Comparative study of Fine Needle Aspiration Cytology and Computerised Cytology Scan in diagnosis of Extra -Thyroidal neck masses.

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ABSTRACT :

Objective : The present study was carried out to compare the utility of Fine needle Aspiration cytology (FNAC) Versus Computerized tomography (CT) scan in diagnosing extra thyroidal neck lesions. The sensitivity and specificity of both were calculated and analysed keeping histopathology as a gold standard. **Material and Methods :** The prospective study was conducted during July 2013 to September 2015 at a tertiary care Hospital, Department of Pathology and Department of Radiology. A total of 100 cases were studied. Only those patients presented with extra Thyroidal neck masses and who underwent both FNAC and CT procedure were selected for the study. **Observation and Results :** The highest incidence of neck masses was between age group 41 to 60 years with Lymph node enlargement as the commonest mass. In the present study, majority of the pathologies were malignant (50%) followed by inflammatory lesions 18%,benign 16% and congenital 16%. The majority of disparity in diagnosis was found in malignant lesions. FNAC revealed more specific diagnosis in case of malignancy. The sensitivity of FNAC was 96.3%, specificity 100% and diagnostic accuracy 96.9%, while CT had sensitivity of 94.4%, specificity 81.8% and diagnostic accuracy 92.3%. **Conclusion :** FNAC remains an upper hand on CT for diagnosis of Extrathyroidalneck masses, due to its easy availability, simplicity, low cost, reliability, minimally invasiveness with acceptable sensitivity and few complications. CT is essential in planning surgical approach and predicting prognosis especially in malignant lesions.

Keywords : Extrathyroidal Neck Lesions, FNAC, Neck Swellings, CT Scan

INTRODUCTION : Palpable masses in the neck are common clinical finding, affecting all age groups and are responsible for significant cause of mortality and morbidity in India.[1] Neck lump is any congenital or acquired mass arising in the anterior or posterior triangle of the neck between the clavicles inferiorly and the mandible and base of skull superiorly. These masses are cosmetically unacceptable, pose a diagnostic dilemma and are to be investigated cytologically and often radiologically to know the nature of the lesion. Fine needle aspiration cytology (FNAC) is a simple, quick and cost effective method to diagnose neck masses. It has particular relevance in this area due to easy accessibility of the target site, minimally invasive nature of procedure and good diagnostic accuracy to differentiate neoplastic and non – neoplastic lesions.[2] Imaging of the neck have always been a challenge to the radiologist. With the advent of Computed Tomography (CT) it is now possible for the radiologist to visualize the complex structure of neck region. Neck masses can be easily diagnosed by CT scan. CT scan is an invaluable tool in staging of Head and Neck Cancers and preoperative assessment of resectability. In recent era of latest radiological equipments, radiological diagnosis is on the verge of replacing the need of tissue diagnosis. However, there is no documentation in literature to compare the utility and efficacy between radiological and pathological diagnosis. This study aims at pointing out the diagnostic utility and efficacy of FNAC and CT in extrathyroidal neck masses.

Materials and Method : This was a prospective study done over a period of two yearsand conducted by Department of Pathology and Radiology at a tertiary care center in Western Maharashtra. Institutional Ethics Committee approval was taken.All the patients attending various specialty and superspecialty clinics of the hospital, having palpable neck masses, were referred to department of Pathology for FNAC and department of Radiology for CT. Thyroid masses were not included in the study. FNAC as well as CT were performed on 100 patients of any age group having Extrathyroidal neck masses, the result of which were further analyzed. Patient who underwent FNAC but did not undergo CT or vice versa and those with acellular and nondiagnostic aspiration were excluded from the study.

Detailed history was taken, local and systemic examination was performed and a clinical diagnosis was made. The FNAC procedure was explained to the

patient in their vernacular language and written consent was taken.FNAC was then performed using10 cc syringe and 21 gauge needle.Few air-dried and few alcohol fixed smears were made and stained with Leishman, papanicolaou stain and Hematoxylin and Eosin stain. For CT, a written informed consent was obtained from each patient or from parents in cases of pediatric patients after explaining the possibility of a contrast reaction. All patients were called with at least 6 hours of fasting before the CT scan. The radiologic procedure was explained to the patients, and CT was performed. The FNAC and CT findings were compared and the sensitivity and specificity were calculated. On the basis of FNAC and CT findings, cases were diagnosed and further classified as malignant neoplasm, benign neoplasm, Inflammatory and congenital lesions.

Table 1 : Distribution of cases diagnosed by FNAC and CT scan

Sr No.	Conditions	FNAC	CT
1.	**Lymphnode**		
	• Tubercular	7	8
	• Reactive	5	4
	• Lymphoma		
	Hodgkin	1	0
	Non - Hodgkin	7	2
	• Metastasis		
	Squamous cell carcinoma	37	32
	Adenocarcinoma	2	0
2	**Salivary Gland**		
	• Chronic Sialadenitis	2	0
	• Submandibular abscess	4	7
	• Benign Neoplasm		
	Pleomorphic adenoma	4	3
	• Malignant Neoplasm		
	Adenoid cystic Carcinoma	1	-
	Acinic cell Carcinoma	1	-
	Mucoepidermoid Carcinoma	1	-
3	**Soft Tissues** Lipoma	12	12

***Twenty discordant cases are mentioned in results and discussed in the discussion.**

Result : A total of 100 cases of Extra–thyroidal neck mass were studied in which 61 were male patients and39 were females. The male to female ratio was 1.5:1. The age of the patients ranged from 6 years to 79 years with mean age of 46 years. We found maximum number of cases of lymph node pathology(n=59), followed by salivary gland(n=13) and soft tissue lesions (n=12)and other miscellaneous lesions consisting congenital cysts(n=16). FNAC and CT scan was done in all the cases and histopathology examination was done in only 67 cases. 13 cases of metastatic lymph nodes were lost on follow-up. In 14 cases of inflammatory pathology including Chronic sialadenitis (n=2), tuberculous lymphadenitis, (n=3) reactive lymphadenitis, (n=5) and submandibular abscess (n=4) histopathology examination was not done and these patients were treated directly based on the diagnosis made by FNAC and CT scan. 6 cases of congenital cysts were also not operated; hence histopathological examination was not done. The detailed diagnosis of the cases based on FNAC and CT scan are shown in Table 1. In few cases the CT scan was inconclusive and offered only a differential diagnosis, such cases are not included in Table 1. These include cases of lymph nodes (n=13) and salivary gland (n=3) in which possibility of neoplastic lesion was suggested and biopsy was advised for confirmation. One case of submandibular abscess diagnosed on FNAC and CT scan proved to be Kimura's disease on histopathology. One case of tuberculous lymph node was missed on FNAC and all cases of epidermal cyst were not picked up by CT scan.

The Statistical analysis of utility of FNAC versus CT scan in diagnosing extra thyroidal neck mass is as shown in Table 2.

Table 2: Statistical analysis showing FNAC versus CT diagnosis

PARAMETER	RESULT (%)	
	F.N.A.C	C.T
Sensitivity	96.3	94.4
Specificity	100	81.8
Positive Predictive Value (PPV)	100	96.2
Negative Predictive Value (NPV)	84.6	75
Diagnostic Accuracy	96.9	92.3

Discussion : FNAC has become an accepted method for workup of many palpable and radiologically demonstrable lesions in Head and Neck region. In today's modern era of improved diagnostic modality of radiology like availability of CT scan, MRI etc, the radiologist claim to diagnose the nature of the lesion replacing the need of tissue diagnosis. CT is fast, well tolerated, and readily available, it can be used for initial evaluation, preoperative planning, biopsy targeting, and post-operative follow-up. Disadvantage of CT are: it involves the use of ionizing radiation, which are undesirable in children and pregnant women. It requires an iodine-based contrast agent injection, which is associated with risk of allergic reactions. CT does not provide soft tissue definition equivalent to that attainable with MRI. Also CT cannot definitely diagnose malignant neoplasms.

Moreover, radiologic diagnosis is expensive and can be done only at tertiary care centres. FNAC on the other hand is a simple, safe, cheap, OPD procedure which can help in tissue diagnosis. FNAC has gained universal acceptance, as in most instances it is inexpensive, safe, quick, accurate with higher degree of reliability and feasibility. Despite these merits, FNAC is not without its own problems and limitations - Nondiagnostic aspirates (sampling error, untrained cytopathologist, complications, false negative results etc.), sub classification of lymphomas (which require an open biopsy) and inaccurate diagnosis of low-grade lymphomas etc.

With this background we aimed to document statistical significance of CT scan versus FNAC in diagnosis of extrathyroidal neck masses.

The maximum numbers of cases seen by us were of lymph node pathology and were showing metastatic deposits of squamous cell carcinomas which were diagnosed by FNAC. This was in accordance with the study by Calabrese L et al[3] who also found metastatic deposits of squamous cell carcinoma in the lymph node to be maximum in number. The CT scan, on the other hand diagnosed most of the cases of metastatic deposits except a few in which the possibility of neoplastic lesion was suggested. CT scan also provided the location, size, multiplicity and extent of the lesion, especially in Maximum intensity projection (MIP)3-D Images of CT Scan. Furthermore the histological types of the metastatic deposits were diagnosed only by FNAC, thus increasing the diagnostic accuracy of FNAC versus CT scan. [Figure 1A, 1B] The lymphoma sub-classification was also more accurate on FNAC as compared to CT scan. The inflammatory lesions of lymph node included tuberculous lymphadenitis followed by reactive lymphadenitis. In our study tuberculous lymphadenitis was the most common amongst inflammatory group of lesions of neck. Maharjan Metal found that tuberculosis is the most common disease in developing countries affecting the cervical lymph nodes. Our study correlates well with this study.[4] One case of tuberculous lymphadenitis was mismatched on FNAC which was more accurately diagnosed on CT scan. Histopathology was done in this case, which confirmed the diagnosis. False negative result on FNAC can be due to sampling error while selecting the lymph node for FNAC, which is the known limitation of FNAC.

FIGURE LEGANDS:

FIGURE 1A : Photomicrograph of Squamous cell carcinoma showing loose cohesive clusters of pleomorphic malignant tumor cells [100X, H&E]

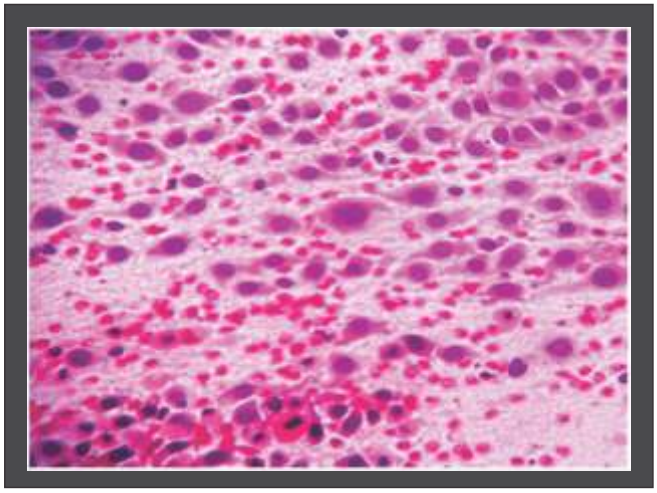


FIGURE 1B : Axial CECT image showing Ill-defined soft tissue density lesion along the buccal side of left gingivo-buccal sulcus likely to be of neoplastic etiology.

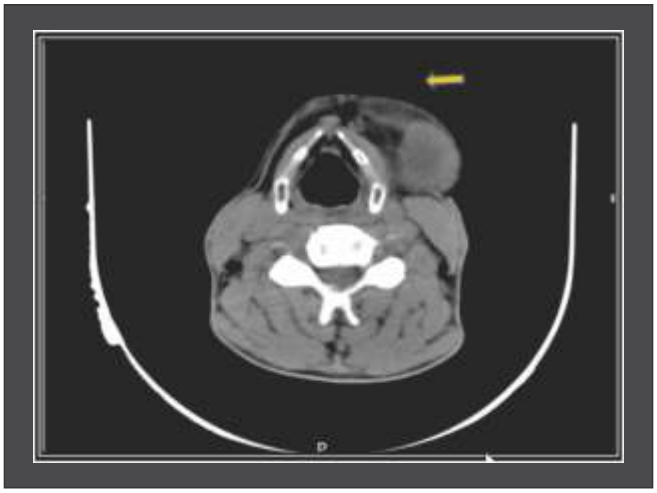
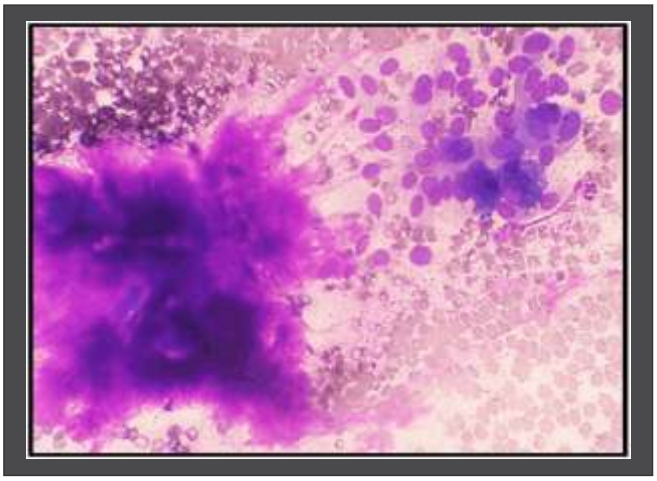


FIGURE 2 A : Photomicrograph of Pleomorphic adenoma, showing fibromyxoid stroma with epithelial cells arranged in gland like pattern or clumps [400X, Leishman]



In Salivary gland lesions, the parotid gland was commonly involved. Our observation was in accordance with the studies by Cristalline EG et al and Cajulis RS.[6,7] Pleomorphic adenoma was the most common salivary gland tumor in this study with diagnostic accuracy of 100% on FNAC and 75% on CT. This was in accordance with studies done by Viguer JM et al and by Kakimotoetal respectively.[8,9] [Figure 2A,2B,2C]Mucoepidermoid carcinomas represent about 30% of all salivary gland malignancies and are the most common malignant tumors in children and adults.[10,11,12] These tumors arise in the parotid gland (about 50%) and in the minor salivary glands (nearly 45%). Acinic cell carcinoma and adenoid cystic tumor both were of submandibular gland origin in our study. These were accurately diagnosed by FNAC. On CT scan low-grade lesions are well circumscribed, whereas high-grade lesions tend to have poor margins and infiltrate surrounding tissues.[13] Imaging findings in acinic cell carcinoma are nonspecific and there is an overlap with benign tumors such as Warthin tumor and pleomorphic adenoma.[14] So definite diagnosis was not possible on CT Scan. Adenoid cystic carcinoma being rare was not suspected at the first instance on CT scan. In our study, CT scan was suggesting possibility of neoplastic lesion and correlation with histopathology was advised for confirmation. The final diagnosis was made from the cytological and histopathological examination.[15]

The other salivary gland lesions included cases of chronic sialadenitis and submandibular abscesses.

FIGURE 2B : Figure showing Axial CECT in venous phase showing well defined lobulated enhancing lesion with foci of hypodensities in superficial lobe of right parotid (arrowhead)

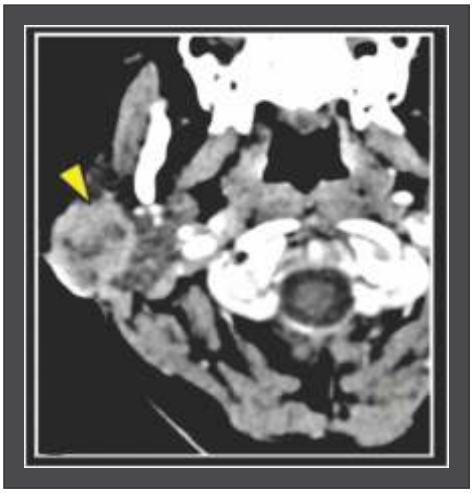
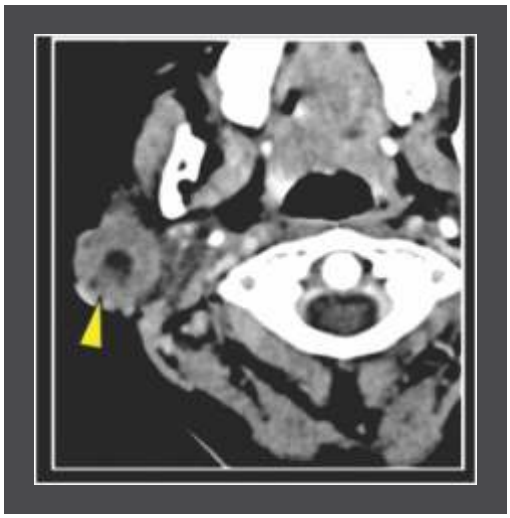


FIGURE 2C : Axial CECT in delayed phase showing central hypodensity with peripheral enhancement.



These inflammatory lesions on CT were characterized by the presence of ill-defined margin, a density less than that of muscle, air pockets, necrosis, and with a heterogeneous, peripheral thick rim of enhancement. [FIGURE 3A,3B,3C] CT scan is the method of choice in patients suspicious for inflammatory disease (abscess, calculi, major salivary duct dilatation, and acute inflammation) or in patients with contraindication for MR imaging.[13] One case was misdiagnosed as submandibular abscess on FNAC and CT. This was reported as Kimura's disease on histopathology. Thus histopathology remains the gold standard for diagnosis.Inflammatory lesions were treated by antibiotics, incision and drainage or antitubercular therapy.

FIGURE 3A: Photomicrograph showing degenerated neutrophils, macrophages and lymphocytes against a necrotic background suggestive of Abscess. [100X, Leishman]

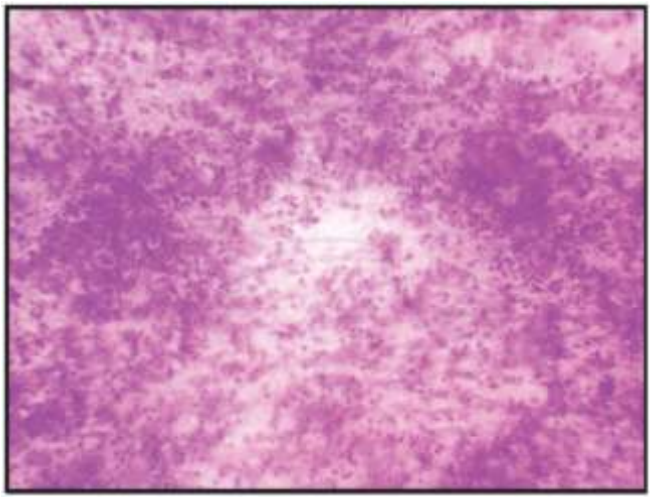


FIGURE 3B : Coronal CECT image showing ill defined, hypodense collection inferior to mylohyoid muscle (arrow) in the submandibular space with peripheral enhancement and surrounding fat stranding (arrowhead) suggestive of abscess.

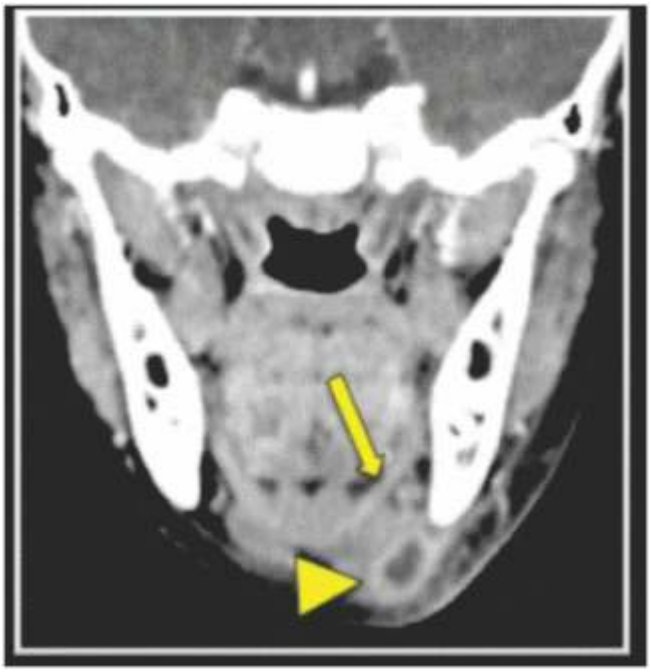
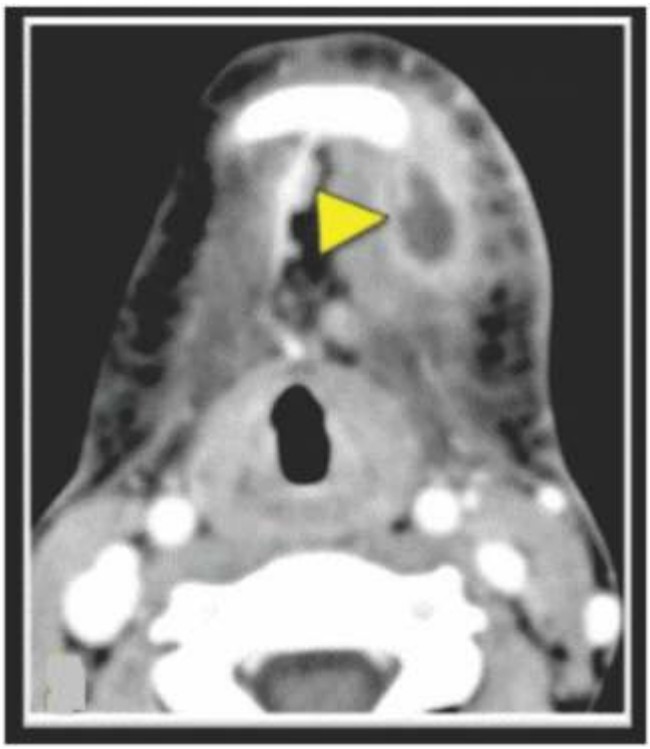


FIGURE 3C: Coronal CECT image showing ill defined, hypodense collection in the submandibular space with peripheral enhancement and surrounding fat stranding (arrowhead) suggestive of abscess



Histopathology was not available in all the cases andsuch cases were not included in calculating the diagnostic accuracy of FNAC versus CT in the present study. This was the limitation of our study. However, CT is noninvasive and preferred mode of diagnostic modality for inflammatory diseases. In our study, CT was more sensitive, specific and accurate in diagnosing inflammatory lesions than FNAC.

Among the soft tissue lesions, lipoma constituted the most common benign neoplasm in our study.Both FNAC and CT had equal accuracy (100%) for diagnosing this pathology. [FIGURE 4A, 4B]The histopathological features confirmed all the cases as lipoma.Our study correlated well with studies done by Rekhi and Murphy.[16,17]

In this study most of the congenital cystic neck masses were correctly diagnosed with 95% diagnostic accuracy using FNAC and CT.This was in accordance with the study by DejmekA et al.6 [FIGURE 5A,5B]Four cases of epidermal cyst were diagnosed on FNAC;While CT scan could not diagnose these lesions. CT scan diagnosed it as cystic lesion to be co related with FNAC and histopathology. Histopathology was available in only 2 cases which confirmed the FNAC diagnosis of sebaceous cyst. The intrinsic contents of epidermal cyst are well appreciated on MRI so MRI is better modality than CT scan for confirmation of the diagnosis in epidermal cyst. Hence FNAC has upper hand than CTscan in diagnosing such lesion.

FIGURE 4A : Photomicrograph of Lipoma, showing clusters of mature adipocytes [100X H&E]

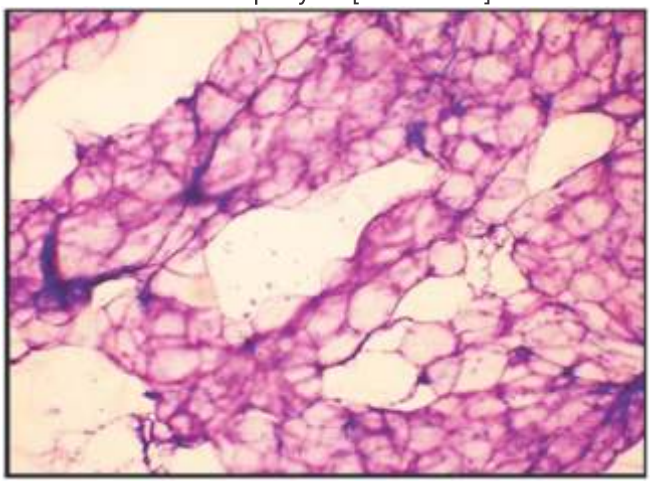
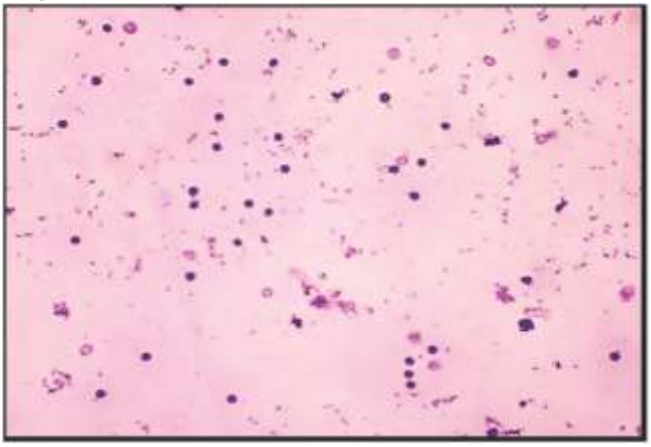


FIGURE 4B : Axial CECT image showing a well-defined fat density lesion in neck paramedian towards left side (arrow) likely to be a Lipoma.

FIGURE 5A: Photomicrograph showing many lymphocytes, histiocytes and eosinophils in a proteinaceous background Suggestive of Cystic Hygroma [100X, Leishman].



CONCLUSION : FNAC remains an upper hand on CT for diagnosis of Extrathyroidalneck masses, due to its easy availability, simplicity, low cost, reliability, minimally invasiveness with acceptable sensitivity and few complications. CT is essential in planning surgical approach and predicting prognosis especially in malignant lesions.

Thus we conclude that the two investigating modalities have to complement each other, along with Histopathology for correct diagnosis of Extrathyroidal Neck Masses.

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