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Origional Research Article

An Audit of Cytology of Head and Neck Masses in a Newly Established Medical Institute in a Remote Indian Island – Two Years' Experience.

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Abstract: **Introduction:** Head and neck area comprises very important and delicate structures and lesions involving these areas may be life threatening necessitating early and accurate diagnosis. We aimed to analyse cytological utility of FNAC from palpable lesions from these areas and to obtain frequency of distribution and subcategorization of the organ specific lesions. **Method:** This was a prospective study conducted during June 2015 to May 2017. FNAC was performed, air –dried and alcohol fixed smears prepared, stained with Giemsa and other special stains as required and analysed.**Result:** 1139 FNACs were performed with 21 – 40 years age group predilection and Female predominance (1.79:1). Most affected organ was Right sided cervical lymph nodes followed by thyroid gland and salivary glands. Most frequently diagnosed lesions from various organs were reactive lymphadenitis followed by tuberculous lymphadenitis, benign colloid nodular goitre followed by autoimmune thyroiditis among non-neoplastic lesion and follicular lesions among neoplastic lesions in thyroid, acute and/or chronic sialadenitis followed by Pleomorphic adenoma in salivary glands and benign cystic lesions followed by lipoma and spindle cell neoplasm among soft tissues. Rare but important entities diagnosed in head and neck regions were Ectopic thyroid tissues, Branchial cysts, Round cell tumors, keloid, Epithelioid angiosarcoma, Pilomatricoma and Lymphangioma.**Conclusion:** We conclude that first line of investigation should be FNAC from various head and neck lesions to accentuate the diagnosis, staging, characterization and management. Lymph node lesions show right side predominance. This study also explores the diagnostic approach for soft tissue lesions in these areas.**Abbreviations:** Fine needle aspiration cytology (FNAC), Papanicolaou stain (PAP), Ziehl – Neelsen stain (ZN), Periodic Acid-Schiff stain (PAS), Epidermal inclusion cyst (EIC), Immunohistochemistry (IHC), Fluorescent In Situ Hybridisation (FISH)**.**

Keywords: Granulomatous, Metastatic, Pleomorphic adenoma, Adenoid cystic carcinoma, Mucoepidermoid carcinoma, Warthin tumor, Lymphangioma, Epithelioid angiosarcoma, Pilomatricoma.

INTRODUCTION

The head and neck area is a complex region encompassing diverse structures within it. A wide range of diseases ranging from inflammatory to malignant are seen in this region. The Fine needle aspiration cytology (FNAC) is a commonly used method in clinical practice for the cytological evaluation of these lesions. Because of its high diagnostic accuracy, it became a useful tool in distinguishing between different pathologies, treatment planning and management. The present study was carried out in a newly established Medical college on a remote island with limited resources available and is an attempt to evaluate the results and diagnostic utility of FNA in Head and Neck region.

MATERIAL AND METHODS

This was a prospective study of 1139 cases selected from lesions involving head and neck area conducted in the department of pathology during the period of June 2015-Dec 2017. All the patients underwent complete clinical examination including local examination of lesions and routine investigations. The procedure was explained to the patient and an informed consent obtained. FNAC attempted from lesions of head and neck region with a 22/23 gauze needle attached to 10 ml plastic disposable syringe. Aspirated materials were well spread over clean glass slides, made air dried and alcohol fixed. Air dried smears were stained with Giemsa and alcohol fixed smears were stained with Papanicolaou (PAP) stain. The special stains such as Ziehl–Neelsen (ZN), Periodic

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Acid-Schiff (PAS) were used wherever required. All smears were examined under the light microscope.

RESULTS

1139 FNACs were performed within two years duration from lesions confined to the Head and neck areas out of which 1118 were satisfactory for evaluation whereas 21 were unsatisfactory.

The present study includes patients of age ranging from 1 to 90 years with maximum number within 21 - 40 years age group (44.54%). Out of 1118 cases female predominance observed with 718 cases (Table 1).

The distribution of organ involvement in head and neck areas show predominance of lymph nodes with 53.22% involvement followed by thyroid gland 29.43% and salivary glands 4.02%. Lesions from other area include scalp, ear lobules, nasal folds, cheek and chin masses which constitute 13.33% (Table 2).

Among the lesions from lymph node, non-neoplastic were more frequent (86.55%) than neoplastic (13.45%). Lymph nodes from head and neck area were subcategorised and analysed on the basis of their location, frequency of involvement and nature of diseases affecting them as follows: anterior and posterior cervical (466/595), right and left submandibular (44/595), supraclavicular (40/595), juxta-auricular (26/595), submental (16/595) and occipital(3/595). 50.42% of lesions from lymph nodes show right side predilection. Female to male ratio of 1.18:1 were observed in lymph node lesions (Table 3). Most frequent pathologies involving the lymph nodes were reactive lymphadenitis (40.34%) followed by tuberculous lymphadenitis (20.67%). Other lesions involving lymph node were ZN negative granulomatous lymphadenitis (19.33%), acute inflammatory lymphadenitis (6.22%), metastatic carcinoma (11.43%) and hematolymphoid malignancies (2.02%) (Table 4 and Figure1).

Out of 329 lesions from thyroid gland 93.68% were non-neoplastic and 6.32% were neoplastic. Female to male ratio was 4.31:1 with female predominance. Among the non-neoplastic lesions observed, benign colloid nodular goitre was the most common entity comprising (62.31%) followed by autoimmune thyroiditis (29.79%) and follicular lesions (4.26%). The neoplastic lesions from thyroid constitute 3.02% only. Two cases of ectopic thyroid tissue were also found, one in right cervical region lateral to middle third of sternocleidomastoid muscle and the other as infra-hyoid midline swelling (0.60%) (Table 3 and Figure 2).

The lesions from salivary gland included were right and left parotid, submandibular as well as submental glands with predilection for parotids. The predominant benign lesions were acute and/or chronic sialadenitis (40.01%) followed by pleomorphic adenoma (37.78%) and Warthin tumor. The malignant lesions were seen in 5 cases including Mucoepidermoid carcinoma, Adenoid cystic carcinoma and poorly differentiated squamous cell carcinoma (Table 3 and Figure 3).

The lesions from skin, soft tissues and miscellaneous category show predominance of benign cystic lesions (50.34%) followed by lipoma (29.53%) and spindle cell neoplasms (6.04%). Cystic lesions include branchial cysts, epidermal inclusion cysts, retention cysts and cysts - not otherwise specified. Rare but important lesions observed from these regions were nonspecific acute and chronic inflammatory lesion, Round cell tumors, keloid, Epithelioid angiosarcoma, Pilomatricoma, benign and malignant adnexal tumors and lymphangioma (Table 3 and Figure 4).

Table 1. Age and sex distribution of Head and neck lesions

Age range (yrs)	Number	Percentage (%)	Female	Male
1-20	296	26.57%	164	132
21-40	498	44.54%	349	149
41-60	248	22.18%	162	86
61-80	72	6.44%	41	31
More than 80	4	0.36%	02	02
Total	1118		718	400

Table 2. Distribution of Organ specific involvement along with sex in Head and neck lesions

Sites	Number (percentage)	Females	Males
Lymph nodes	595 (53.22%)	322 (54.12%)	273 (45.88%)
Thyroid	329 (29.43%)	267 (62.92%)	62 (37.08%)
Salivary glands	45 (4.02%)	29 (53.13%)	16 (46.87%)
Others	149 (13.33%)	100 (39.39%)	49 (60.60%)
Total	1118	718 (65.01%)	400 (34.99%)

Table 3. Frequency of site and sex distribution in lymph node lesions

Lymph node sites	Female	Male	Right side	Left side	Bilateral	Total	Percentage (%)
Cervical	248	218	236	194	36	466	78.32%
Supraclavicular	33	7	23	17	0	40	6.72%
Submental	7	9	0	0	16	16	2.69%
Submandibular	20	24	22	22	0	44	7.39%
Juxta-auricular	13	13	16	10	0	26	4.37%
Occipital	1	2	3	0	0	3	0.50%

Table 4. Distribution of lesions involving specific organs along with sex distribution in Head and neck lesion.

Organ	Lesion	No. of cases	Percentage	F	M
Lymph Node	Reactive lymphadenitis	240/595	40.34%	142	98
	Tuberculous lymphadenitis	123/595	20.67%	68	55
	Granulomatous lymphadenitis	115/595	19.33%	59	56
	Acute inflammatory lymphadenitis	37/595	6.22%	17	20
	Metastatic carcinoma	68/595	11.43%	31	37
	Hematolymphoid malignancies	12/595	2.02%	5	7
Thyroid gland	Colloid gloiter - includes (CD+MNG+Adenomatous+nodular+cyst)	205/329	62.31%	159	46
	Autoimmune thyroiditis(HT+LT+ Subacute)	98/329	29.79%	87	11
	Follicular lesions(Suspicious for follicular neoplasm+FN+FA+atypia)	14/329	4.26%	12	2
	Carcinomas [PTC (6), Follicular Ca (2), Medullary Ca (1), Anaplastic Ca (1)]	10/329	3.04%	8	2
	Ectopic thyroid	2/329	0.60%	1	1
Salivary glands	Sialadenitis(Acute + chronic+ Gr)	18/45	40.01%	11	7
	Sialadenosis	4/45	8.88%	3	1
	Pleomorphic adenoma	17/45	37.78%	10	7
	PD SCC	1/45	2.22%	1	0
	MEC	3/45	6.67%	2	1
	Adenoid cystic carcinoma	1/45	2.22%	1	0
	Warthin tumor	1/45	2.22%	1	0
Others	Cystic lesion:-	75/149	50.34%		
	Cyst NOS	17/75		13	4
	Sebaceous+Dermoid+EIC+Retention cyst	48/75		39	9
	Thyroglossal cyst	8/75		6	2
	Bronchial cyst	2/75		1	1
	Lipoma	44/149	29.53%	24	20
	Vascular lesions(PG+LCH)	5/149	3.36%	3	2
	Spindle cell neoplasm	9/149	6.04%	4	5
	Acute+chronic+Gr inflammation	5/149	3.36%	3	2
	Round cell tumor	2/149	1.34%	1	1
	Keloid	1/149	0.67%	0	1
	Lymphangioma	1/149	0.67%	1	0
	Malignant lesion (Adnexal + SCC)	4/149	2.68%	2	2
	Benign adnexal tumor	1/149	0.67%	1	0
	Pilomatricoma	1/149	0.67%	1	0
	Epithelioid angiosarcoma	1/149	0.67%	1	0

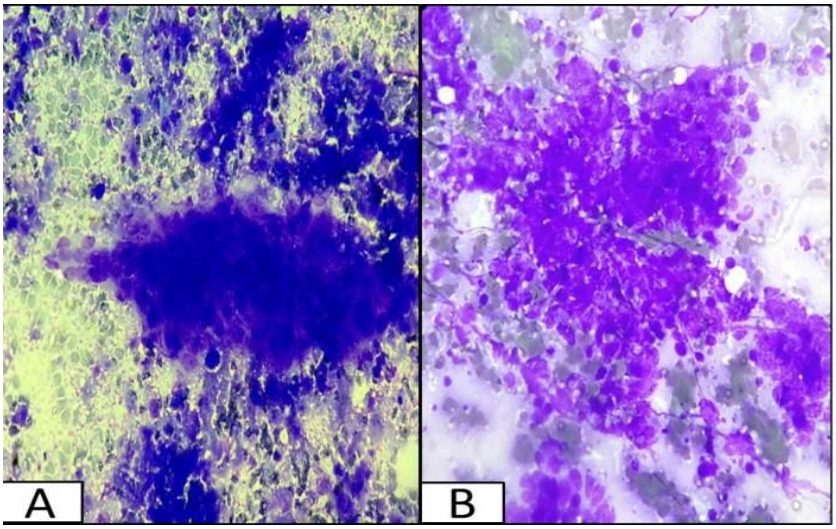

Figure. 1: Photomicrograph from cervical lymph nodes showing A) Metastatic SCC and B) Metastatic Adenocarcinoma.

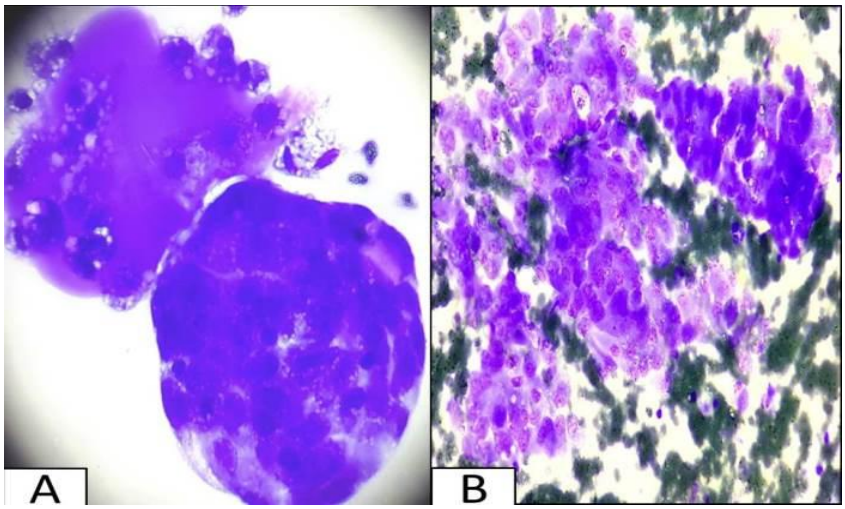

Figure. 2: Photomicrograph from midline neck swelling showing cytomorphology of A) Thyroglossal cyst with squamous metaplasia and B) Follicular neoplasm in thyroid gland.

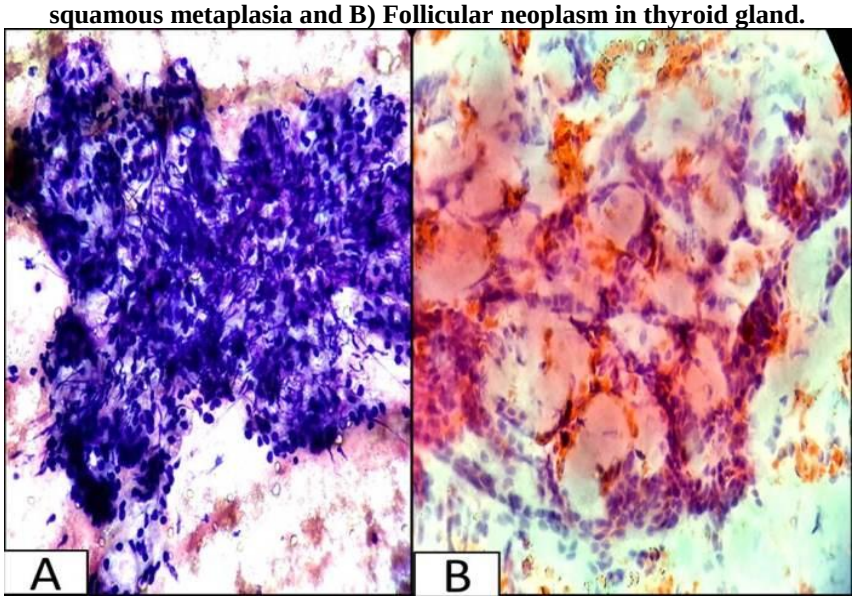

Figure. 3: Photomicrograph from Salivary gland showing cytomorphology of A) Sialadenosis and B) Adenoid cystic Carcinoma (Pap stain).

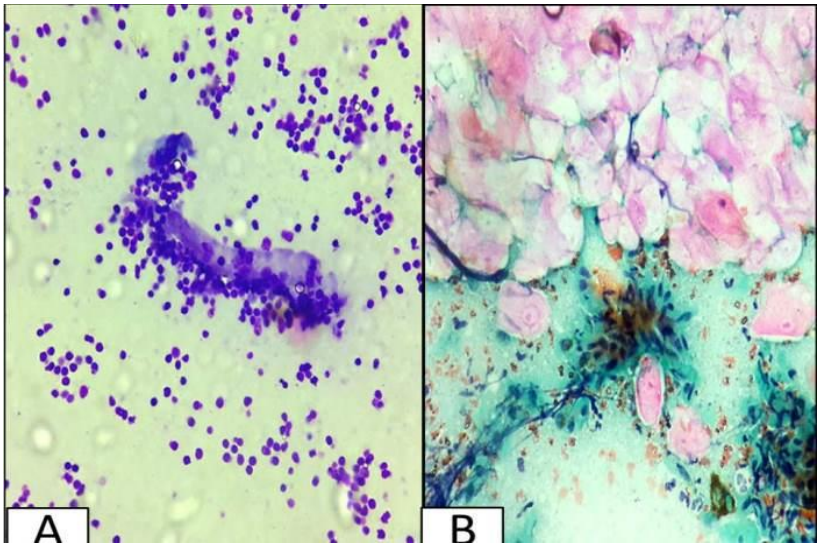

Figure. 4: Photomicrograph from palpable soft tissue lesions showing cytomorphology of A) Lymphangioma and B) Epithelioid Angiosarcoma (Pap stain).

DISCUSSION

FNAC is a safe, rapid, inexpensive, reliable, feasible and commonly used diagnostic procedure in the investigation of head and neck masses with high diagnostic accuracy and low complication rates (Rathod, G., & Parmar, P. 2012; & González, M. *et al.*, 2008). The commonly described advantages of this procedure are: pre-operative diagnosis of lesions without unnecessary injury to crucial structures, low risk of infection, clinical follow-up and more convenience for the patient (Rathod, G., & Parmar, P. 2012). The provision for cell block preparation is an another advantage of FNAC which allow to perform ancillary tests, for example Immunohistochemistry, In Situ Hybridization, PCR and FISH that helps in further confirmation of the cytological diagnosis suspected on evaluation of smears (González, M. *et al.*, 2008). The diagnostic accuracy of FNAC in head & neck region is depend on the location as each anatomical locations are associated with a group of differential diagnosis (González, M. *et al.*, 2008). In the present study, variety of lesions observed from various sites in head & neck region support its effectiveness as a diagnostic tool.

The frequency of unsatisfactory smears in present study (1.84%) correlates well with that of the study of Poorey and Tyagi (1.12%) (Poorey, V. K., & Tyagi, A. 2014) and is very less in comparison to those described in the study of Rathod (9.3 -15%) (Rathod, G., & Parmar, P. 2012), Gonzalez (5 -10%) (González, M. *et al.*, 2008) and Chauhan *et al.*, (7.8%) (Savithri, C. *et al.*, 2012). This reflects the measures undertaken during sample collection by means of skilful approach with minimized sampling error.

The age distribution in this study show maximum number of 21 to 40 years age group (44.54%) similar to those found in the studies of Gonzalez, (González, M. *et al.*, 2008) Poorey, (Poorey, V. K., & Tyagi, A. 2014) Khetrapal, (Khetrapal, S. *et al.*, 2015). Vimal, (Vimal, S. *et al.*, 2016) Bhide (Bhide, P.S. *et al.*, 2017) and Paker (2013) Female were most frequently affected in our study and studies of Poorey (Poorey, V. K., & Tyagi, A. 2014), Bhide (Bhide, P.S. *et al.*, 2017), Fernandes (2009) and Paker (2013) with female to male ratio of 1.8:1.

In the present study, most frequently affected anatomical locations were lymph node followed by thyroid and salivary glands which is similar to those observed in previous studies (González, M. *et al.*, 2008; Savithri, C. *et al.*, 2012; Paker, I. O. *et al.*, 2013), but contradicts with some other studies which observed thyroid lesions as commonest among head and neck lesions followed by lymph node lesions (Rathod, G., & Parmar, P. 2012; Fernandes, H. *et al.*, 2009).

Incidence of non-neoplastic (82.83%) and neoplastic (17.17%) lesions correlate well with the study of Poorey (2014) and Patel, D. N. *et al.*, (2015) However Gonzalez *et al.*, (2008). demonstrates neoplastic as the most frequent one than non-neoplastic lesions.

Females were found to be more frequently affected with lymph node masses in our study and in that of Badge (Badge, S. A. *et al.*, 2017). The present study observed that cervical group of lymph nodes was the most frequently involved among lymph nodal masses with right sided predominance followed by submandibular and supraclavicular groups. No any study described such finding even after extensive search in best of our knowledge.

Among the various nodal lesions, reactive lymphoid hyperplasia was the commonest one followed by tubercular lymphadenitis and granulomatous lymphadenitis. This study correlates well with the studies of Vimal (2016), Fernandes (2009) and Patel *et al.*, (2015) however Bhide (2017), Arul (2016) and

Sharma (2015) observed tuberculous lymphadenitis as the commonest one in their respective studies. The most probable aetiopathogenesis of such observation in the present study should be the warm and humid costal environment, small and dark living places, low socio-economic condition and close contacts of the patients attending our Institute. The reactive lymph nodes show nonspecific polymorphous lymphoid cell proliferation and Tingible body laden macrophages in a proteinaceous background. One case of Kikuchi disease was also identified and confirmed on histology. The various morphological patterns of tubercular lymph node observed in the study were – (a) necrosis with acute inflammatory cells and cell debris only, (b) group of epithelioid cells, Langhans type of giant cells and necrosis and (c) epithelioid cell granulomas with necrosis. All of these lesions were confirmed by ZN stain. Three cases were presented as ruptured lymph node abscesses with purulent discharge. The malignant lesions from lymph nodes show predominance of metastatic involvement (11.43%) closely similar with the study of Rathod (Rathod, G., & Parmar, P. 2012), Bhide (2017) Patel *et al.,* (2015) and Badge (2017) suggesting epidemiological and environmental variation followed by lymphomas. Among the metastatic malignancies squamous cell carcinoma was the commonest one followed by adenocarcinoma. Paker (2013) observed similar frequency in their study. Hematolymphoid malignancies included Non – Hodgkin's Lymphoma most frequently followed by Hodgkin's lymphoma in our study as well as that of Paker (2013).

Lesions from thyroid gland show female predominance (92.82%) in the present study similar to those in the study of Patel *et al.,* (2015) Bagga, P. K., & Mahajan, N. C. (2010) and Handa *et al.,* (2008). Out of 329 thyroid lesions, 308 were non-neoplastic and 21 were neoplastic in origin which correlates well with that of Bagga, P. K., & Mahajan, N. C. (2010) and Handa *et al.,* (2008). Benign lesions include colloid goitre most commonly followed by thyroiditis similar to the observations of Savithri *et al.,* (2012) Fernandes *et al.,* (2009) and Rathod, G., & Parmar, P. (2012). The cyto-morphological subcategories of goiterous lesions observed in the study were colloid cyst with or without secondary degenerative changes and cyst macrophages, follicular cell clusters, Hurthle cell clusters and thick colloid. Adenomatous goitre shows sheets and macro follicles of benign follicular cells with scant colloid. Smears from autoimmune thyroiditis show polymorphous lymphoid cells and follicular epithelial cell clusters in varying proportion. They may also have epithelioid cell clusters, granulomas, eosinophils, cyst macrophages or Hurthle cell clusters in few of them. Among the neoplastic lesions, the present study show follicular lesions including Bethesda category-suspicious for follicular neoplasm, follicular neoplasm, follicular adenoma and follicular neoplasm with atypia (4.25%) as more common in comparison to papillary carcinoma (1.82%) which corresponds very well with the study of Poorey (2014) and Handa *et al.,* (2008) whereas Khetrapal (2015) and Fernandes observed Papillary carcinoma as the commonest neoplasm. One false negative case of papillary carcinoma was observed in this study because of aspiration of large volume of brown thin colloid followed by vanishing of swelling. It was found as papillary carcinoma when centrifuged smears revealed numerous colloid filled macrophages and cyst macrophages and aspiration was repeated under high suspicion of malignancy. Aspiration from thyroid lesions require some technical precautions in the form of complete patient assurance and procedure description, patient positioning, use of thin bore needle preferably 23 G, minimum three or four passes without negative pressure and immediate smear preparation and alcohol fixation. Implementation of these precautions will decrease the number of attempts, risk of pain, bleeding and incidental piercing of trachea.

Patients from salivary gland lesions were presented most frequently as painless or painful swellings with gradual or acute onset in the preauricular, submandibular and submental areas. These lesions were aspirated after sonographic confirmation for the site as salivary gland. Parotid glands were found to be the most frequently involved amongst all with right side predilection followed by submandibular glands. This was also seen in observations of Gonzalez (2008) Poorey (2014) Savithri, *et al.,* (2012) and Jain *et al.,* (2013). The salivary gland lesions were subcategorised as neoplastic and nonneoplastic. The most frequent benign neoplastic lesion was pleomorphic adenoma (37.78%) and malignant was muco-epidermoid carcinoma in our study. This finding correlates well with those of studies from Rathod (2012), Poorey (2014), Savithri,C. (2012), Fernande (2009), Patel (2015) and Jain (2013). The non-neoplastic lesions show sialadenitis (acute, chronic and nonspecific) as most common (40%) lesion. Some cases of pleomorphic adenoma express purulent aspirate followed by reduction in the size of lesion. Cytology from these smears show cell debris, inflammatory cells and fibrin in a necrotic background with high probability of false diagnosis as sialadenitis. This troubleshoot will be overcome by keeping it in mind and make it in a practice that always take a second pass if necrotic material aspirated at first aspiration. The one more diagnostic difficulty we faced during the diagnosis was to differentiate between pleomorphic adenoma with basal cell adenoma and adenoid cystic carcinoma while examining the cytology showing less chondromyxoid stroma and large amount of hyaline globules. Since the natural course, management and prognosis of these lesions show marked variation, confirmation of diagnosis is necessary. The morphology and texture of hyaline globules will help in confirmatory diagnosis as they show sharp smooth borders (Jain, R. *et al.,* 2013) in adenoid cystic carcinoma in comparison to those in pleomorphic

adenoma. These Gray-zone areas can be resolved with the help of cell block preparation and their analysis. Cases of Muco-epidermoid carcinoma, Warthin tumor, Adenoid cystic tumor and Poorly differentiated Squamous cell carcinoma were also found in this study.

Of soft tissue and miscellaneous group of lesions in head and neck territory cystic lesions were the commonest one (50.33%) with Epidermal inclusion cyst predominance (64%) followed by lipoma (29.53%). Poorey *et al.,* (2014) observed sebaceous cysts as commonest lesion in their studies whereas Thyroglossal cysts were the commonest soft tissue lesions in the studies of Gonzalez (2008) and Savithri, C. *et al.,* (2012) Khetrapal *et al.,* (2015) found lipomatous lesions as most frequent entity in their study.

Other benign soft tissue lesions include pyogenic granuloma/lobular capillary hemangioma, lymphangioma, acute, chronic and granulomatous inflammation, benign spindle cell neoplasm and benign adnexal tumors. The rare but interesting lesions found in our study were pilomatricoma, epithelioid angiosarcoma, malignant adnexal tumors and squamous cell carcinoma. These cases were followed up and diagnosis was further confirmed on histology.

CONCLUSION

FNAC yields rapid diagnosis, staging and characterization of various head and neck lesions and ancillary technique application of aspirates (cell blocks, IHC, FISH). Commonest organ involved were Right cervical lymph node groups. Diagnosis and categorization of various cutaneous and soft tissue lesions were the most interesting and challenging aspect. .This study also concludes that skilful attempt and careful sample processing is necessary to increase the yield and reduce injuries and complications. This will enhance the accuracy of diagnosis of lesions from very complex and compact area with various vital and critical organs.

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