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Pathology

A Two Years Cyto -Histological Study of Salivary Gland Swellings in A Interior Region of Kumaon (India)

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Original Research Article

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Abstract: The characteristic cytological features of salivary gland lesions have been well described in literatures, but there also exist cytological diagnostic pitfalls that make it difficult to form an accurate diagnosis in some cases. To evaluate the sensitivity, specificity, positive predictive value and negative predictive value by Cyto-histological correlation with an emphasis on discordant cases. Retro-prospective study. 83 non- guided / palpable FNAC of suspected salivary gland enlargements were performed from 2016 to 2018 at tertiary care hospital of interior regions of kumaon. The cytological smears were stained with May Grunwald Giemsa, Papanicolaou, Hematoxylin Eosin stains. Surgically resected specimens were received for histopathology in 21 cases only. The cytologic and histologic slides were studied, compared and correlated where ever possible and statistical analysis done. Out of 83 patients male to female ratio was 1.44: 1. The different categories of salivary gland lesions included: non diagnostic, non-neoplastic, benign and malignant constituted 02, 34, 36 and 11 cases respectively. Pleomorphic adenoma and mucoepidermoid carcinoma was the commonest benign and malignant neoplasm reported in this study respectively. False negative and false positive results were mainly due to cystic and papillary lesions. The sensitivity, specificity, along with positive predictive value, negative predictive value of present study was 50 %, 94.11%, 67%, 88.88% respectively. Though palpable FNAC of the salivary gland tumors is simple, rapid and cost-effective in a developing country but rate of characterization of specific type of salivary gland tumor is lower due to overlapping cytomorphology.
Keywords: Salivary gland swelling, Histopathology, Cytology, Discordance.

INTRODUCTION

Salivary gland neoplasms account for 2%–6.5 % [1-3] of all the head and neck neoplasms. 64-80% occur in the parotid glands, 7-11% occur in the sub-mandibular, less than 1% occur in the sublingual and 9-23% occur in the minor salivary glands [4, 5] Although salivary gland neoplasm are not very common but are very interesting because of their histologic diversity and difficulties in predicting prognosis [6].

Salivary neoplasms usually appear after the age of 40 and the malignant counterparts have maximum incidence in the sixth decade [5]. The females are affected more commonly except warthin's tumour (WT) and high grade carcinoma which are commonly seen in males [7]. Nodular or diffuse enlargement of the salivary glands may be caused by non-neoplastic or neoplastic lesions which are generally asymtomatic in early stages except for acute infections which are usually painful, [8] hence large number of them present with advanced disease that may complicate the management.

The Core biopsy is a relatively new technique which offers certain edge over FNA in terms of sensitivity but causes more morbidity due to needle tracking. Open biopsy- Frozen sections of salivary tumours taken for treatment planning are no longer justified because of risk of tumour spillage, bleeding, inflammation and damage to facial nerve compared to FNAC where complications are very negligible [9]. Thus FNAC of salivary gland tumour is accurate, well tolerated and harmless to subjects [10]. It reduces the rate of unnecessary salivary gland surgery in patients with benign nodules.

There is widespread acceptance of FNAC as primary method for early dectection of salivary gland lesions. The role of FNAC is to confirm the origin and to get a preliminary specific diagnosis in the majority of cases about the nature of the disease process before

following definite management plan [11]. The cytological evaluation of salivary gland tumors is sometimes limited by number of reasons, including sampling, size of the lesion, clinico-radiological data, utilization of Romanowsky type of stain, wide range and heterogeneous nature of neoplastic tumors as well as overlapping cytological features. More over due to complicated anatomy of the maxillofacial region it requires sophisticated imaging techniques to be able to accurately make out the extension of the tumor. So a FNAC of a salivary gland should be correlated with clinico-radiological findings and follow up procedures should be performed as indicated to get best results. Unfortunately, most of these investigations are not available in a source limited health facilities.

The aim of the study is to evaluate the utility of FNAC, cytomorphological spectrum, cytohistological correlation wherever possible with emphasis on diagnostic pitfall's and its potential causes in relation to salivary gland lesions.

MATERIALS AND METHODS

This study was carried out at tertiary care hospital on total 83 patients over a period of 2 years during 2016-2018. After detailed clinical history FNAC was done using a 20 ml syringe and 22- 23 gauge needle fitted to aspiration handle under aseptic conditions. The material was aspirated and smeared onto clean glass slides. FNA dried smears were stained with May Grunwald's Giemsa (MGG) stain and wet smears were stained with papanicoulau stain, haematoxylin and eosin (H&E) respectively and few special stains like PAS, PAS-AD, mucicarmine were performed where required. All lesions were studied under three categories which included benign, malignant and non- neoplastic. The cytological and histopathological stained slides were studied, analyzed and correlated wherever it was available and sensitivity and specificity were calculated.

RESULTS

Out of 83 cases, 49 cases (59.04 %) were males while 34 cases (40.96%) were females. Male to female ratio in our study was 1.44:1 (Table-1)**.**

Out of 83 cases maximum cases, 57 cases (68.67%) were in parotid region, followed by 21 cases (25.30%) in submandibular region, 2 cases (2.40%) in hard palate and 1 case (1.20%) each in infra-auricular, floor of mouth and external auditory canal (Table-2).

The duration in our study varies from 3 day - 17 years with mean duration of presentation as 3.16 years. Maximum cases (33 cases; 39.75%) presented with >1 year -5 years duration and minimum cases (9 cases; 10.84% each) with history of < 1 month and < 6 months duration (Table-3).

The majority of the patients 55 cases (66.26%) had the size of the salivary gland swelling between 0 to 2 cms, followed by 22 cases; 26.50% of >2-4cms and 6 cases; 7.22% of >4 cms size. Maximum size of the swelling was 8 cms in diameter while minimum size was 0.5 cms**.** The mean size was 2 cms.

This study **s**hows, out of 83 salivary gland FNA procedures performed, 2 cases (2.41%) were non-diagnostic / unsatisfactory, 34 cases (40.96%) were non-neoplastic, 36 cases (43.37%) were benign and 11 cases (13.25%) were malignant (Table 4).

Among the 34 cases reported as non neoplastic lesions, 25 cases were of chronic sialadenitis, 5 cases of sialadenosis and 1 case was each of mucocele, suppurative, inflammatory and non-specific pathology. Among 36 cases of benign group 32 cases were of pleomorphic adenoma and 4 cases were of warthin's tumor. Among 11 cases of malignant group 2 cases were of adenoid cystic carcinoma, 2 cases of acinic cell carcinoma, 1 case of high-grade mucoepidermoid carcinoma, 3 cases of low-grade mucoepidermoid carcinoma, 1 case of carcinoma Ex pleomorphic adenoma and 2 cases of poorly differentiated adenocarcinoma? Carcinoma Ex pleomorphic adenoma (Table-5).

Maximum number of cases 23 (27.71%) were encountered in 31-40 years of age group and most of them were non neoplastic lesions (11 cases; 47.82%), followed by benign lesions (9 cases; 39.13%) and malignant lesions (3 cases; 13.04%). Benign lesions of the salivary gland tumors found out to be most common in 31-40 years age group (9 cases, 25% of the total benign lesions) followed by 21-30 years and 51-60 years age group (3 cases each, 27.27% of the total benign lesions) while malignant lesions are most common in 21-30 years, 31-40 and 51-60 years of age group (3 cases; 27.27% of the total malignant lesions) followed by 41-50 years age group (2 cases; 18.18% of the total malignant lesions) (Table-6).

Chronic sialadenitis, pleomorphic adenoma and mucoepidermoid carcinoma were most common non neoplastic, benign and malignant lesions, all with slight male predominance (Table-7).

Out of 21 cases, cytological findings were in agreement with histopathological findings in 15 cases (71.43%). The overall gross discrepancy between cytology and histopathology diagnosis was found in 6 cases (28.57 %). Cytological findings were in agreement with histopathological findings in PA (11 cases) followed by chronic sialadenitis (2 cases) and 1 case each of acinic cell carcinoma and CA Ex PA. Cytological findings were in discordance with histopathological findings in PA (4 cases) followed by 1 case each of non-diagnostic and possibility of low grade MEC (Table-8).

In our study sensitivity of cytology was 50%, specificity of 94.11%, positive predictive value was 67% and negative predictive value was 88.88% (Table-9).

OBSERVATIONS AND RESULTS

Table-1: Gender distribution of the salivary gland lesions (n=83)

Gender	*No. of cases*	*Percentage*
Male	49	59.04%
Female	34	40.96%
Total	83	100.00%

Table-2: Cytodignosis, Site and Gender-wise distribution of the salivary gland lesions (n=83)

Site	Male	Female	Total	Percentage	*Non diagnostic*	*Non neoplastic*	*Benign*	*Malignant*
Parotid	36	21	57	68.67%	1	19	30	7
Submandibular	11	10	21	25.30%	1	14	4	2
Infra-auricular	1	0	1	1.20%	0	0	1	0
Palate	1	1	2	2.41%	0	0	1	1
External auditory canal	0	1	1	1.20%	0	0	0	1
Floor of mouth	1	0	1	1.20%	0	1	0	0
Total	45	32	83	100%	2	34	36	11

Table-3: Profile of cytodiagnosis of the salivary gland lesions on the basis of Duration (n=83).

Lesions	Duration				
	<1 month	**1-6 months**	**6 months-1 year**	**>1-5 years**	**>5 years**
Non diagnostic				2	
Non- neoplastic lesions					
Inflammatory : Acute: Suppurative			1	0	
Chronic: Chronic Sialadenitis.	5	5	7	7	1
Non specific		1			
Sialadenosis	1	1	1	2	
Mucocele			1	0	
Nonspecific pathology			1	0	
Neoplastic lesions					
PA	1	1	7	16	7
Warthin's tumor	1		1	2	
Adenoid cystic CA	1		1	0	
Poorly differentiated adenocarcinoma-? CA Ex PA					2
MEC		1	1	2	
Acinic cell CA			1	1	
CA Ex PA				1	
Total	9	9	22	33	10

Table-4: Profile of the salivary gland lesions on the basis of cytodiagnosis (n=83)

Type of lesion	*Cases*	*Percentage (%)*
Non diagnostic	2	(2.41%)
Non neoplastic	34	(40.96%)
Benign	36	(43.37%)
Malignant	11	(13.25%)
Total	83	(100%)

Table-5: Spectrum of salivary gland lesions on basis of cytodiagnosis

Category	*Sub-types*	*No. of cases*	*FNAC cases (%)*
1.Non-diagnostic lesions	**Non-diagnostic lesions**	2	2.41%
2.Non-neoplastic	**Inflammatory:** Acute- Suppurative Chronic-Chronic sialadenitis Non specific Sialadenosis Mucocele Nonspecific pathology	 1 25 1 5 1 1	34(40.96%)
3.Benign	Pleomorphic adenoma Warthin's tumor	32 4	36(43.37%)
4.Malignant	Adenoid cystic carcinoma Acinic cell carcinoma High-grade Mucoepidermoid carcinoma Low-grade Mucoepidermoid carcinoma Carcinoma Ex Pleomorphic adenoma Poorly differentiated adenocarcinoma? Carcinoma Ex Pleomorphic adenoma	2 2 1 3 1 2	11(13.25%)
Total		83	83(100%)

Table-6: Age -Wise distribution of the salivary gland lesions (n=83)

Age	*Non diagnostic*	*Non neoplastic*	*Benign*	*Malignant*	*Total*	*%*
1-10	0	3	2	0	5	6.02%
11-20	0	1	4	0	5	6.02%
21 -30	0	8	6	3	17	20.48%
31-40	0	11	9	3	23	27.71%
41 - 50	1	6	4	2	13	15.66%
51-60	1	3	6	3	13	15.66%
61 - 70	0	2	3	0	5	6.02%
71-80	0	0	1	0	1	1.20%
81 - 90	0	0	1	0	1	1.20%
Total	2	34	36	11	83	100%

Table-7: Profile of cytodiagnosis of the salivary gland lesions on basis of Gender with percentage (n=83)

Profile of cytodiagnosis of the salivary gland lesions on basis of Gender with percentage (n=83)						
Cases	***Male***		***Female***		***Total***	
Non diagnostic	0	0.00%	2	2.41%	2	2.41%
Non-neoplastic lesions						
Inflammatory: **Acute: Suppurative**	1	1.20%	0	0.00%	1	1.20%
Chronic: **Chronic Sialadenitis**	16	19.28%	9	10.84%	25	30.12%
Nonspecific:	0	0.00%	1	1.20%	1	1.20%
Sialadenosis	5	6.02%	0	0.00%	5	6.02%
Mucocele	0	0.00%	1	1.20%	1	1.20%
Nonspecific pathology	0	0.00%	1	1.20%	1	1.20%
Neoplastic lesions						
PA	17	20.48%	15	18.07%	32	38.55%
Warthin's tumor	4	4.82%	0	0.00%	4	4.82%
Adenoid cystic CA	0	0.00%	2	2.41%	2	2.41%
Poorly differentiated adenocarcinoma-? CA Ex PA	0	0.00%	2	2.41%	2	2.41%
MEC	3	3.61%	1	1.20%	4	4.82%
Acinic cell CA	2	2.41%	0	0.00%	2	2.41%
CA Ex PA	1	1.20%	0	0.00%	1	1.20%
Total	49	59.04%	34	40.96%	83	100.00%

Table-8: Profile of Histo-cytological discordant cases of the salivary gland lesions (n=6/21)

Discordant(6)	
FNAC	**HISTOLOGY**
Non diagnostic	Vascular malformation with papillary endothelial hyperplasia
PA	Suppurative pathology
PA(2)	Adenoid cystic CA(2)
PA	Chronic Sialadenitis
Possibility of low grade MEC	Warthin's tumor

Table-9: Statistical data of present study

True Positive	2
False Negative	2
True Negative	16
False Positive	1
Sensitivity	50%
Specificity	94.11%
Diagnostic accuracy	85%
Positive predictive value	67%
Negative predictive value	88.88%

Figure Legends

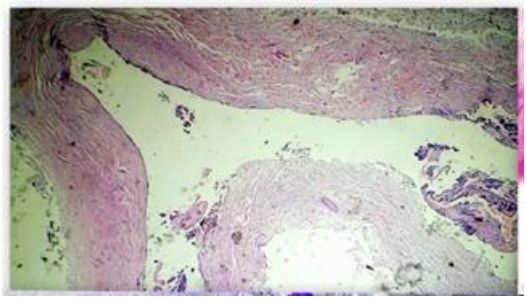

Fig-1(a): Vascular malformation: Papillary endothelial hyperplasia (a) & (b) (H&E X 100)

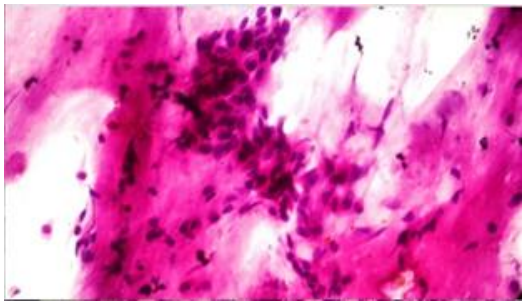

Fig-1(b): Inflammatory pathology (suppurative): Ductal epithelial cells embedded in fibromyxoid stromal like tissue fragments (misdiagnosed as PA) on a background containing occasional scattered cystic macrophages and acinar cells. (H&E X 400).

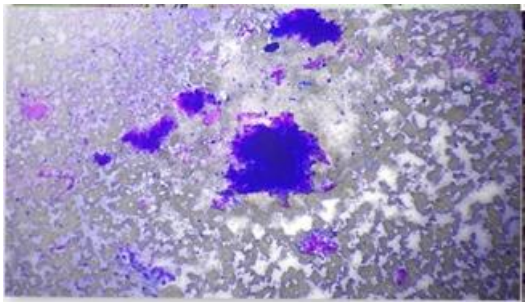

Fig-1(c): Chronic sialadenitis: Ductal epithelial cells embedded in fibromyxoid stromal tissue like fragments (misdiagnosed as PA) on a background containing occasional scattered cystic macrophages and acinar cells along with few inflammatorycell infiltrate (MGG X 100).

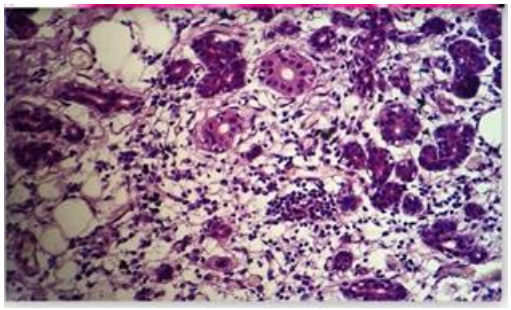

Fig-1(d): Chronic sialadenitis: Atrophy of acini along with fibrotic stroma and chronic inflammatory infiltrate (H&E X 400).

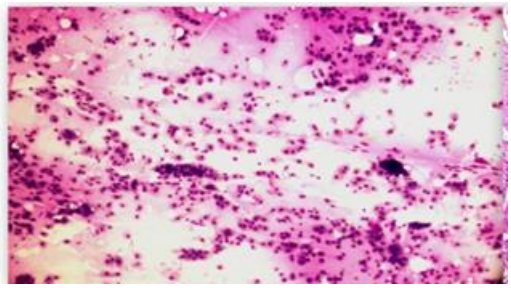

Fig-2(a): Warthin's tumor: Singly dispersed mucinophages and small groups of intermediate cells simulating low grade MEC. (H&E X 100)

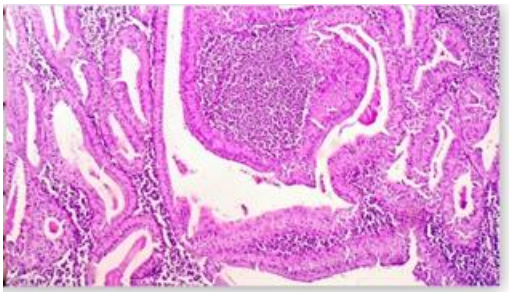

Fig-2(b): Warthin's tumor: Large cystic spaces lined by apocrine epithelial cells with eosinophilic homogenous material containing inflammatroy cells and? mucinophages. Subepithelial collection of lymphoid cells (H&E X 400).

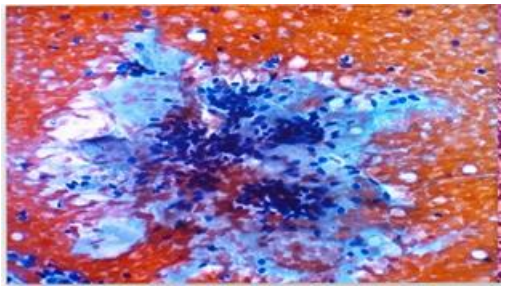

Fig-3(a): Adenoid cystic carcinoma: basaloid cells embedded in and surrounded by myxoid material diagnosed as cellular pleomorphic adenoma (PAP X 400).

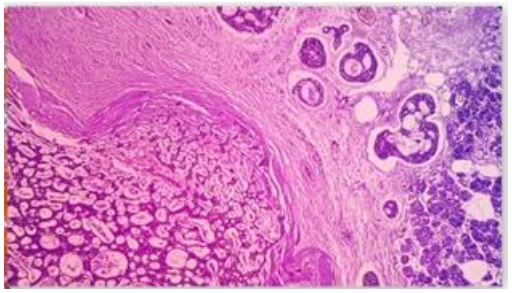

Fig-3(b): Adenoid cystic carcinoma: Multiple sheets of cells arranged in cribriform pattern and swiss cheese appearance containing globular myxoid ground substance with capsular and vascular invasion. (HE X 100)

DISCUSSION

Salivary gland FNAC are very common but often present several interpretative challenges. However, a wide variety of tumors in these glands and insufficient tumor cells in aspiration cytology make the diagnosis difficult in some patients [12, 13].

The male to female ratio are variable. Some of the studies show female preponderance whereas others show slight excess in male but sex differences are not significant [14-16]. In our study, out of total 83 cases, there was male predominance with male to female ratio being 1.4:1. This was comparable to previous studies done by Gandhi S H *et al.*, [7] but in contrast to studies done by Singh A *et al*., [17] and Khandekar M. M *et al*., [18] which showed a slight female predominance. Small sample size was mainly due to poor socio-economic and socio-demographic factors.

The parotid region is the commonest site of salivary gland lesions in the present study followed by the submandibular gland. This is comparable with study by Hilda Fernandes *et al*., [19]. The general rule in salivary gland neoplasms is: smaller the gland, higher the rate of malignancy. The likelihood that a salivary gland tumour being malignant is inversely proportional to the size of the gland [2]. Thus, the rate of malignancy increases from 20%-25% in the parotid gland to 40%-50% in the submandibular gland and to 50%-81% in the sublingual glands and minor salivary glands.[20, 21] But in our study parotid was most common site followed by submandibular gland for non-neoplastic and neoplastic lesions (Table-2).

Duration of salivary gland lesions depends on severity of symptom, awareness of the patients at the time of consultation and socio-demographic factors of the patients. Patients with short duration of less than 1 month comprised of maximum cases of non-neoplastic lesions followed by benign cases and malignant cases. This was due to associated history of pain for which patient came early for treatment. Patient with longest duration of more than 5 years and comprised of maximum cases of benign lesions followed by malignant and non-neoplastic lesions. This was due to ignorance of patient about these lesions and slow transformation of benign lesions into malignant lesions.

The small size of the salivary gland swelling mostly favors benign pathology. In our study small size mostly favored non neoplastic pathology (21 cases) whereas large size favored neoplastic pathology (6 cases).

Out of 83 cases, most of the cases were benign on cytology. Followed by non-neoplastic, malignant and inconclusive/ un-satisfactory/ non diagnostic smears. These finding are in agreement with similar studies done previously by other authors [7] while disagreement with study done by Koirala S *et al*., [22].

The commonest non neoplastic lesion was chronic sialadenitis (25 cases, 73.53%). Gandhi *et al*., [7] and Khandekar M. M *et al*., [18] also reported similar incidence of chronic sialadenitis in their study. The commonest benign lesion was pleomorphic adenoma (32 cases; 88.89% and 38.55% of total cases),

similar to previously published studies [7, 17]. The commonest malignant lesion was mucoepidermoid carcinoma similar to other studies [7, 18]. Wide age distribution was noted for various salivary gland lesions in most of the study series. In our study age ranges from 5-81 years which is comparable with other similar studies [2, 4] with the mean age of patient 37.73 years. Maximum cases were seen in age group of 31-40 years which is in contrast to these studies.

In non-neoplastic category youngest and oldest patient were of 5 and 68 years of age and both were with the cytological diagnosis of chronic sialadenitis. In benign category youngest and oldest patient were of 8 and 81 years of age with the cytological diagnosis of pleomorphic adenoma in both cases. In the malignant category youngest patient was 24 years of age with cytological diagnosis of acinic cell carcinoma, whereas oldest patient was of 60 years of age with cytological diagnosis of CA Ex PA.

In the present study ideal correlation of cytology with histopathology is not possible because of smaller sample size as biopsy is avoided in non neoplastic cases and most of the cases which were diagnosed malignant in cytology were referred to the higher centres for further evaluation and treatment.

One case was given as inconclusive on cytology but it turned out to be vascular malformation with papillary endothelial hyperplasia on histopathology (Figure-1a). This may be due to non-representative smears. The reasons why a representative sample is not always obtained may be related to the positioning of the needle outside the target area and the presence of haemorrhagic, necrotic or cystic areas in the tumour.

One case of suppurative pathology (Figure-1b) was misdiagnosed as pleomorphic adenoma as smears showed cohesive sheets of ductal epithelial cells displaying unremarkable morphology along with fibroblastic and occasional myxoid stromal fragments against a haemorrhagic background containing scattered cystic macrophages and few groups of acinar cells. This may be due to inadequate sampling leading to inadequate inflammatory component in smears and fibrotic stroma that showed metachromasia on rapid Romanowsky stain which led to diagnosis of pleomorphic adenoma.

One case of chronic sialadenitis (Figure-1c, d) was misdiagnosed as pleomorphic adenoma as smears of which show cohesive sheets of ductal epithelial cells displaying unremarkable morphology along with fibroblastic and occasional myxoid stromal fragments against a haemorrhagic background containing scattered cystic macrophages and few groups of acinar cells. Presence of myxoid stromal fragments and lack of adequate, representative sample led to misdiagnosis in this case. FNA of chronic sialadenitis may yield fibrotic stroma that may show metachromasia on rapid Romanowsky stain and, when seen together with ductal cells (which dominate such smears because of acinar cell atrophy) showing metaplastic squamous differentiation, a diagnosis of pleomorphic adenoma may be considered [23].

In the present study one case of warthin's tumor (Figure-2a,b) was over diagnosed as low grade mucoepidermoid carcinoma on cytology (Figure-2a), due to aspiration mainly from cystic spaces which result in error in diagnosis due to presence of scattered small groups as well as singly dispersed mucinophages - like cells / oncocytic cells with cytoplasmic vacuolation which leads to interpretation of mucinophages, presence of mucus debris and occasional small groups of intermediate-like cells (squamous cells mimicking intermediate cells) on a mucoproteinaceous background containing sparse lymphocytes.

Cystic lesions are well-known sources of false-negative diagnoses. Ways to avoid this unfortunate occurrence include multidirectional / multiple sampling of larger area, re-aspiration of any residual cyst mass after draining. It has also been the experience of most observers that if cysts recur, it is wise to remove them. False-positive diagnoses are also a problem with cystic lesions. One of the most common settings for this diagnostic pitfall is in a cyst with extensive squamous metaplasia. If it becomes irritated for any reason, such as by infection or radiation, considerable pleomorphism may occur and one would be tempted to entertain a diagnosis of squamous cell carcinoma [24].

Two cases of adenoid cystic carcinoma (AdCC) (Figure-3a) were diagnosed as pleomorphic adenoma and pleomorphic adenoma due to high cellularity, cluster and sheets of uniform epithelial cells embedded in and lying adjacent to the fibrillary stroma and absence of spherical / cylindrical shaped myxoid stromal component (although myxoid stromal fragments were present). The cells showed no atypia and there were no naked nuclei seen. Biopsy revealed picture of AdCC displaying multiple sheets of cells arranged in cribriform pattern and Swiss cheese appearance containing globular myxoid ground substance with capsular and vascular invasion. (Figure-3b)

Small amount of fibrillary stromal material is also seen in AdCC similar to that seen in PA [17]. The presence of fibrillary stroma is often a signature of pleomorphic adenoma and mostly cells are embedded in the stroma whereas AdCC has stroma with straight sharp edges surrounded by the basaloid epithelial cells. Plasmacytoid myoepithelial cells are the most helpful cytomorphologic feature for distinguishing PA from

AdCC [25]. Lowhagen *et al*., advocate that if the cribriform structures appear together with any features of PA, a diagnosis of PA should be given [26]. The cytologic identification of AdCC rests on adequate sampling and careful inspection of all material to rule out the possibility of benign PA. The distinction between pleomorphic adenoma and adenoid cystic carcinoma is clinically important from the point of veiw of management. Cytological detail that should be examined carefully are scanty cytoplasm, high nucleus to cytoplasm ratio, naked nuclei, nuclear moulding and nuclear hyperchromasia to avoid errors in the cytological diagnosis of adenoid cystic carcinoma [27].

The discordance in interpretation of salivary gland lesion mainly occurred because of trying to interpret hypocellular smears. This led to more false negative cases, giving a low sensitivity. However, the guiding principle of any cytologist should always be to reduce the false negative cases to absolute minimum, so that the confidence of the referring specialists, in FNAC, is boosted and more importantly, no patient with malignancy is falsely reassured. This can be achieved by making multiple passes through different sites of the lesion and checking the adequacy of smears in the aspiration room itself using some rapid stains viz. Diff Quik to reduce the number of hypocellular smears reaching the cytopathologist for evaluation. A study was conducted by Peter A. Brennan *et al*., in 2008 to study the value of repeat FNAC in suspected salivary gland tumors when despite having adequate material for interpretation, a cytological diagnosis was not possible. They also proposed guided aspiration in certain cases to improve the diagnostic accuracy and advocate consideration of frozen sections in clinically suspicious mass where cytological diagnosis is benign [28].

Significant correlation between cytopathological and histopathological finding in our study (p) could not be accessed due to small sample size.

In our study diagnostic accuracy was comparable to Stramandinoli *et al.,* [29] Sensitivity was comparable to Faizal *et al*., [25] The positive predictive value and negative predictive value were comparable with Stramandinoli *et al*., [29] and Naz *et al*., [11]. Overall our study was well comparable with Stramandinoli *et al.,* [29] Faizal *et al*., [25] and Naz *et al*., [11] Our study was in contrast with Vaidya S *et al*.**,** [30] study. Sensitivity is low in our study due to small sample size as surgery was avoided in many of the non-neoplastic, benign lesions and many of the malignant cases were lost during post FNAC follow up and, overlapping cytomorphological features and inter-personal observer variation/ experience.

CONCLUSION

Salivary gland FNAC proves to be simple reliable repeatable cost effective first line diagnostic method of high patient acceptance without complications, not only in the diagnosis and typing of salivary gland tumors but also in their segregation from non-neoplastic lesions. Although there are few diagnostic pitfalls. So the knowledge of overlapping cytomorphological patterns, clinical findings and other investigations like USG findings, multidirectional aspiration, repeat aspirations from different parts of gland and liberal sampling can improve results and thus a confident diagnosis can be made pre-operatively and thereby reducing the number of unnecessary surgeries. This was the first study carried out in this unapproachable hilly region with results comparable to previous studies carried out in other states.

RECOMMANDATION

Latest Milan system [31] given below should be adopted for improving the overall effectiveness of salivary gland FNAC to establish better communication between clinicians and pathologists which will ultimately leads to improved patients care.

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