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## **Study on role of cytology in diagnosis of head and neck lesions in a tertiary care hospital**

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### **Abstract**

**Background:** Head and neck lesions are commonly encountered in patients across all age groups. This region encompasses a multitude of congenital, inflammatory or neoplastic lesions. FNAC is a clinically appropriate procedure associated with minimal trauma and complications for patients for analysis of head and neck swellings because of factors such as easy approachability of the target site, increased compliance and helping to avoid surgery in non-neoplastic lesions, inflammatory conditions and also some tumors.

**Objective:** This study is undertaken to assess the accuracy of cytopathological diagnosis of head and neck lesions by FNAC and to correlate and analyze FNAC of head and neck lesions with that of histopathological study.

**Material and Methods:** The present study was Laboratory based Cross sectional descriptive type of observational study. A total of 100 cases undergoing FNAC among the head and neck lesion were enrolled for present study. FNAC was done using 10 cc disposable syringe and 22/23 gauge needle taking all aseptic precautions. Both aspiration and non-aspiration techniques were used wherever required. Smears were stained with PAP, Haematoxylin-Eosin stain and Leishman stain. Zeihl-Neelsen staining for acid fast bacilli was done in suspected tubercular lesions.

**Results:** Out of 100 patients lymph node lesions (46%) was the predominant site of FNAC. Out of 46 lesions of Lymph node; tubercular lymphadenitis was the most common pathological findings. Among 28 thyroid lesion Colloid goitre (45.5%) was the predominant finding. Out of 18 salivary gland lesions the most common lesion was pleomorphic adenoma. Out of 14 soft tissue and miscellaneous lesions benign lesions were commonest finding.

**Conclusion:** FNAC is a simple, rapid and cheap diagnostic tool that can be done as an outpatient procedure with overall accuracy rate of more than 90 % which differentiates non-neoplastic lesions from neoplastic lesions thus avoiding unnecessary surgeries.

**Keywords:** FNAC, lymphnode lesion, colloid goitre, salivary gland lesion, neoplastic lesion

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### **Introduction**

Head and neck lesions are commonly encountered in patients across all age groups<sup>[1]</sup>. This region encompasses a multitude of congenital, inflammatory or neoplastic lesions. These pathological lesions arise at several anatomical sites include oral, upper aero-digestive tract, otologic, thyroid, salivary glands, lymph nodes, skin and soft tissues<sup>[2, 3]</sup>. The evaluation of head and neck mass is a common clinical dilemma and a condition which clinicians routinely encounter. It is evident that their early diagnosis provides the best chance of successful treatment<sup>[4]</sup>. At present, the preferred method of obtaining biopsy material from a neck mass is fine needle aspiration cytology technique.

FNAC is a clinically appropriate procedure associated with minimal trauma and complications for patients for analysis of head and neck swellings because of factors such as easy approachability of the target site, increased compliance and helping to avoid surgery in non-neoplastic lesions, inflammatory conditions and also some tumors<sup>[5]</sup>. Till now, there is no evidence that the tumour spreads through the skin track created by the fine hypodermic needle used in this technique<sup>[6]</sup>. FNAC helps to differentiate benign from malignant lesions except in differentiating follicular adenoma from follicular carcinoma of thyroid<sup>[7]</sup>. FNAC is both diagnostic and therapeutic in a cystic swelling<sup>[8]</sup>. This technique is helpful for the diagnosis of salivary gland tumours where it can differentiate between a malignant and a benign tumor with over 90% accuracy<sup>[9]</sup>.

The accurate identification of the lesion is very essential for the proper management of patients. Radiology does not always help & may not be cost effective. Although biopsy gives reliable tissue diagnosis, it carries the complications of surgical intervention, may require hospitalization & it leaves behind unsightly scars. Therefore this study is undertaken to assess the accuracy of cytopathological diagnosis of head and neck lesions by FNAC and to correlate and analyze FNAC of head and neck lesions with that of histopathological study.

### **Material and Methods**

#### **Study design**

The present study was Laboratory based Cross sectional descriptive type of observational study. A total of 100 cases undergoing FNAC among the head and neck lesion were enrolled for present study. The study protocol was approved by the Ethics Committee of SMS Hospital Jaipur.

#### **Inclusion Criteria**

1. Palpable and non-palpable head and neck lesions.
2. Head and neck lesions irrespective of age and sex.

#### **Exclusion Criteria**

1. Haemorrhagic smears.
2. Smears with inadequate cellularity.

- Poorly preserved specimen having adequate material but morphology is not discernible.

Detail clinical history and significant findings were noted. After explanation of procedure and taking informed consent of patient, FNAC was done using 10 cc disposable syringe and 22/23 gauge needle taking all aseptic precautions. Both aspiration and non-aspiration techniques were used wherever required. Smears were stained with PAP, Haematoxylin-Eosin stain and Leishman stain. Zeihl-Neelsen staining for acid fast bacilli was done in suspected tubercular lesions. Aspirations taken from various sites include lymph node, thyroid, salivary gland and soft tissue. Cytomorphological diagnosis was given depending upon the pathology.

**Results**

In this study out of 100 sample tested 55(55%) were female while 45(45%) were male. Female outnumbered male. Among that most of the patients (41%) belong to 16-30 years of age, followed by 31 -45 years of age. Out of 100 patients lymph node lesions (46%) was the predominant site of FNAC and the least was Soft tissue and miscellaneous lesion (14%). Out of 46 lesions of Lymph node; tubercular lymphadenitis was the most common pathological findings (43.4%) while the least was nonspecific inflammatory lesions (4.3%). Among 28 thyroid lesion Colloid goitre (45.5%) was the predominant finding in benign lesion followed by Hashimoto’s thyroiditis (13.6%) while in malignant papillary thyroid lesions were the predominant lesions (13.6%). Out of 18 salivary gland lesions the most common lesion was pleomorphic adenoma (66.66%) followed by chronic sialadenitis (16.6%) in benign lesion followed by Mucoepidermoid carcinoma(11.1%) in malignant cases. Out of 14 soft tissue and miscellaneous lesions benign lesions were commonest finding which includes epidermal cyst (28.5%), lipoma (14.2%) and benign adnexal tumor (14.2%). In malignant squamous cell carcinoma were seen in 14.2%.

In this study out of 100 FNAC there are 8 cases in which cytological diagnosis varied from histopathological findings. The most common were Reactive lymphadenitis which was our cytological diagnosis whereas in histopathological findings we found tubercular lymphadenitis. Out of 46 lymph node lesions 41(89.1%) found to be similar in histopathological findings. Discordance was found only in 5 cases (10.9%) when we correlate with histopathological findings. Similarly out of 22 thyroid lesions 21(95.4%) found to be similar in histopathological findings. Discordance was found only in one case (4.6%) when we correlate with histopathological findings. Out of 18 salivary gland lesions 17(94.4%) found to be similar in histopathological findings. Discordance was found only in one case (5.6%) when we correlate with histopathological findings. Out of 14 soft tissue and miscellaneous lesions 13(92.8%) found to be similar in histopathological findings. Discordance was found only in one case (7.2%) when we correlate with histopathological findings.

**Table 1:** Distributions of various head and neck lesions according to site

| Various Site                  | Number of cases (n=100) | Percentage |
|-------------------------------|-------------------------|------------|
| Lymph node                    | 46                      | 46%        |
| Thyroid gland                 | 22                      | 22%        |
| Salivary gland                | 18                      | 18%        |
| Soft tissue and miscellaneous | 14                      | 14%        |
| Total                         | 100                     | 100%       |

**Table 2:** Distributions of various lymph node lesions

| Various lesions of lymph node | Number of cases (n=46) | Percentage % |
|-------------------------------|------------------------|--------------|
| 1. Reactive adenitis          |                        |              |
|                               | 12                     | 26.1         |
| 2. Inflammatory               |                        |              |
| Non specific                  | 02                     | 4.3          |
| Tuberculosis                  | 20                     | 43.4         |
| 3. Malignant                  |                        |              |
| Lymphoma                      | 05                     | 10.8         |
| Metastasis                    | 07                     | 15.2         |
| Total                         | 46                     | 100          |

**Table 3:** Distributions of various thyroid lesions

| Various lesions of thyroid             | Number of cases (n=22) | Percentage % |
|--|------------------------|--------------|
| 1. Benign                              |                        |              |
| Colloid goitre                         | 10                     | 45.5         |
| Thyroglossal cyst                      | 02                     | 9.0          |
| Follicular neoplasm                    | 02                     | 9.0          |
| Thyroiditis                            | 03                     | 13.6         |
| 2. Malignant                           |                        |              |
| Papillary thyroid carcinoma            | 03                     | 13.6         |
| Follicular carcinoma                   | 01                     | 4.5          |
| Poorly differentiate thyroid carcinoma | 01                     | 4.5          |
| Total                                  | 22                     | 100          |

**Table 4:** Distributions of various salivary gland lesions

| Various lesions of salivary gland | Number of cases (n=18) | Percentage % |
|-----------------------------------|------------------------|--------------|
| 1. Inflammatory                   |                        |              |
| Acute Sialadinitis                | 00                     | 00           |
| Chronic Sialadinitis              | 03                     | 16.6         |
| 2. Benign                         |                        |              |
| Pleomorphic adenoma               | 12                     | 66.6         |
| Warthin tumor                     | 01                     | 5.5          |
| 3. Malignant                      |                        |              |
| Mucoepidermoid carcinoma          | 02                     | 11.1         |
| Total                             | 18                     | 100          |

**Table 5:** Distributions of soft tissue and miscellaneous lesions

| Various lesions of soft tissue and miscellaneous part | Number of cases (n=14) | Percentage % |
|---|------------------------|--------------|
| 1. Benign   |                        |              |
| Lipoma  | 02                     | 14.2         |
| Epidermal cyst  | 04                     | 28.5         |
| Adenaxal tumor  | 02                     | 14.2         |
| Schwannoma  | 01                     | 7.1          |
| Hemangioma  | 02                     | 14.2         |
| 2. Malignant  |                        |              |
| Squamous cell carcinoma                               | 02                     | 14.2         |
| Metastatic epithelial tumor                           | 01                     | 7.1          |
| Total   | 14                     | 100          |

**Table 6:** Overall Distribution of variation in cytological and histopathological diagnosis

| Sl No. | Site of the lesion            | Cytological diagnosis         | Histopathological diagnosis     |
|--------|-------------------------------|-------------------------------|---------------------------------|
| 1      | Left cervical lymph node      | Tubercular lymphadenitis      | Hodgkin's Lymphoma              |
| 2      | Right cervical lymph node     | Reactive lymphadenitis        | Castleman's disease             |
| 3      | Right side of neck swelling   | Reactive lymphadenitis        | Tubercular lymphadenitis        |
| 4      | Left submandibular lymph node | Reactive lymphadenitis        | Tubercular lymphadenitis        |
| 5      | Left cervical swelling        | Reactive lymphadenitis        | Tubercular lymphadenitis        |
| 6      | Left parotid swelling         | Inflammatory lesion           | Mucoepidermoid carcinoma        |
| 7      | Right side of neck swelling   | Colloid cyst                  | Papillary carcinoma             |
| 8      | Left side of neck swelling    | Malignant epithelial neoplasm | Evidence of malignancy not seen |

## Discussion

The differential diagnosis of a head and neck swelling covers a broad spectrum of disease with differing implications for management. The nature of lesion will determine whether patient can be managed non-operatively or has to be subjected to a major surgical procedure and in malignant lesions whether further chemotherapy or radiotherapy is required. In present study we found that predominant site of FNAC was lymph node lesions (46%) followed by thyroid gland (22%), salivary gland (18%) and the least was Soft tissue and miscellaneous lesion (14%). Our results are in accordance with Bhagat V M. *et al.*<sup>[10]</sup> (53.5%) and Suryawanshi K H. *et al.*<sup>[11]</sup> (39.5%) who have reported lymph node was the predominant site of FNAC however Muddegowda *et al.*<sup>[12]</sup> and Rathod G *et al.*<sup>[13]</sup> reported thyroid was the predominant site of FNAC. In this study we found that in lymph node lesions tubercular lymphadenitis was the most common pathological findings (43.4%) followed by reactive lymphadenitis (26.1%), Metastasis (15.2%), Lymphoma (10.8%) which is in concordance with Suryawanshi Kishor H *et al.*<sup>[11]</sup> (47.36%) Rathod G *et al.*<sup>[13]</sup> (42.12%), Tariq *et al.*<sup>[14]</sup> (36%) who also reported tubercular lymphadenitis was the most common pathological findings. However Afnan Gul *et al.*<sup>[15]</sup> has reported the most common lesion of lymph node was reactive lymphadenitis due to inflammatory pathology, frequently seen in the first three decades.

In this study we found that in thyroid lesions Colloid goiter (45.5%) was the predominant finding in benign lesion followed by inflammatory lesions consisting of Hashimoto's thyroiditis (13.6%), chronic lymphocytic thyroiditis (9%). Our results are in accordance with Suryawanshi K H *et al.*<sup>[11]</sup> (47.7%), Muddegowda *et al.*<sup>[16]</sup> (44%) and Rathod G B *et al.*<sup>[13]</sup> (49%) also found thyroid lesions as the predominant site of FNAC in their study with colloid goiter as the predominant finding. We also observed malignant lesion of thyroid constitute about 22.6%. Among these malignant lesion 13.6% were papillary thyroid, follicular carcinoma (4.5%) and 4.5% were poorly differentiate thyroid carcinoma. In present study we found that in salivary gland lesions the most common lesion was pleomorphic adenoma (66.66%) followed by chronic sialadenitis (16.6%) in benign lesion followed by Mucoepidermoid carcinoma (11.1%) in malignant cases. Similar findings were observed by various authors<sup>[10, 17, 18, 19]</sup> who reported pleomorphic adenoma as the predominant salivary gland lesion in their study. However Sharma N *et al.*<sup>[20]</sup> and Suryavanshi K *et al.*<sup>[11]</sup> found inflammatory lesions as the commonest findings followed by benign neoplasms including pleomorphic adenoma. In this study we found that in soft tissue and miscellaneous lesions benign lesions were commonest finding which includes epidermal cyst (28.5%), lipoma (14.2%) and benign adnexal tumor (14.2%). In

malignant squamous cell carcinoma were seen in 14.2% and one case of metastatic epithelial tumor (7.1%) were seen in our study. Our results are similar to the findings of Kishor *et al.*<sup>[11]</sup> where epidermal cyst was 57.14% and lipoma was 23.8%. Bhagat V *et al.*<sup>[10]</sup> also found epidermal cyst (24%) as the most common soft tissue lesion followed by lipoma 12.4%). In this study we found that out of 100 FNAC there are 8 cases in which cytological diagnosis varied from histopathological findings. The most common were reactive lymphadenitis which was our cytological diagnosis whereas in histopathological findings it was turned to tubercular lymphadenitis. Similarly one case of tubercular lymphadenitis was turned to Hodgkin's Lymphoma in histopathological findings. One case of inflammatory lesion was turned to mucoepidermoid carcinoma in histopathological findings. Similarly one lesion of colloid cyst was turned to papillary carcinoma. However we found one case of Malignant epithelial neoplasm in cytological diagnosis while in histopathological findings evidence of malignancy not seen.

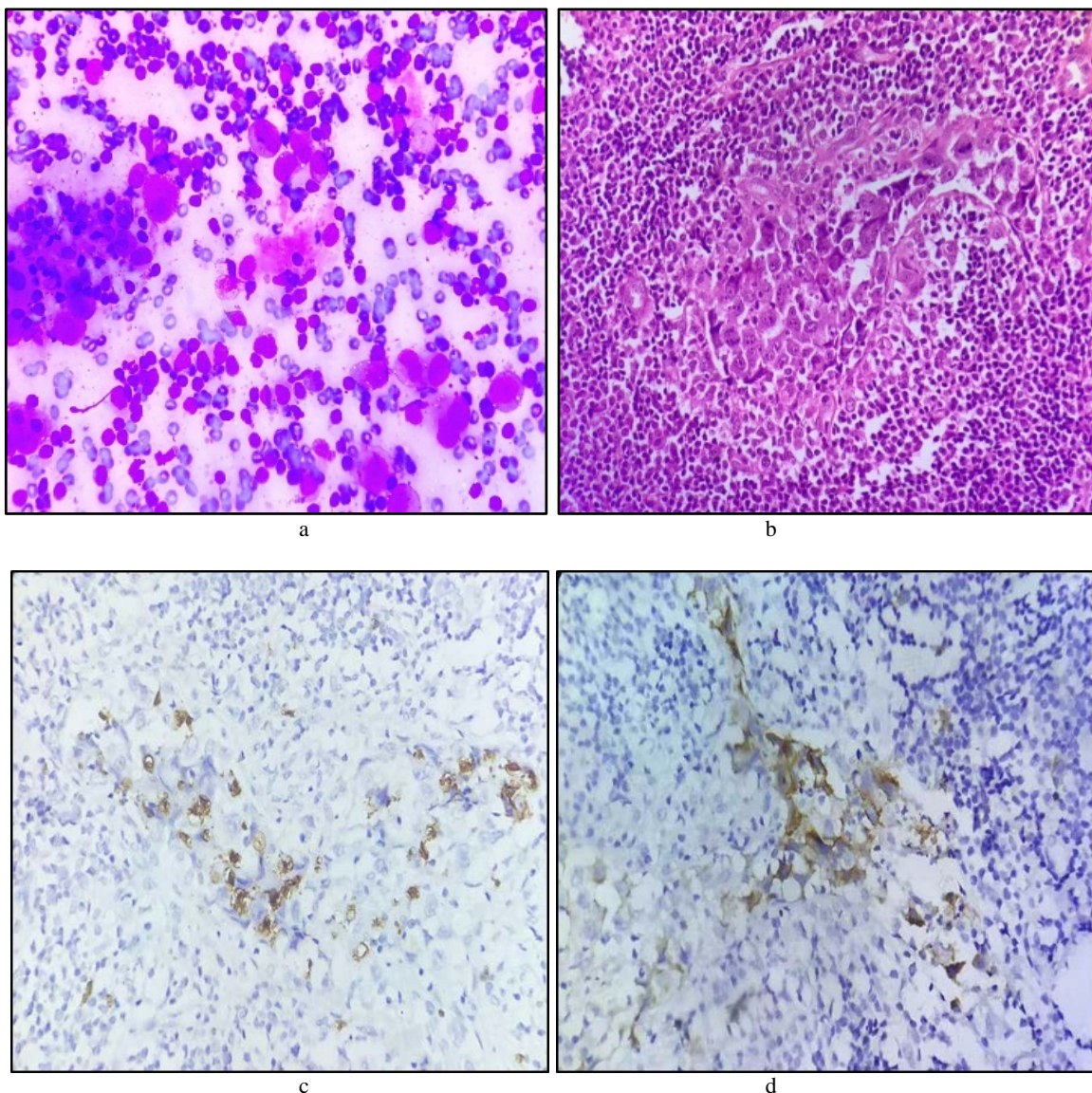
In this study we found that out of 46 lymph node lesions 41(89.1%) found to be similar in histopathological findings. Discordance was found only in 5 cases (10.9%) when we correlate with histopathological findings. The diagnostic accuracy of FNAC in lymph node pathology was 89.1%. This was in accordance with several other studies, reporting the diagnostic accuracy ranging from 82.2% to 94.4%<sup>[21]</sup>. Similarly out of 22 thyroid lesions 21(95.4%) found to be similar in histopathological findings. Discordance was found only in one case (4.6%). In this study out of 18 salivary gland lesions 17(94.4%) found to be similar in histopathological findings while discordance was found only in one case (5.6%). Our findings are in accordance with K Amita *et al.*<sup>[22]</sup>. The rate of false-negative diagnosis on cytology reported in literature ranges from 0% to 37%<sup>[23]</sup>. The diagnosis of low grade mucoepidermoid carcinoma being missed at cytology due to aspiration of mucoid material accompanied by cellular dilution due to cyst fluid has been emphasized in literature. Also low grade mucoepidermoid carcinoma may show chronic inflammation adding to the diagnostic dilemma. In present study out of 14 soft tissue and miscellaneous lesions 13(92.8%) found to be similar in histopathological findings while discordance was found only in one case (7.2%). One cytologically diagnosed case of colloid goitre turned out to be papillary carcinoma on histopathology, false negative results was due to (a) acellular or poorly cellular sample as encountered in large cystic papillary carcinoma, in marked desmoplasia and in cases of thick fibrous or calcified capsule. (b) Sampling error- in cases of small carcinoma where the needle may not reach the lesion. (c) Occasionally thyroid carcinoma may have macro-follicular areas and yield moderate amounts of colloid on FNA. Tilak *et al* described this features in

several follicular variants of papillary carcinoma and in papillary carcinoma with degenerative change [24]. They also stressed the importance of doing multiple aspirations in a thyroid swelling in order to obtain representative material from different areas since the thyroid can be affected by more than one diseases process.

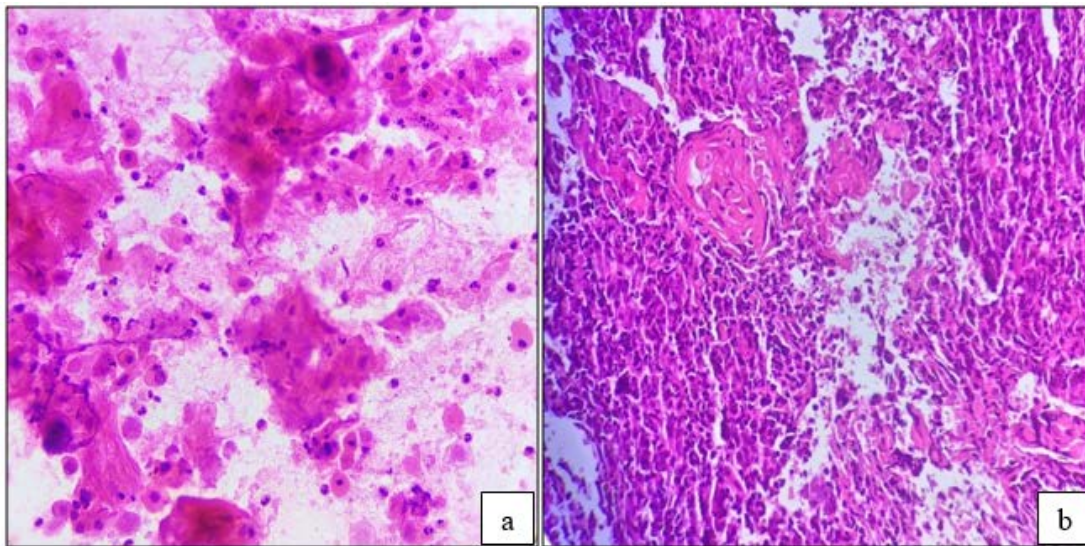
In this study we found that one false negative case was of Non-Hodgkin's lymphoma, misdiagnosed as tubercular lymphadenitis in FNAC. One of the study showed that the inability to evaluate the lymph node architectural changes in FNAC, low sensitivity in differentiating reactive hyperplasia from low grade non-Hodgkin's lymphoma or lymphocyte predominant form of Hodgkin's lymphoma and partial involvement of lymph nodes in some cases of lymphoma have been proposed as the main reasons for false negative results according to Rakhshan M [25].

Cause of misinterpretation may be due to mixed population of lymphoid tissue and some tangible body macrophage. Germinal centres may be very large in some cases of reactive follicular

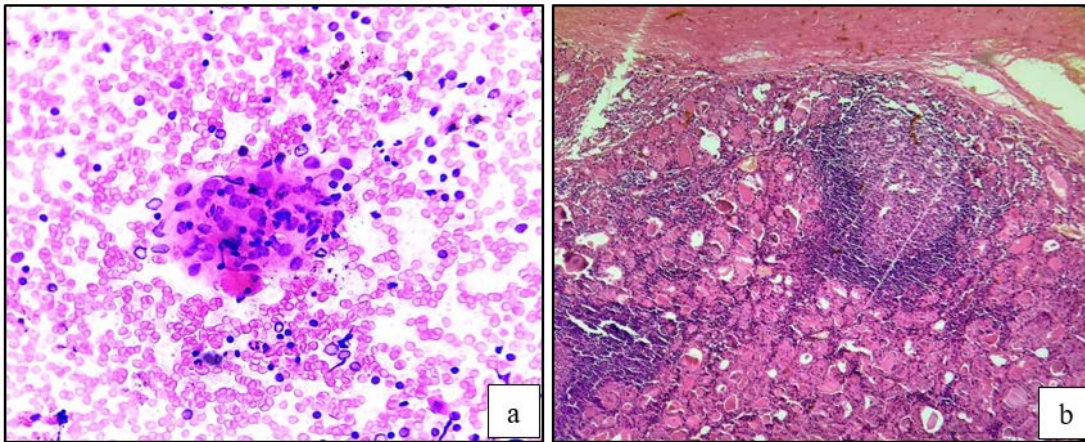
hyperplasia, if aspirate derived from such a large germinal centre, the proportion of large cells (centroblasts, dendrite reticulum cells) and numbers of mitoses may be impressive enough to suggest malignant lymphomas. The presence of macrophage with tangible bodies favours reactive hyperplasia but do not rule out lymphoma. The differential diagnosis between prominent follicular hyperplasia and follicular lymphoma of mixed cell type can be very difficult in FNA smears. The accuracy of cytological diagnosis and classification of lymphoma on FNA sample varies between 10-90 % according to Amatya BB [26]. In present study we also find that 3 cases of tubercular lymphadenitis were misdiagnosed as reactive lymphadenitis on cytological examination. It may be due to probably, the representative sample was not obtained in these cases. In present study overall accuracy rate of FNAC was 92% with sensitivity of 85.00 %, specificity of 97.51 %, and positive predictive value of 87.91% and negative predictive value of 94.79 %.



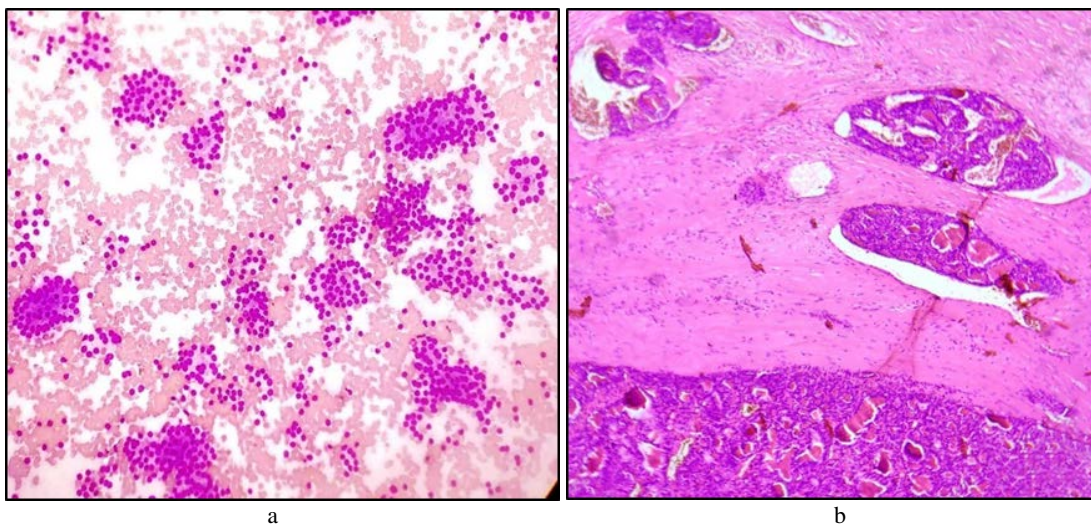
**Fig 1:** Classical Hodgkin's Lymphoma. (a) Photomicrograph showing cytological appearance of nucleate and mirror shaped nuclei of Reed-Sternberg cells in background of reactive lymphocyte and RBCs (MGG, 400x). (b) HPE shows classical RS cells in reactive lymphocytic background (H&E, 400x). (c) Showing membranous CD15 positivity in RS cells (IHC,400x). (d) Showing membranous CD 30 positivity in RS cells (IHC, 400x).



**Fig 2:** Metastatic Squamous Cell Carcinoma. (a) Photomicrograph showing cytological appearance of malignant cells with orangeophilic cytoplasm and tadpole cell in background of lymphoid cells (H&E, 400x). (b) HPE shows metastatic squamous cell carcinoma (H&E, 400x).



**Fig 3:** Thyroiditis (Bethesda category II). (a) Photomicrograph showing cytological appearance of clusters of thyroid follicular cells showing impinging of lymphocytes and background shows lymphoid cells (H&E, 400x). (b) HPE shows marked lymphoplasmacytic infiltration with germinal center formation, thyroid follicles are small with scant colloid. (H&E, 100x).



**Fig 4:** Follicular Neoplasm (Bethesda category IV). (a) photomicrograph showing cytological appearance of thyroid follicular cells arranged in micro and macro follicles, cellularity is increased and no colloid seen(H&E, 100x). (b) HPE shows presence of a growth having solid sheets of overlapping follicles and vascular invasion seen in follicular carcinoma thyroid (H&E, 400x).

## Conclusion

FNAC is a simple, rapid and cheap diagnostic tool that can be done as an outpatient procedure with overall accuracy rate of more than 90 % which differentiates non-neoplastic lesions from neoplastic lesions thus avoiding unnecessary surgeries. A careful and diligent search for various cytological features and accurate sampling can help in reducing the number of indeterminate, false positive and false negative diagnosis.

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