Yield and Safety Profile of Ultrasound Guided Fine Needle Aspiration Cytology (FNAC) of Lymph Nodes

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ABSTRACT

Objective: To determine the re-biopsy rate, positive yield and safety profile of ultrasound guided fine needle aspiration cytology (FNAC) in cervical lymph nodes in terms of its complications and repeat procedures.

Study Design: An analytical study.

Place and Duration of Study: Department of Vascular and Interventional Radiology, Dow University Hospital, Dow University of Health Sciences, Karachi, from June to December 2013.

Methodology: Eighty neck swellings, which were found to be lymph nodes on ultrasound, underwent ultrasound guided FNAC, from outpatients. Lymph nodes which were included in the study were those that were not easily palpable, located near major blood vessels, where patient refused of direct palpation and wanted image guided FNAC, those directly sent by physician for image guided FNAC and where blind biopsy remained inconclusive. Patients who refused on explanation or did not give consent were excluded. Complications and repeat biopsy were noted.

Results: This study consisted of 80 cases, of which 51 cases (63.75%) were female and 29 cases (36.25%) were male. Repeat biopsy was required in 1 case (1.6%). There were no procedure-related complications. A total of 44 cases (55%) revealed evidence suggesting or confirming the existence of tuberculosis. Rest of the others showed other benign lesions, reactive lymphadenopathy and malignancy.

Conclusion: Ultrasound guided FNAC is a safe procedure with low re-biopsy rate that aids diagnosis. The predominant cause of cervical lymphadenopathy in this study was tuberculous lymphadenitis.

Key Words: Ultrasound, FNAC, Enlarged lymph nodes, Cervical lymphadenopathy, Tuberculous lymphadenitis.

INTRODUCTION

There are about 800 lymph nodes in our body, out of which 300 are located in the neck. The most commonly used classification on the head and neck lymph nodes was produced by Rouviere in 1938. Accordingly, head and neck lymph nodes were divided as anterior cervical group, lateral cervical group and collar group, which include occipital, mastoid, parotid, retropharyngeal, facial, sub-maxillary, sub-mental and lingual lymph nodes. Lymph nodes are important site of defence and accommodation of discharge in the body. Cervical lymph nodes are involved in a variety of diseases which may involve salivary glands, thyroid, lymph nodes or skin. Tuberculosis, distant metastasis, and lymphomas are the most common causes of cervical lymphadenopathy. This shows that they may run a course from benign and treatable conditions to malignant causes as well. Hence, making an accurate diagnosis is essential when dealing with cervical lymphadenitis. Tuberculosis remains a leading cause of morbidity and mortality in developing countries, such as Pakistan. According to WHO Global Tuberculosis Report 2013, Pakistan Tuberculosis Profile, the prevalence of tuberculosis was recorded as 670,000 cases/annually. Pulmonary manifestations play a pivotal role in tuberculosis. Whereas, tuberculous lymphadenitis accounts for 4 - 5% of all tuberculosis patients and 20.3 - 50% of all cases of extra pulmonary tuberculosis, thus making it the most common form of extra pulmonary tuberculosis. M. tuberculosis induces lymphadenitis resulting in the formation of epitheloid and caseating granulomas, termed as “Scrofulous”. More than 90% of tuberculous lymphadenitis appear in cervical lymph nodes, whereas the remaining appear in the mediastinal nodes. Despite CT and MR, an accurate differentiation among infectious, benign and malignant causes cannot always be done, hence requiring biopsy through FNAC. However, this procedure is not widely reported in local literature in this context.

This procedure and its application in the local scenario and clinical practice has been the subject of this study. The biopsy done by clinicians often gives negative yield requiring re-biopsy. Another factor is the busy clinical schedule along with no specific provision of aseptic measures in OPD setting which precludes biopsy of palpable nodes by clinicians.

The aim of the study was to determine the re-biopsy rate, positive yield, and safety profile of ultrasound...
guided FNAC in cervical lymph nodes in terms of its complications, keeping in mind the aforementioned factors.

METHODOLOGY

This descriptive, analytical study was conducted in the Department of Vascular and Interventional Radiology, Dow University Hospital, Ojha Campus, Dow University of Health Sciences, Karachi, Pakistan, from June to December 2013. Eighty neck swelling specimens, which were proven to be lymph nodes on ultrasound, were taken from non-consecutive patients who came in OPD for FNAC to diagnose the type of lymph-node enlargement. Lymph nodes, which were included in the study, fit in either one or all of the criteria: lymph nodes that were not easily palpable, were near major blood vessels, those where patient refused of direct palpation and wanted image guided FNAC, those directly sent by physician for image guided FNAC, and where blind biopsy remained inconclusive. Patients who refused the procedure on explanation or did not give consent were excluded. Only the swellings due to enlarged lymph nodes were included in the study.

With the help of high frequency probe ultrasound machine (Logic P5, 5 - 7 MHz), the suspected/enlarge lymph nodes were localized and using aseptic techniques under local anesthesia, i.e. 2% Xylocaine, a 21-G needle was inserted and with the continuous jiggling for few seconds, specimens were obtained in the needle tip using negative pressure for suction by the syringe. Later, slides were made, fixed in alcohol solution, and sent for cytological examination. At the end of the procedure, hemostasis was secured with manual compression at the puncture site. The puncture of lymph nodes was performed twice and sometimes thrice in few cases to obtain maximum number of cells on the slide. In 5 specimens, the material was not up to the mark and was returned from the Laboratory; hence repeat FNAC was performed the same day.

Descriptive statistics were obtained for age, size of nodes, site of nodes and cytological diagnosis. Studied variables were demographics (age and gender), presenting complain, duration, location, size of node, re-biopsy rate, percentage of positive yield and safety profile in terms of complication rate. Data was collected on Microsoft Excel and frequency was expressed in percentages.

RESULTS

This study consisted of 80 cases, of which 51 cases (63.75%) were female and 29 cases (36.25%) were male. A total of 17 cases (21.25%) were present in patients below the age of 15 years, 41 cases (51.25%) in patients between 16 years to 30 years, 16 cases

![Figure 1: Histopathological findings of specimens.](image-url)
(20%) in patients between 31 years to 45 years, 5 cases (6.25%) in patients between 46 years to 60 years and 1 case (1.25%) in a patient above the age of 60 (Table I). The mean age of the patients was 25.01 ±2.1 years.

The specimens were obtained from neck, supraclavicular, sub-mandibular, sub-mental and parotid regions. A total of 46 cases (57.5%) confirming the existence of tuberculosis, out of which 10 (21.73%) were males and 36 (78.26%) were females (Figure 1). The remaining 34 cases (42.5%) had other diagnoses (Figure 2).

Out of 80 specimens, 61 were obtained from cervical region, 7 were parotid, 6 were supraclavicular, 3 were axillary, 2 were sub-mandibular and 1 was from sub-mental region. Thirty-eight (47.5%) specimens from the cervical region, 1 (1.25%) from parotid, 4 (5%) of supraclavicular, 1 (1.25%) from axillary region, 1 (1.25%) in sub-mandibular, and 1 (1.25%) in sub-mental region revealed evidence suggesting tuberculosis on cytological examination.

The mean size of the lymph nodes was 0.82 cm ±0.4 S.D, with majority of them (62.3%, n=38) obtained from cervical region. The diagnostic accuracy of ultrasound guided FNAC was found to be 98%, with the safety profile of 100%. Repeat biopsy was required in one (1.6%).

DISCUSSION

Tuberculosis is the leading cause of morbidity and mortality in developing countries. As in European region, WHO has reported an annual increase of 2.7% from 2004-2008, with 3.6% of them as multi-drug resistant.10 WHO also reported in their data that one case of infectious tuberculosis is likely to infect 10 persons per year for 2 years, infecting a total of 20 individuals.11 Making tuberculosis a growing disease world-wide, FNAC is considered to be highly diagnostic when evaluating both neoplastic and infective lesions. Cytological patterns observed in tuberculosis show granulomatous inflammation and necrosis.12 Lymph nodes, when assessed, may be labelled as reactive or tubercular lymphadenitis. When a patient presents with lymphadenitis, it is important for clinicians to make an early diagnosis, hence the patient be provided early treatment and cure. Ultrasound guided FNAC is non-invasive, and found to be well tolerated by patients without need of a local anesthesia to assess lymphadenitis.13

In this study, 80 suspicious/enlarged lymph nodes cases were assessed by ultrasound guided FNAC, 46 (57.5%) cases had finding suggestive or likely of tuberculosis. On ultrasonography, most distinguishing feature of tuberculous lymphadenitis is hypoechoic appearance with strong internal echoes.14 Few are matted together in cluster.

In a study conducted in New Delhi, India, incidence of tuberculous lymphadenitis was found to be 55% in evaluating lymph nodes by FNAC.15 Contrasting to that in a study conducted in Ireland, where FNAC was used to evaluate patients with granulomatous lymphadenitis, only 27.7 patients were diagnosed with tuberculosis.16 This is possibly due to regional difference in the incidence of tuberculosis. Bezabih reported 66.3% prevalence of tuberculous lymphadenitis in patients with enlarged superficial lymph node undergoing FNAC for diagnosis.17 A similar study conducted in Karachi, reported the incidence of tuberculous lymphadenitis to be 57.2% when neck nodes were evaluated by FNAC,18 validating the results found in this study.

FNAC as a diagnostic tool is considered to be cost effective, minimally invasive, a high yield and low mortality. In this study, diagnostic accuracy of FNAC was found to be 98%. Lioe et al. found diagnostic accuracy of FNAC to be 94.4%, with sensitivity of 85.4% and specificity 100%.19 Another study done by Addams-William et al. concluded ultrasound guided FNAC to be superior to non-ultrasound guided FNAC. In this study, patients undergoing non-ultrasound guided FNAC, 34% patients had a non-diagnostic sample, compared to 12% non-diagnostic samples, when they underwent an ultrasound guided FNAC.20 Similarly, Khanna et al. stated in their research, that ideally for evaluation of lymph nodes ultrasound guided FNAC sample should be obtained.21 As cyto-fixator was not used to reduce the cost, this may be a possible reason for re-biopsy because of non-conclusive smear. Secondly, samples sent after 2:00 PM were analyzed by cyto-technologist rather than cyto-pathologist.

In the study conducted in AKU Hospital, Karachi, the yield of FNAC was found to be around 98% in

#### Table 1: Age and sex distribution of patients.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 and below</td>
<td>8</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>16 - 30</td>
<td>11</td>
<td>30</td>
<td>41</td>
</tr>
<tr>
<td>31 - 45</td>
<td>7</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>46 - 60</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>61 and above</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>51</td>
<td>80</td>
</tr>
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establishing diagnosis. Adhikari, when compared the results of FNAC and histopathology in lymphadenopathy, found the correlation between the results of the two to be 90.9%. 

In this study, tuberculosis was found to be more prevalent in females (78.26%) than in males (21.73%) who were evaluated by FNAC in this study. Similar result was found in a population-based study conducted in Taiwan by Lin et al. They reported that in patients older than 45 years, women were more likely to develop pulmonary tuberculosis than men. In another study by Sahin et al., while studying characteristics of endobronchial tuberculosis, found it to be more prevalent in females. On the contrary, Reddy et al. in their 7-year study conducted on extra-pulmonary tuberculosis, found there was no significant difference between males and females regarding the incidence. Apostu et al., when studying respiratory changes in pulmonary tuberculosis, found male gender to be associated with obstructive and mixed ventilatory defects in tuberculosis patients.

Safety profile was found to be 100% in this study where none of the patients presenting with any complications. The re-biopsy rate was 1.6%, as re-biopsy was required in patients where the histopathology department refused to take the sample for test; hence patient had to come next day again for a re-test.

CONCLUSION

The ultrasound guided FNAC is the simplest, accurate, non-expensive, easily available with high diagnostic yield for suspicious enlarged cervical lymph nodes. It is safe and easily be performed having lowest to nil morbidity and mortality rates.

REFERENCES