

Fine Needle Aspiration of Head and Neck Tumours (Excluding Thyroid Lesions) in Correlation with Histopathology and Immunohistochemistry – a Retrospective Study.

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Abstract:

Background: Head and neck regions are hearth for various palpable neoplastic and nonneoplastic lesions of organs like lymphnodes, salivary glands, thyroid, soft tissues and bone. These lesions may vary from developmental anamolies to malignancies. The advantage of swellings of head and neck is that they can readily be noticed by the patient and are easily accessible by the doctor. FNAC has been gained immense popular diagnostic procedure as it ts simple, least expensive, rapidly diagnostic and an easy to perform procedure. In inaccessible swellings fnac can be done under radiological guidance. FNAC of head and neck regions accounts for about 2/3rds of all body swellings aspirated. With this concept we take up the study of FNAC of tumors of head and neck excluding thyroid.

Aim: The aim of the study is to establish the importance of FNAC as a diagnostic contrivance, to evaluate and to document the role of FNAC in the initial assessment, diagnostic procedures and clinical management of patients with palpable lesions in head and neck regions(excluding thyroid). To document the diagnostic occurrence with accommodating histopathology and to determine sensitivity as well as specificity of FNA in the diagnosis of palpable head and neck lesions(excluding thyroid).

Materials & methods: 360 cases of neoplastic lesions in the head and neck regions were included in the present study. FNAC was performed and stained by haematoxylin & eosin, May Grunwald giemsa and Papanicolaou stain. The biopsy sections were stained by H & E followed by immunohistochemistry wherever necessary. Histopathology was correlated with the findings of FNAC.

Results: FNAC of 360 cases of neoplastic lesions in head & neck regions were included in the present study. Male to female ratio is 5.5:4.5 with high incidence in 5th decade. Out of total neoplastic lesions lymphnode lesions comprises – 38%, soft tissue tumours – 39%, salivary gland lesions – 19% and skin & adnexae – 4%. Benign lesions comprises 58.3% and malignant lesions – 41.7%. Of the malignant lesions, metastatic deposits accounts more with 32.22% and lymphomas 5.55%.

Keywords: FNAC, Histopathology, Immunohistochemistry, Head & neck tumours.

I. Introduction

Palpable swellings of head and neck are common and include neoplastic as well as non neoplastic conditions of organs like lymph nodes, salivary glands, thyroid, skin, soft tissues, bone etc. The lesions include wide variety of conditions ranging from developmental anamolies to malignancies. The advantage of swellings of head & neck regions is that they can be readily noticed by the patient and are easily accessible to the doctor. Fine needle aspiration cytology as a part of diagnostic pathology is simple, least expensive, rapidly diagnostic and an easy procedure to perform particularly in palpable lesions of head & neck regions. By the above reasons it has gained immense popularity globally and has been accepted as a routine diagnostic procedure in almost all hospitals. Deep seated lesions of head and neck can be done under the guidance of imaging techniques such as ultrasound, CT, MRI.

Aspiration cytology was first reported by Schwartz et al ¹ in 1847 and in 1930 the technique of FNAC in head and neck tumors was introduced, Mc Lean ² in 1961 preferred FNAC to open or excision biopsy in head and neck regions. Gartener et al (1981) ³ reported 80% accuracy in the diagnosis of malignant tumors. Young M. J et al ⁴ got 94.5% accuracy for all head and neck lesions as like with the studies of Platt et al and Schwartz et al (1990).

The present study is conducted to find the importance of FNAC with adjunct histopathology in diagnosing various lesions occurring in head and neck regions, so that early treatment can be advocated. Effort has been made to study the various lesions occurring in this region.

II. Materials and Methods

Our study was carried out in 360 patients who attended out patient department in period of July 2013 to June 2015 with a complaint related to head and neck regions irrespective of age and sex involving different organs like lymph nodes, salivary glands, skin & adnexae, soft tissue tumors. Before the procedure the thorough clinical examination of each case was done and patient was informed about the procedure. Except in two to three cases where aspiration was inconclusive and acellular, local anaesthesia was not used in any of these cases examined. A tissue biopsy followed by IHC was done wherever necessary and histopathology correlated with the findings of FNAC. FNAC was carried out by percutaneous approach for superficial lesions and ultrasound guided aspiration procedure for deep seated lesions. Smears aspirated were immediately fixed in 95% Isopropyl alcohol and air dried as per the requirement. Air dried smears were stained by Romanowsky stain such as May-Graunwald Giemsa stain and Leishman, . Wet fixed smears are stained by Papanicolaou and Hematoxylin and Eosin stains.

III. Results

FNAC of 360 neoplastic lesions in the head and neck region were studied. There was no striking gender predilection with male to female ratio 1.2 : 1. Out of 360 cases , 210 cases (58,3%) showed benign pathology and 150 cases(41.7%) showed malignant pathology. Out of 360 cases soft tissue tumors were slightly predominating, 140 cases(39%) over lymph nodes composed of 136 cases (38%). Remaining organ distribution is salivary glands 69(19%), skin & adnexae 15 (4%). The age range of 360 cases is between 9months to 83 years.

The maximum no. of cases were seen in patients 41 – 50 years (21.6%) and majority of them were benign. Least no. of cases were seen in patients between 81 – 90 years of age (0.6%) and they were all malignant of either primary or secondary type. Out of 210 benign lesions most common benign tumor encountered in the present study was lipoma , 109(30.27%) followed by pleomorphic adenoma, 53(14.44%). Out of 150 malignant lesions most common malignant lesion encountered was metastatic deposits in lymph nodes 118(32.22%), followed by lymphomas 18 (5.55%). All 140 soft tissue tumors were commonly seen in the age group of 31 – 40 years and male to female ratio is 0.8 to 1, and most common soft tissue tumors are lipomas, 109 (77.85%).

Cervical lymphadenopathy is one of the common presentations for FNAC of which most of the cases occur in children and are usually reactive in nature.

In our study 136 cases of lymph nodal malignancies were commonly seen between 51 – 60 yrs and male to female ratio is 1.4 : 1. Metastatic malignancies were more common 118 (86.74%) than primary lymphomas 18 (13.24%) .Metastatic deposits of unknown primary site were the commonest lesions diagnosed. Most common metastatic malignancy was squamous cell carcinoma (81 cases) followed by adenocarcinoma (25 cases) and papillary carcinoma thyroid (10 cases) and mostly these lesions are seen in males between 50 – 60 yrs of age. Histopathological examination was done for 33 out of 136 cases of lymph node tumors of which 16 cases of deposits of squamous cell carcinoma, 1 case of adenocarcinoma, 6 cases of deposits from papillary carcinoma thyroid, 6 and 4 cases of non hodgkin (NHL) and hodgkin lymphoma (HL) respectively. IHC was available for two cases of NHL and HL each.

Diagnostic accuracy of FNAC was 93.7% in correlation with histopathological examination for metastatic deposits for squamous cell carcinoma and 100% accuracy for other tumors with overall accuracy of 98.7%. In our study out of 360 head and neck tumors 69 (19%) cases from salivary glands and common age group is in between 41 – 50 yrs with slight female predominance (56.5%). Benign salivary gland tumors are more common in females with male to female ratio 0.6 : 1 in contrast to malignant tumors which are more common in males with M:F is 2:1. Majority of tumors are involved Parotid followed by submandibular and minor salivary glands. Benign tumors of salivary glands out number the malignant ones with 57 (83%)cases and 12(17%) cases respectively. In our study most common benign tumor is pleomorphic adenoma 53 (91.22%) and most common malignant tumor is mucoepidermoid carcinoma(60%). With the diagnostic accuracy of 67%. The diagnostic accuracy of benign salivary gland tumors is 77.7% and a case of pleomorphic adenoma on FNAC proved to be epithelial myoepithelial carcinoma on biopsy and IHC. Rare tumors like Adenoid cystic carcinoma, Warthins and Acinic cell carcinoma were confirmed on histopathology with a diagnostic accuracy of 100% and it was compared with the study of KLINEJ et al ⁵. The lesions were categorized under different categories. (Table .1).

Out of 360 FNACs of head and neck tumors (excluding thyroid) 106 cases were turned up to biopsy. Only 11 out of 106 cases showed negative correlation with 5 false negative and 6 false positive cases. Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were 95.23%, 94.39%, 94.34%, 95.28% and 94.8% respectively.

IV. Discussion

Wide array of head and neck tumors exhibiting interesting cytological and histopathological features. FNAC has become an accepted method for work up of many palpable and radiologically demonstrable lesions in head and neck regions. FNAC of head and neck tumors helped to categorize into benign and malignant lesions. If malignant the nature of malignancy is as a clue to the primary site of malignancy was analysed.

Though histopathological diagnosis was the ultimate tool and gold standard for confirmation of FNA diagnosis, many a times the accuracy was excellent in FNA cytological diagnosis. Mc Lean et al studied 151 cases and Schwartz et al studied 165 cases of head and neck tumors and observed the male to female ratio to be 1.3 : 1 and 1.4 : 1 respectively. Similar results of sex incidence of 1.2 : 1 was obtained in the present study.

The age group observed in our present study was 9 months to 83 yrs with mean age of 42 yrs and the similar range was observed with the study of Mc Lean et al at between 13 – 89 yrs and Mondal⁶ et al from 2 – 88 yrs. The present study outlines the clinical applicability of the FNAC procedure as an adjunct in evaluating head and neck tumors. In the present study out of 360 cases of head and neck region 140 cases were soft tissue tumors (39%), 136 cases were lymph node tumors (38%), 69 cases of salivary glands (19%) and 15 cases of adnexal tumors (4%). This is in comparison with other study groups^{2,4,5} ..

In the present study majority accountable 140 cases of soft tissue tumors, lipomas constituted the maximum number of cases (109 cases with 30.2%). Lipoma is the most common soft tissue tumor with head and neck being the most common location . Our study showed (77.8%) which show similar result as with the study of Rasool et al (67.4%) and Priyank et al (69%).31 of 33 cases of soft issue tumors showed positive correlation on histopathological examination with a diagnostic accuracy of 95.2%.This is consistent with the results of Schwartz et al (92%)⁴ Fulciniti et al⁷ Abrari et al (93%) .

Most common lesion in lymph node tumors is metastatic deposits. Fine needle aspirates observe not only to establish the diagnosis but also permit histologic type and sometimes organ of origin of metastasis. In our study 136 lymph nodal neoplastic lesions were studied with predominant metastatic deposits constituting 118 cases. In the present study 87.7% of metastatic deposits and 13.3% of lymphomas were diagnosed. In a study by Mondel et al and Yadav et al metastatic deposits and lymphomas of 69.9% & 29.4% and 57.1% & 42.9% respectively. Metastatic deposits were predominantly squamous cell carcinoma (68.6%), followed by adenocarcinoma (21.1%), papillary carcinoma thyroid (8.7%) and infiltrating duct cell carcinoma (1.6%). These results were correlated with the study of Koss et al, Caraway NP et al and Sneige et al^{8,9,10}. Lymphomas constitute Non hodgkins and Hodgkin lymphomas. In Non hodgkins lymphoma monotonous population of lymphocytes with mixture of centrocytes, centroblasts seen.^{11,12,13} In Hodgkins lymphoma (Figure-6) atypical mononuclear cells (Hodgkin cells) with nucleus of 3/4ths size of small lymphocyte, Reed – Sternberg cell, variable no. of eosinophils, plasma cells, histiotype with immunophenotype of CD30, CD15, MUM1 and small lymphocytes with CD3.

Fine needle aspiration cytology only complements, but does not give a definite diagnosis in case of Hodgkins and Non hodgkins lymphomas. The ever expanding histopathologic sub classification of NHL makes it clear that FNAC cannot be a substitute for histopathology. But FNAC can be an important first line diagnostic approach and can be extremely useful during follow up. In the present study 4 cases of Hodgkins disease were diagnosed and had an overall accuracy rate of 100%. Jose AJ et al reported a sensitivity of 82.4% in their series. Kline et al diagnosed 20 cases of Hodgkins lymphoma out of total 29 cases studied. The diagnostic accuracy in various studies ranged from 33% to 90%.14 out of 136 cases of lymph node aspiration were NHL, 6/14 cases had histopathological confirmation giving an over all accuracy of 100%. The over all diagnostic accuracy of FNAC in diagnosis of lymph node tumors was as high as 98.7% and it was correlated with the studies of Liew et al and Suresh et al.

FNAC is an important diagnostic procedure used to evaluate salivary gland lesions and to supplement their preoperative management and over all therapy. In the present study of 360 cases of palpable head and neck tumors 69 (19.6%) cases were salivary gland tumors. Majority of the cases were seen the 5th decade and predominantly in females. Majority of the cases were done in parotid gland (48 cases) followed by submandibular gland (18 cases). Among benign neoplasms pleomorphic adenoma was the most common tumor accounting 53 cases (77.3%) and in 6/12 cases were mucoepidermoid carcinomas. Cytomorphology of pleomorphic adenoma (Figure-1) shows variable cellularity of single cells, poorly cohesive clusters and sheets with fibrillary chondromyxoid background admixed with myoepithelial cells along with few metaplastic cells like oncocytic, sebaceous and squamous cells^{14,15,16}. Basal cell and canalicular adenoma were diagnosed by clusters of basaloid epithelial cells with peripheral palisading having regular round nucleus with bland chromatin and scant fibrous stroma, hyaline material in the background.^{17,18} Aspirates of Warthins tumor show mucoid milky fluid with cohesive, monolayered oncocytic cells against amorphous and granular debris as well as lymphoid cells in the background.^{19,20} Aspirates of oncocytomas show multilayered aggregates of oncocytic cells with small regular nuclei and absence of fluid, debris and lymphoid cells.²¹ In our present study of benign salivary gland lesions, out of 53 cases of pleomorphic adenomas on cytopathology 18 cases were turned upto

histopathology with positive correlation in 14 cases having diagnostic accuracy 77.7%. Cytopathology of basal cell adenoma warthins tumor (Figure-4) with 2 cases each correlated with histopathology having diagnostic accuracy 100%. These findings were correlated with the study of Evertuo CM and Ricoldo SC. Cytomorphology of acinic cell carcinoma constitute rich cellularity with micro acinar groups of clusters of cells and inconspicuous fibrovascular stroma, fragile finely vacuolated dense oncocyte like cytoplasm with many stippled nuclei.^{22, 23} Cytology of mucoepidermoid carcinoma (Figure-5) shows low cellularity, a dirty background of mucus and debris with cohesive clusters and sheets of epithelial cells, small streams of cells within the mucus and also intermediate cells resembling squamous metaplastic cells.²⁴ Cytology of adenoid cystic carcinoma (Figure-2) shows cellular smears with both single and clusters. Smears also show hyaline spherical globules of varying sizes with adherent tumor cells and scant cytoplasm, high N/C ratio, nuclear moulding, naked nuclei.²⁵ Cytology of polymorphous low grade adenocarcinoma shows cell clusters and single cells adherent to fibrovascular stromain pseudo papillary pattern with hyaline stromal globules and small basaloid epithelial cells.²⁶ Cytology of myoepithelial carcinoma (Figure-3) shows cells in tissue fragments, clusters arranged in trabecular / pseudopapillary pattern. Myoepithelial cells are less cohesive with pale fragile cytoplasm, moderate nuclear atypia, naked nuclei and epithelial cells are smaller, uniform mainly in tight clusters.²⁷ in our present study diagnostic accuracy of 3 cases of mucoepidermoid carcinoma is 66.6% with one case proved as sabaceous lymphadenoma carcinoma. Rest of the malignant salivary gland tumors like adenoid cystic carcinoma, carcinoma Ex pleomorphic adenoma and acinic cell carcinoma were confirmed on histopathology with a diagnostic accuracy of 100% and these were correlated with the studies of Ellis GL et al, Arati Bhatia, Ricoldo SC, Layfield.

Sensitivity and specificity in the present study were 95.2% and 94.4% with overall diagnostic accuracy 94.8%. these results were found to be consistant with other study groups of Tilak et al, Klemi et al and Fernandes et al etc.

V. Conclusion

In the present study of 360 cases of head and neck tumors 39% were soft tissue tumors, 38% were lymph node lesions, 19% were salivary gland tumors and 4% were adnexal tumors. Histopathological correlation was done for 106/360 cases. 80 cases were subjected to immunohistochemistry for further confirmation. Present study showed 6 false positive and 5 false negative cases. The overall diagnostic accuracy was 94.8%, sensitivity was 95.2%, specificity was 94.4%.

In conclusion FNAC is very useful , cheap, safe , accurate and best investigation of choice for preoperative diagnosis and recognising tumor occurrence. Also avoid open biopsy in many cases reducing patient's morbidity and cost effectiveness. Therefore FNAC can be an excellent diagnostic contrivance in majority cases especially associated with histopathological and histochemistry correlation.

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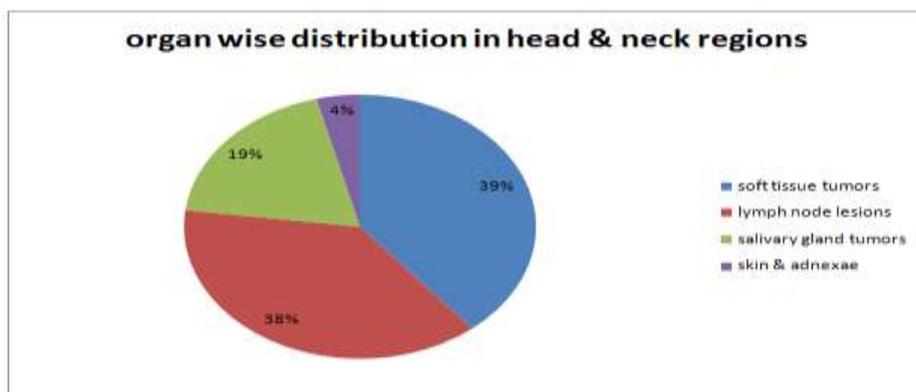


Table 2 : cytological category of tumors of head & neck

S . No	Cytological category	No . of cases	%
1	Benign	210	58.3
2	Malignant	150	41.7
	Total	360	100

Table 3 :Comparative study of diagnostic accuracy of FNAC of soft tissue tumors

Study groups	No . of cases	Diagnostic accuracy
Schwartz et al	182	92%
Fulciniti et al	218	86.4%
Abrari et al	150	93%
Present study	140	95.2%

Table 4 :Comparative study of diagnostic accuracy of FNAC of lymph node tumors

Study	No . of cases	Diagnostic accuracy
Lio et al	154	91.6%
Suresh et al	65	95.3%
Present study	136	98.7%

Figure – 1

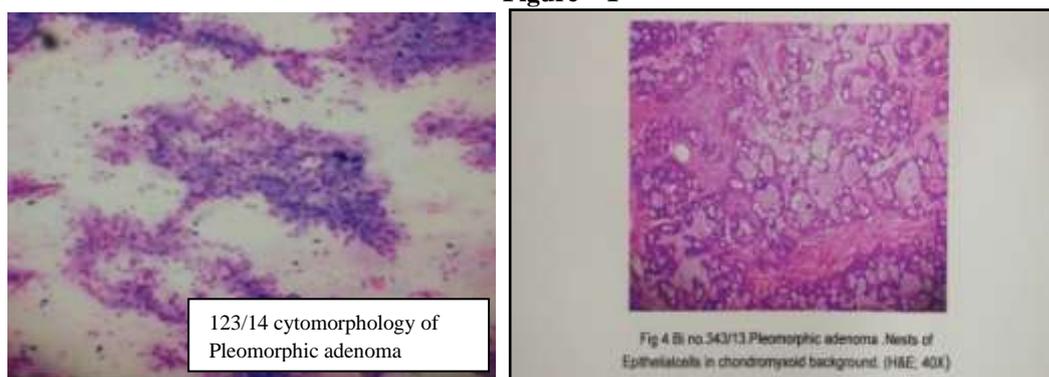


Figure - 2

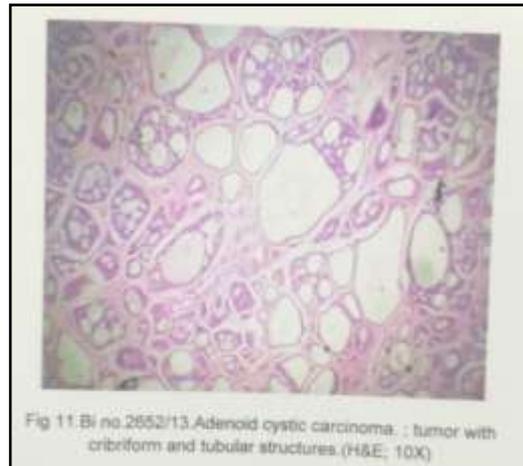
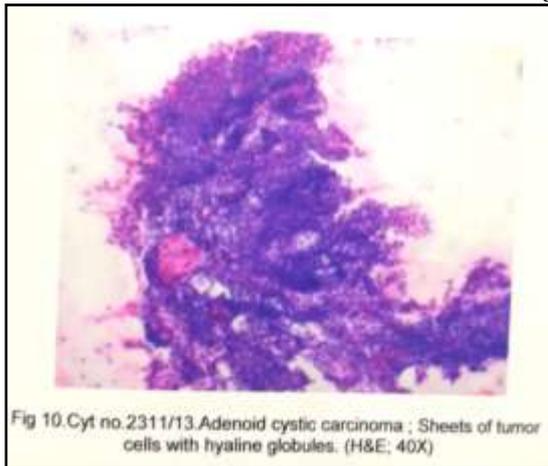


Figure - 3

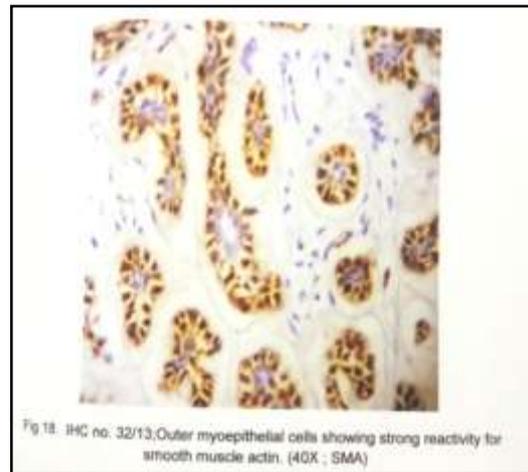
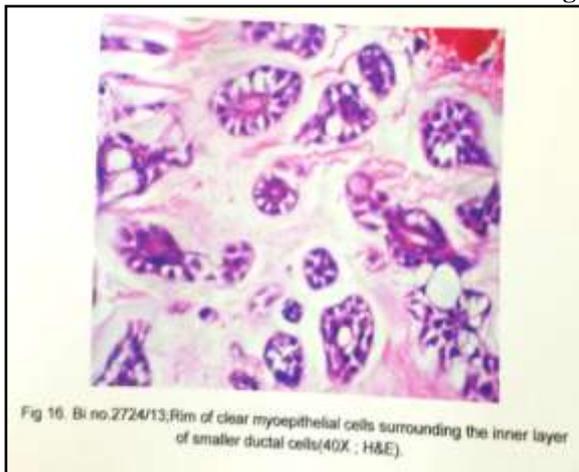


Figure - 4

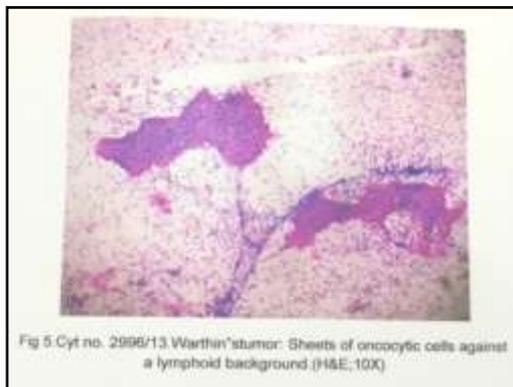


Figure - 5

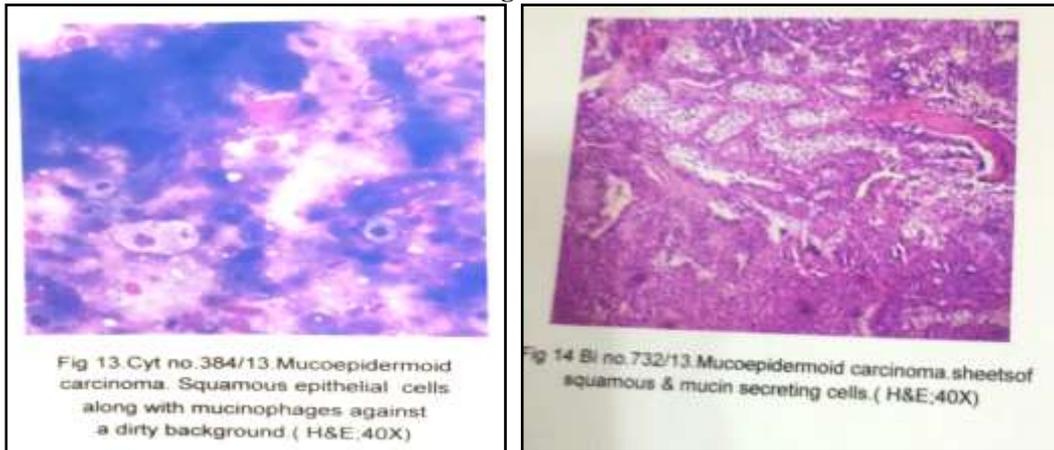


Fig 13. Cyt no. 384/13. Mucoepidermoid carcinoma. Squamous epithelial cells along with mucinophages against a dirty background (H&E;40X)

Fig 14 Bi no. 732/13 Mucoepidermoid carcinoma. sheets of squamous & mucin secreting cells. (H&E;40X)

Figure - 6

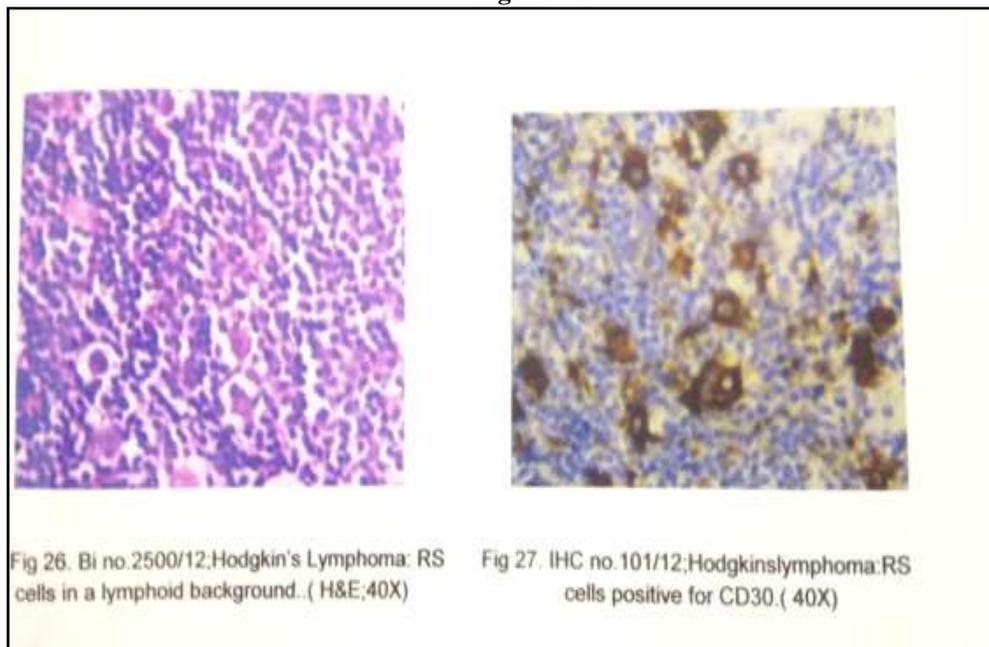


Fig 26. Bi no. 2500/12, Hodgkin's Lymphoma: RS cells in a lymphoid background..(H&E;40X)

Fig 27. IHC no. 101/12; Hodgkinslymphoma: RS cells positive for CD30.(40X)