% of all tumors and 76.08% of benign tumors and parotid was the most commonly studied gland. The peak age incidence was seen in the 5th and 7th decade with a female predominance. Results are similar to the study by Gandhi et al.¹³

The risk of developing Warthin's tumors is 8 times high in smokers as compared to non-smokers. In the present study, majority of the patients who were diagnosed as cases of Warthin's tumor had history of smoking. It was the 2nd most benign tumor found in 5th to 8th decade with male predominance. 8 cases involved parotid gland and 2 cases showed submandibular gland involvement.

Only one case of basal cell adenoma was found in a 42 years old female patient involving the parotid gland in the present study which is similar with the finding observed by Gandhi et al.¹³

Among the malignant lesions, maximum patients were of mucoepidermoid carcinoma accounting for 4 (36.3%) cases. 3 cases were more than 50 years of age and showed involvement of the parotid gland. One case showed involvement of minor salivary gland. The results are consistent with the studies conducted by Gandhi et al who had 5 cases (41.66%) and Singh et al who had 4 cases (30.7%).^{2,13}

Adenocarcinoma was the second most common malignant tumor in our study. It affected patients in the age group of 2nd and 7th decade. No case was reported in the study by Gandhi et al and Singh et al.^{2,13}

Acinic cell carcinoma was present in two cases (18%), found in 3rd to 5th decade and results are consistent with the study conducted by Gandhi et al found 2 cases (16.6%) and Singh et al found 1 case (7.6%).^{2,13}

One case (9.09%) of adenoid cystic carcinoma was seen in a female patient in our study. However, Gandhi et al

found 5 (41.6%) cases and Singh et al found 8 cases (61.5%).^{2,13}

Non-Hodgkin's lymphoma of salivary gland is very rare and its occurrence almost always follows systemic lymphoma and mostly present with bilateral involvement of parotid gland. Our study also had one case of bilateral parotid swelling in a 42 year old female which was diagnosed as Non-Hodgkin's lymphoma infiltration into the parotid gland.

FNA is a safe, minimally invasive, cost-efficient, and effective diagnostic technique. It has an edge over frozen sections because it proves the nature of the lesion before surgery and thus acts as a useful triage tool and prevents patients with non-neoplastic lesions from undergoing surgery. In many centers, this is the first tissue-based procedure applied to establish a diagnosis before any surgical intervention. The usefulness of salivary gland FNA relates to the fact that it is easy to perform, smear evaluation is immediate, and the procedure can be repeated several times to obtain more tissue for diagnosis or special studies. When a malignant diagnosis is given, the surgeon is in a better position to plan the management. Diagnosis of a benign lesion provides immediate relief to the patient, sparing him from the anxiety of waiting for several days for a surgical biopsy diagnosis.

In our study, the overall sensitivity, specificity and accuracy was 95.98%, 99.20% and 98.08% respectively which is similar to the study conducted by Gandhi et al.¹³ Overall diagnostic accuracy of present study is 98.09%. These findings are also quite similar to the findings of Omhare, et al who observed an overall diagnostic accuracy of FNA as 95.3%.¹⁷

The positive predictive and negative predictive values were 96.96% and 97.35% respectively which were comparable to other studies.¹⁰ Positive predictive value and negative predictive value for neoplastic tumours reported by Omhare, et al were 88.2% and 97.1%, respectively which corroborated well to the present study.

The present study showed a false negative rate of 4.04% while Omhare, et al observed it 2.3% which is in close proximity to the present study.¹⁷

FNAC was inconclusive in two cases. The cause for non-diagnostics smears being scant representative cellularity and suboptimal quality of the smears due to drying artefact or admixture with blood. Expert technique and repeat FNA can help in improving the diagnostic accuracy.

CONCLUSION

FNAC is a rapid, convenient and accurate method of tissue diagnosis that can be performed on outpatient basis. It is highly sensitive and specific technique for

diagnosis of most salivary gland lesions. Early diagnosis by this non-invasive method helps in rapid management of salivary gland lesions.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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