Original Article

# Efficacy of Ultrasound-guided Fine Needle Aspiration Cytology (FNAC) of Abdominal, Pelvic and Retroperitoneal Lymph Nodes

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**Objective:** To evaluate the efficacy of ultrasound-guided FNAC of abdominal, pelvic and retro-peritoneal lymph nodes. **Study Design:** Cross sectional analytical (comparative study)**.Setting:** Department of Histopathology, Sheikh Zayed Hospital, Lahore. **Study period:** One year.
**Material & Methods:** A total of 36 lymph nodes including 12 abdominal, 10 pelvic and 14 retro-peritoneal were submitted to FNAC from January 2001 to December 2001. Adequate aspirates were obtained in all these cases. The smears were stained with Haematoxylin and Eosin (H & E), papanicolaou staining (PAP) and May-Grunwald Giemsa stain (MCG). Results of FNAC were categorized as malignant (group-I) and non-neoplastic/ inflammatory (group-II). Excision biopsies from the same 36 cases were also obtained, processed and stained with routine H & E staining. Histology was taken as the gold standard.
**Results:** On histological examination 24 of the total 36 cases were categorized as malignant, and 12 as non-neoplastic/ inflammatory lesions. FNAC picked up 20 cases as malignant with 4 false negative diagnoses, including 2 cases of Hodgkin's lymphoma and 2 cases of non-Hodgkins lymphoma. No false positive diagnosis was obtained. The most common malignancy was diffuse non-Hodgkin's lymphoma, while granulomatous lymphadenitis was the commonest inflammatory lesion. Malignant tumours revealed 83.3% sensitivity and 88.89% diagnostic accuracy, while non-neoplastic/ inflammatory lesions showed a 100% sensitivity and diagnostic accuracy.
**Conclusion:** Majority of the malignant tumours can be categorized on FNAC with a high degree of accuracy while lymphomas, specially of the mixed large and small cell type and Hodgkin's lymphomas pose maximum diagnostic problems. Non-neoplastic/ inflammatory lesions can be correctly diagnosed on FNAC.
**Keywords**: FNAC, malignant, non-neoplastic.

## Introduction

Fine needle aspiration cytology (FNAC) has become a well accepted procedure for diagnosis and management of breast masses, cold nodules of thyroid and lymphodenopathy all over the world[1-3] including our country.[4-6] It is rapid, safe, well tolerated, easily repeatable, accurate and efficacious for deep nodes, as small as 1 cm in diameter, in abdomen, pelvis and retro-peritoneum.[7] It not only offers a tissue diagnosis, but also serves as a preliminary screening procedure for a number of clinical considerations e.g., tuberculosis, lymphoma, leukaemia, metastatic diseases, fibrosis and lymphadenopathy (NOS).[8,9] Its major role is in documentation of whether the lymph node is benign or malignant and also helps in diagnosis of infectious disease, second malignancy and recurrent disease in already diagnosed lymphoma patients. The identification of progression from a known low grade lymphoma to a high grade lesion is another advantageous use of FNAC of lymph nodes.[10]

The effect of FNAC on lymph nodes is minimal & rarely interferes with subsequent histological interpretation.[11,12]

## Material and Methods

A total of 36 lymph nodes, including 12 abdominal, 10 pelvic and 14 retro-peritoneal lymph nodes were subjected to FNAC and excision biopsies from the same 36 cases were then obtained, without any discrimination of age and gender. The study period extended from January 2001 to December 2001. A clinical proforma was filled in each case, to document the particulars of the patient, clinical and radiological details, including the size, site and extent of the mass. Aspirates were then obtained with a 21 or 22 guage needle attached with a 10 ml syringe. When adequate material appeared in the hub, the needle was withdrawn after releasing the suction pressure and 5 smears prepared including a clot, after fixation in 10% neutral buffered formalin. Two of the smears were air dried for Giemsa staining, 1 smear each for

papanicolaou (PAP) and Haematoxylin and Eosin (H & E) staining after wet fixation in 95% ethyl alcohol. After screening the results were categorized into 2 groups, malignant (group-I) (including primary and metastatic tumours) and non-neoplastic/ inflammatory lesions (group-II). Biopsy specimens from all these cases were also received and fixed in 10% formalin. These specimens were thoroughly examined by naked eye and representative sections were taken which were processed in an automatic tissue processor (Auto processor, model 2LE, Shandon Germany). After processing the tissue was embedded and paraffin blocks were made. Section cutting was done by rotary microtome (Model RM 2125, Leica, Germany). H & E staining was done in each case. Results of FNAC and histological diagnosis were then correlated. Histology was taken as gold standard. The statistical analysis was done. The diagnostic efficacy/ accuracy was ascertained by calculating the sensitivity, specificity, positive predictive values and negative predictive values, in accordance with the methods employed by Galen and Gambino.[13]

## Results

During the period from January 2001 to December 2001, a total of 36 patients of abdominal, pelvic and retro-peritoneal lymph nodes underwent FNAC and tissue biopsies. All these patients had adequate aspirates. Cytological examination showed 24 cases (66.67%) to be malignant (group-I) and 12 cases (33.33%) to be non-neoplastic/ inflammatory lesions (group-II). Twenty four of the total 36 cases were reported as malignant and 12 as non-neoplastic/ inflammatory lesions. These 24 malignant cases included 12 non-Hodgkin's lymphoma, 2 Hodgkin's lymphoma, 6 metastatic adenocarcinoma and 2 cases each of malignant round cell tumours and undifferentiated malignant tumours. Out of 12 cases of non-Hodgkin lymphoma, 10 were correctly diagnosed on FNAC. The remaining 2 cases diagnosed as mixed small and large cell lymphomas on histological examination were reported as reactive hyperplasia (false negative) on FNAC. Both the cases of Hodgkin's lymphoma were mis-diagnosed as reactive hyperplasia (false negative) on FNAC. All the 6 cases of metastatic adenocarcinoma, 2 cases each of malignant round cell tumours and undifferentiated malignant tumours were correctly diagnosed on FNAC. All the 12 non-neoplastic/ inflammatory lesions were correctly diagnosed on FNAC, including 8 cases of granulomatous lymphadenitis and 2 cases each of reactive hyperplasia and non-specific abscess **(Table-I).** No false positive diagnosis was made. Diagnostic accuracy of FNAC was calculated taking histological diagnosis as the gold standard. The statistical analysis showed 83.33% sensitivity and 88.89% diagnostic accuracy with 100% specificity

**Table-2:** Indices indicating diagnostic reliability of ultrasound guided FNAC of malignant tumours of lymph nodes.

| | Malignant Group-I) | Non-Neoplastic/inflammatory lesions (group-II) |
|---|---|---|
| Specificity | 100% | 100% |
| Sensitivity | 83.33% | 100% |
| Diagnostic accuracy | 88.89% | 100% |

**Table-1:** Comparison of FNAC with histology (n=36)

| Lesions | Cytological Diagnosis | Histological Diagnosis | False Negative |
|---|---|---|---|
| **Malignant Group-1)** | | | |
| Non Hodgkin's Lymphoma | 10 | 12 | 2 (Reactive Hyperplasia) |
| Hodgkin's Lymphoma | 0 | 02 | 2 (Reactive hyperplasia) |
| Metastatic adenocarcinoma | 06 | 06 | – |
| Undifferentiated malignant tumour | 02 | 02 | – |
| Malignant round cell tumour | 02 | 02 | – |
| **Non Neoplastic /Inflammatory Lesions (Group-II)** | | | |
| Tuberculous lymphadenitis | 08 | 08 | – |
| Reactive hyperplasia | 02 | 02 | – |
| Non-specific abscess | 02 | 02 | – |
| Total | 32 | 36 | 04 |

and positive predictive value for malignant tumours, while for non-neoplastic/ inflammatory lesions a 100% sensitivity, specificity, diagnostic accuracy, positive and negative predictive value was achieved **(Table-II).**

## Discussion

On FNAC, a definite diagnosis was made in 32 (88.89%) of patients, with 4 false negative diagnoses for malignant tumours, but no false positive diagnosis was made. FNAC can usually diagnose high grade non-Hodgkins lymphomas and most cases of Hodgkin's lymphomas.[14] It can also distinguish between low grade and high grade non-Hodgkin's lymphomas.[15,16]

The malignant tumours in our study comprised 12 cases of non-Hodgkin's lymphomas, 10 of which were of large cell type, all of which were correctly diagnosed. These 10 cases included 3 cases in which a differential diagnosis between a large cell undifferentiated carcinoma and malignant melanoma was also given for which an excision biopsy was suggested and to aid diagnosis, immunohisto- chemistry was recommended.

Cytologic diagnosis of malignant lymphoma can be made and it has been indicated by Usten et al that this can be achieved in 50-75% of the cases, the accuracy being greatest in high grade lymphomas.[17] Diagnosis of low grade lymphomas can sometimes be difficult particularly for those that have a conspicuous non-malignant component (false negative).[14] Also there may be a diagnostic gray zone between low and intermediate grade lymphomas, because architectural growth pattern usually cannot be assessed cytologically.[18-20] In our series two cases of mixed large and small cell lymphoma were mis-diagnosed as reactive hyperplasia (false negative) on FNAC which were cytologically difficult to distinguish from benign reactive conditions. Although large cell lymphomas are typically easy to recognize, mixed large and small cell lymphomas and well differentiated lymphocytic lymphomas can be difficult to distinguish from benign reactive conditions. Furthermore, non-haematolymphoid malignancies such as small undifferentiated carcinoma and malignant melanoma can be misinterpreted as lymphoma.[9] Two cases reported as reactive hyperplasia on FNAC were found to be Hodgkin's lymphoma (nodular sclerosis) on histology. This false negative diagnosis was probably because of poor yield due to background fibrosis of the lymph node, thus making it difficult to diagnose. Also no definite Reed-Sternberg cells were identified on FNAC. Classic Reed-Sternberg cells are required for the primary diagnosis of Hodgkin's lymphoma and they must be found in the characteristic background.[21,22] The background of Hodgkin's lymphoma tends to be polymorphic, similar to benign hyperplasia.

All the 6 cases of metastatic adenocarcinomas were correctly diagnosed on FNAC. Two cases were reported as undifferentiated malignant tumours. The differentials of these 2 cases included large cell lymphoma, anaplastic carcinoma and malignant melanoma on FNAC. The diagnosis of malignant melanoma was confirmed on histology and tumour markers. The remaining 2 cases were reported as malignant round cell tumours, with possibilities of lymphoma, Rhabdo-myosarcoma, Ewings sarcoma/ PNET and neuroblastoma on FNAC, while a histological diagnosis of lymphoma was given, which was also confirmed by tumour markers.

FNAC is useful for the documentation of metastatic carcinoma, diagnosis of recurrent lymphoma, for staging the extent of disease, and for monitoring the treatment in lymph nodes with a significantly low risk of complications, including tumour recurrence, as compared to excisional biopsy.[23,24] More than 90% of lymph node metastases are diagnosed by an initial aspiration[23] and can also give clues regarding the nature and origin of the primary tumour.[24] The sensitivity and diagnostic accuracy for malignant tumours was 88.33% and 88.89% respectively.

Diagnostic sensitivity was generally found to be significantly lower for lymphomas than for metastatic malignancy,[15] as also seen in our study. In general there is a good correlation between the subclassification of lymphoma by FNAC cytology and that obtained by histologic examination, and cases that are difficult to sub-classify by FNAC cytology are also difficult to sub-classify by examination of biopsy specimens.[10] Although the diagnostic sensitivity of metastatic and recurring malignancy varies, it is usually above 95%.[26-29] Diagnostic specificity on the other hand is high. False positive diagnosis are rare,[30-31] as also seen in our study. Our results are favorably comparable with other studies[9] in diagnosing lymph node neoplasms. A 100% correct cytologic diagnosis was achieved for all the non-neoplastic/ inflammatory lesions, including 8 cases of granulomatous lymphadenitis, all of which were due to tuberculosis, confirmed on Ziehl-Neelson staining and 2 cases each of reactive hyperplasia and non-specific abscess (**Table-I**). A 100% sensitivity, specificity, and diagnostic accuracy was achieved for non-neoplastic/ inflammatory lesions.

Relatively high diagnostic accuracy achieved in our study can be attributed to adequate/ diagnostic material, blood clot, processing and examination, thorough screening of the smears, with relevant clinical and radiological information. Also majority of non-Hodgkin's lymphomas were large cell type, which are relatively easier to recognize on cytology.

## Conclusion

Both tuberculosis and lymphomas are common in our patient population. FNAC is reliably safe in the diagnosis of tuberculosis lymphadenitis and in differentiating it from lymphoma and other malignancies. The diagnosis of mixed large and small cell lymphomas, well differentiated lymphomas and Hodgkin's lymphomas can pose diagnostic problems on FNAC because of the overlapping cytological features with benign reactive conditions especially as the tissue architecture is not available. However special techniques like conventional special stains, electron microscopy, immunochemistry, cytogenetics and molecular methods when applied can increase the diagnostic accuracy. In patients with a negative cytologic finding, a search for a definite diagnosis should be pursued by a combined cytohistological correlation and ancillary technique. FNAC is simple, safe, and cost effective procedure, and should be considered as the first line of investigation for lymphadenopathy, specially in our country, with limited resources in secondary care hospitals.

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