ORIGINAL ARTICLE

MORPHOLOGICAL SPECTRUM AND ACCURACY OF FINE NEEDLE ASPIRATION CYTOLOGY IN TUBERCULOUS LYMPHADENITIS

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is an easy and minimally invasive procedure which can help in the diagnosis of tuberculous lymphadenitis. The aim of this study was to determine the morphological spectrum and accuracy of FNAC to diagnose tuberculous lymphadenitis.

Material & Methods: This prospective study was carried out at Armed Forces Institute of Pathology, Rawalpindi, Pakistan from January 1991 to December 1991. Patients with superficial lymphadenopathy were included. FNAC was performed on all the patients presenting. Lymph node biopsy for histopathology was also performed. The data was recorded on a proforma made specifically for this purpose. Specificity and sensitivity of FNAC was calculated, taking histopathology of biopsy specimens as gold standard.

Results: Out of 85 cases, granulomatous changes were seen in 35 cases on fine needle aspiration diagnosis made prior to surgery. On histology a diagnosis of tuberculous lymphadenitis was made in 44 cases. Comparing the 35 cases showing granulomatous changes on FNAC smears, 34(97%) cases complied with the histopathological diagnosis. One false positive and 10 false negative cases on FNAC smear occurred. This gave the sensitivity of 77% and specificity of 98%.

Conclusion: FNAC is a sensitive and very specific test for the diagnosis of tuberculous lymphadenitis. Its sensitivity was 77% and specificity 98% in our study.

KEY WORDS: Caseation necrosis, Epithelioid granuloma, FNAC, Lymph node, Tuberculous lymphadenitis.

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INRODUCTION

Tuberculous lymphadenitis has afflicted mankind for over 3000 years.[1] Hippocrates (460-377 BC) mentioned scrofulous tumors in his writings. In the Middle Ages in Europe a royal touch was given to it by calling it "King's evil."[2] According to WHO in 2011 there were nearly 9 million new cases and 1.4 million deaths from tuberculosis worldwide.[3] Pakistan ranks sixth among countries with a high tuberculosis (TB) burden.[4] It is caused by *Mycobacterium tuberculosis* and reaches the draining lymph nodes from the primary site which in 90% of cases may heal subsequently.[5]

Histologically, the pattern of tuberculous lymphadenitis may vary from a collection of few epithelioid cells in a background of mild reactive changes and noncaseating granulomas to caseating granulomas and complete necrosis.[5] Although granulomatous lymphadenitis may be seen in sarcoidosis and certain bacterial and fungal diseases, yet in our region tuberculosis is common and other granulomatous diseases are rare,[6] therefore, the presence of granulomatous features on lymph node biopsy sections or fine needle aspiration cytology (FNAC) is highly suggestive of tuberculosis. Taking FNAC samples from the superficial lymph nodes is easy, safe, cost-effective and almost painless to which the patients willingly submit. FNAC can help to arrive at an early diagnosis of tuberculous lymphadenitis which will allow early institution of treatment before a final diagnosis can be made by biopsy and culture.[2]

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Tuberculous lymphadenitis is seen in nearly 35% of extra-pulmonary tuberculosis which constitutes about 15-20% of all cases of tuberculosis.[2]

Fine needle aspirates from tuberculous lymph nodes can be subjected to a variety of tests and procedures including application of special stains and culture and sensitivity for *Mycobacterium tuberculosis*.

The aim of this study was to determine the morphological spectrum and accuracy of FNAC to diagnose tuberculous lymphadenitis.

MATERIAL AND METHODS

This prospective study was carried out at Armed Forces Institute of Pathology, Rawalpindi, Pakistan from January 1991 to December 1991.

Patients with superficial lymphadenopathy were included. A thorough history, general physical and systemic examination were performed. An informed consent was taken before the aspiration of lesion. FNAC was performed on all the patients. The morphological spectrum of tuberculous/granulomatous inflammation on FNAC smears was compared with histopathological findings of lymph node biopsy sections. Confirmation of tuberculous lymphadenitis was based on histopathology of biopsy material. The data was recorded on a proforma. The sensitivity and specificity of FNAC was determined taking histopathology of biopsy specimens as gold standard.

RESULTS

A total number of 85 samples were examined. On histopathology of lymph node biopsy taken as gold standard a diagnosis of tuberculous lymphadenitis was made in 44 cases. On FNAC granulomatous changes were seen in 35 cases, with one false

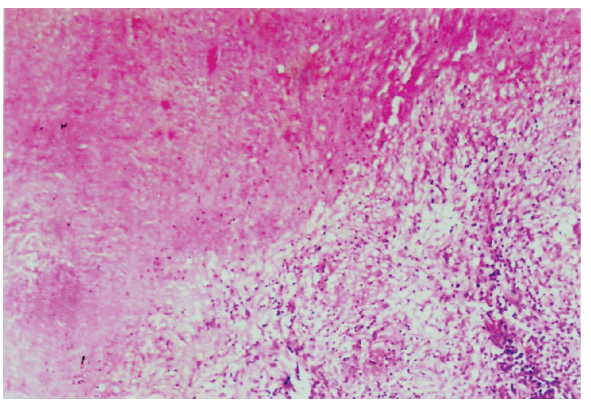

Fig. 1: Epithelioid granuloma with abundant caseation necrosis.

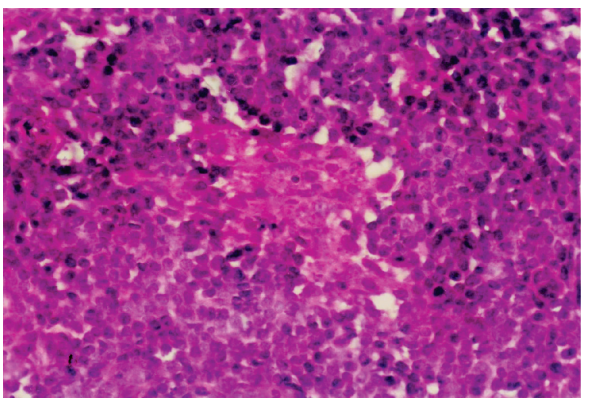

Fig. 3: A collection of epithelioid cells in the center of a lymph node.

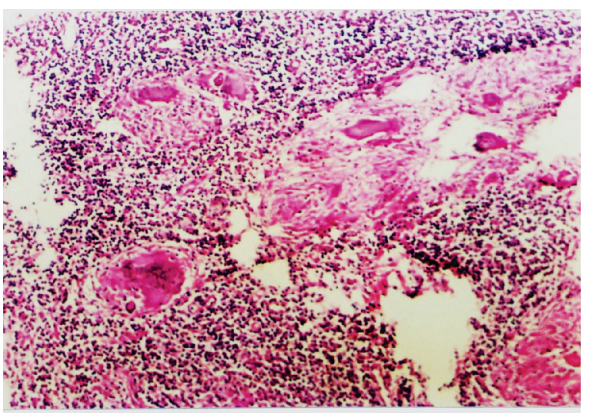

Fig 2: Non-caseating granulomas with Langhan giant cells.

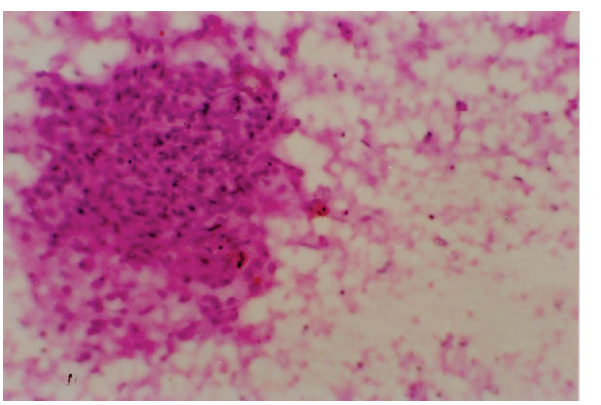

Figure 4: Epithelioid granuloma in a background of abundant caseation necrosis.

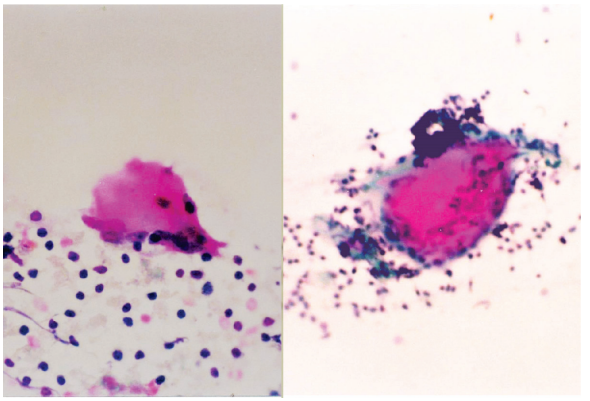

Figure 5: Langhan giant cells.

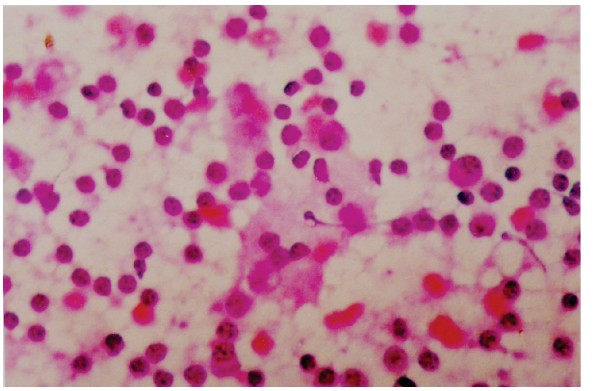

Figure 6: Epithelioid cells and mixed inflammatory cells in a background of mild caseation.

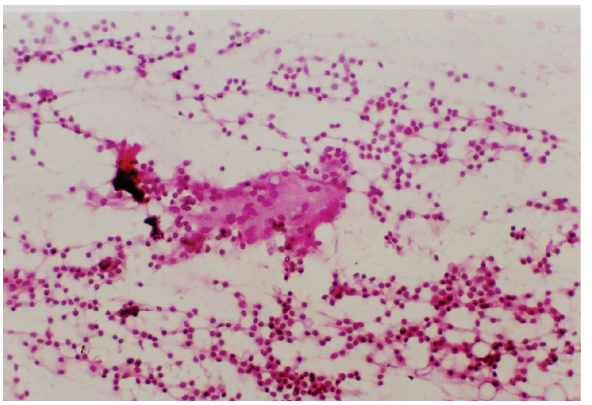

Figure 7: An epithelioid granuloma in the center surrounded by mixed inflammatory infiltrate

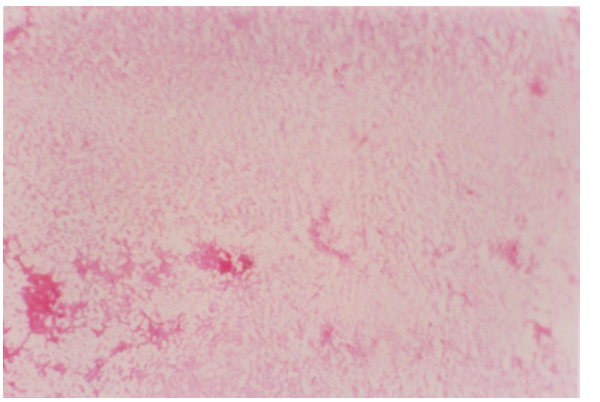

Figure 8: Abundant caseation necrosis

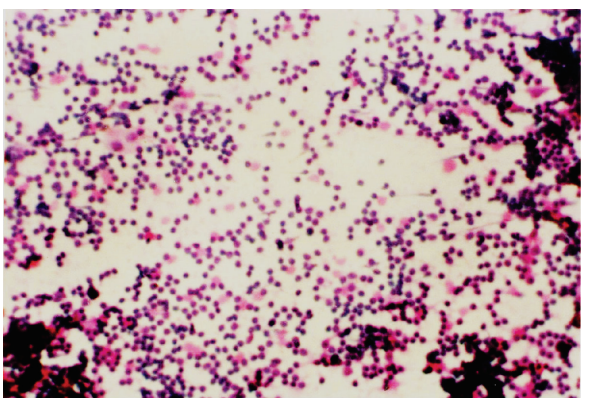

Figure 9: Lymphocytes in various stages of maturation and histiocytes.

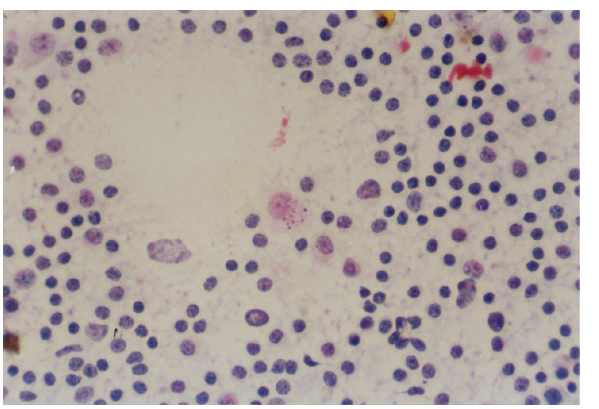

Figure 10: A tingible body macrophage in the center.

positive and 10 false negative cases. This gave the sensitivity of 77% and specificity of 98%.

On lymph node biopsy sections caseating granulomas were seen in 91% cases, non-caseating granulomas in 5%, a collection of epithelioid cells with rest of the lymph node showing reactive changes in 2% and caseation necrosis only in 2%. (Fig. 1-3)

On FNAC smears the morphological findings were divided into five groups. (Table 1)

DISCUSSION

In the current study we tried to determine the morphological spectrum of superficial tuberculous lymph nodes directly on FNAC. Eighty-five FNAs from superficial lymph nodes were studied and a diagnosis made prior to surgery. In 52% biopsies of the identical lymph nodes granulomatous changes compatible with tuberculosis were seen. This led us to conclude that in our region the etiology of an enlarged lymph node is likely to be tuberculous in

Table 1: Morphological spectrum of tuberculous lymph nodes on FNAC smears.

S. No.	Morphological spectrum	Number of cases	Percentage
1.	A combination of caseation, granulomas or collection of epithelioid cells cytoplasm and a mixed inflammatory infiltrate comprising of histiocytes, plasma cells, lymphocytes (mainly small), some immunoblasts and polymorphs along with a few eosinophils in 10 cases. (Fig. 4) In 10 cases Langhan giant cells were seen. (Fig. 5)	20	45
2.	A combination of caseation necrosis and mixed inflammatory infiltrate consisting of polymorphs, small and large lymphocytes, plasma cells, histiocytes and occasional epithelioid cells. No granulomas or Langhan giant cells. (Fig. 6)	8	18
3.	Granulomas without caseation and a mixed inflammatory infiltrate. (Fig. 7)	6	14
4.	Comprising of caseation necrosis only. (Fig. 8)	2	5
5.	Histiocytes and mixed inflammatory infiltrate comprising of small and large lymphocytes in a ratio of 4:1, plasma cells, occasional polymorphs, immunoblasts and histiocytes. (Fig. 9) Tingible body macrophages could also be visualized. (Fig. 10) No caseation, granulomas, epithelioid cells or Langhan giant cells were seen.	8	18

origin. Similar results have been reported by other investigators.[7,8,9]

The morphological spectrum of tuberculous lymphadenitis on FNAC smears varies from a picture of nonspecific reactive changes to the presence of epithelioid granulomas, Langhan giant cells, clusters of epithelioid and inflammatory cells and caseation necrosis. In the present series, the morphological findings on FNAC were divided into 5 groups, viz., caseation, granulomas, epithelioid cells and a mixed inflammatory infiltrate (45%); caseation necrosis and mixed inflammatory infiltrate mainly comprising of polymorphs and lymphocytes (18%); granulomas with inflammatory cells (14%); caseation necrosis only (5%) and nonspecific reactive changes (18%). Accordingly several other authors have classified the FNAC material in their own ways for interpretation purposes. Arora & Arora[10] performed FNAC on 200 cases of tuberculous lymph nodes and divided the cytomorphologic features on FNAC into 6 groups based on the presence of cell type and necrosis, viz., epithelioid cells only (7%), epithelioid cells and giant cells (8%), epithelioid cells and necrosis (15%), epithelioid cells, giant cells and necrosis (45%), necrosis, polymorphonuclear leukocytes and lymphocytes (15%) and acellular necrotic material (10%). Comparing our study a large part (45%) comprised of caseation, granulomas, epithelioid cells and a mixed inflammatory infiltrate and 5% comprised of necrotic material only.

Bailey et al[11] divided the FNAC smears from tuberculous lymph nodes into 2 groups, 46.1% of the 39 cases in which distinct epithelioid granulomas were present, 53.9% cases in which no granulomas were found but large amount of necrotic debris with a variable number of polymorphonuclear cells, histiocytes and lymphocytes were present. In our series 18% showed caseation necrosis with a mixed inflammatory infiltrate.

Lau et al[12] studied fine needle aspiration biopsies of 42 histologically confirmed tuberculous cervical lesions out of which an aspiration biopsy diagnosis of granulomatous or tuberculous cervical lymphadenopathy was made in 71%. Comparing our study a correct diagnosis on FNAC was made in 77% cases out of 44 lymph node biopsies confirmed as tuberculous on histology.

Bezabih et al[13] divided the cytomorphologic pattern of aspirates from tuberculous lymph nodes into granulomas without necrosis (15.6%), granulomas with necrosis (32.8%) and non-granulomatous abscess necrosis (51.5%). The corresponding figures in our series are 14%, 45% and 23%; the later also includes caseation mixed with inflammatory cells. They did not include the possibility of findings of reactive changes (18%) on FNAC in tuberculous lymphadenitis.

According to Sarwar et al[14], the morphological spectrum of tuberculous lymphadenitis ranges from caseation necrosis and neutrophilic dust to the formation of well-defined epithelioid granulomas along with lymphocytes and plasma cells. According to them caseation is the first stage and as the immunity develops granulomas are formed. In an analysis of spectrum of various cytomorphological patterns in tuberculous lymphadenitis by Sen et al[15], FNAC on 100 cases of lymphadenopathy of which 42 were diagnosed as tuberculous on histopathology. Cytomorphological and histological correlation for tuberculous lymphadenitis was seen in 76% cases

only. Eight cases 19% were considered false negative showing reactive changes and 5% were inadequate. They observed six cytological patterns of tuberculous lymphadenitis on FNAC which is comparable to our study.

Lau et al[16] gives the sensitivity and specificity of FNAC in diagnosing tuberculous lymphadenopathy as 77% and 93% respectively. In his study of 68 cases of FNAC in whom granulomatous changes were seen, on histological examination 3 cases showed nonspecific abscesses, one nonspecific lymphadenitis and one metastatic carcinoma. Ahmad et al[17] has given the sensitivity and specificity as 97% and 97.5% respectively whereas according to Balaji et al[18], it is 98% and 100% respectively. Malakar et al[19], has calculated it as 79% and 94% respectively. All of them agree that FNAC is an excellent first line method to diagnose tuberculous lymphadenitis and if performed correctly it has equal accuracy to excision biopsy. In our study, a sensitivity of 77% and specificity of 98% in diagnosis of tuberculous lymphadenitis by FNAC has been calculated. The one false negative case was from follicular large cell lymphoma in this series, in which granulomatous changes were seen on FNAC smears. This is because of the fact that a granulomatous type of smear may be obtained from malignant lymphoma or metastatic carcinoma, especially those of squamous cell origin.[20] In our case of false negative report, granulomatous changes appeared in a background of necrosis and lymphoid cells.

CONCLUSION

FNAC is a sensitive and very specific test for the diagnosis of tuberculous lymphadenitis. Its sensitivity was 77% and specificity 98% in our study.

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