Cytological Study of Cervical Lymphadenopathy in a Tertiary Care Institution from Kashmir Valley, India

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Abstract

Background: Cervical lymphadenopathy is a common clinical finding in all age-groups that ranges in etiology from inflammation to malignancy. Fine needle aspiration cytology (FNAC) is a standard first-line investigation in the evaluation of cervical lymphadenopathy.

Objective: The study aimed to analyze the clinical profile and causes of cervical lymphadenopathy in different age-groups and the diagnostic utility of FNAC in our setup.

Methods: This retrospective study included all the patients of cervical lymphadenopathy of more than 2-3 weeks duration, who underwent FNAC in our tertiary care institution in Kashmir valley, India during the two-year study period (January 2009-December 2011) in whom the aspirated material was adequate and satisfactory for evaluation.

Results: A total of 790 cases were selected. Upper deep cervical lymph nodes were involved most frequently (38.9%); reactive lymphadenitis (39.4%) followed by metastasis (38.2%) were the commonest causes, in general. In addition, reactive lymphadenitis was the most common cause of lymphadenopathy in all age groups less than 40 years and at all topographic sites of cervical lymph node. However, in more than 40 years age-groups and at supraclavicular region, metastasis was the commonest cause of enlargement. Squamous cell carcinoma (36.4%) followed by adenocarcinoma, (25.8%) were the most common metastatic tumors.

Conclusion: Enlargement of cervical lymph nodes, particularly in elderly patients involving supraclavicular nodes, should raise a suspicion of malignancy; and cervical lymphadenopathy can be effectively evaluated by FNAC without the need for surgical biopsy.

Keywords: Cervical; Fine needle aspiration cytology; Lymphadenopathy; Lymph node

Introduction

Cervical lymphadenopathy is a common clinical finding and may be a sign of an indolent inflammation, infection or a malignant disorder, depending upon many factors including the geographical conditions and socio-economic set up [1-3]. In our country, infective (tubercular) lymphadenopathy is quite common. However, still a large percentage of cervical lymphadenopathy in adults turns out to be malignant. Hence, it is necessary to evaluate a patient of unexplained cervical lymphadenopathy without any delay.

Although, histopathology is considered as gold standard criteria, lymph node sampling by FNAC has potential benefits over the other diagnostic modalities like simplicity, minimal trauma and complications, and easy availability of results, that have made it a frequently practiced investigation in the initial diagnosis and management of patients with cervical lymphadenopathy; in the diagnosis and follow up of primary lymph node malignancies; and in following patients with other malignant diseases and identifying metastasis or recurrence [3-5].

Since, Kashmir valley (a part of North India) differs from rest of the country in its geographical and socioeconomic conditions, this study was done to analyze the clinical profile of patients presented with cervical lymphadenopathy to our tertiary care institution and determine the causes in different age-groups along with the diagnostic accuracy of FNAC, in our set up.

Materials and Methods

This retrospective study was conducted over a period of two years (January 2009 to December 2011) on all patients (both in-patient and out-patient) of cervical lymphadenopathy of more than 2-3 weeks duration presented to our tertiary care Institution. A total of 900 patients underwent FNAC of enlarged cervical lymph nodes during this study period. Among them, aspirated material was either inadequate or smears were unsatisfactory for evaluation in 85 cases and in 25 cases, after aspiration, apparently looking cervical nodal swellings were found to be non-lymphoid in nature like schwannoma, lipoma etc. Hence, these 110 cases were excluded from the study and the remaining 790 cases were studied, which included patients with solid malignancy (like breast, lung, thyroid, pancreas etc.). All the relevant clinical details like age, sex, site, duration, involvement of other nodes and cytological diagnosis of the selected patients were noted, their slides were reviewed and different cytological features studied.

Results

A total of 790 cases of FNACs done from enlarged cervical lymph nodes, in whom the aspirated material was adequate and smears were satisfactory for evaluation, were studied. A male to female ratio of 1.5:1.

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Cervical lymphadenopathy often presents a diagnostic challenge to the medical professional as it may be the manifestation of a primary tumor or benign condition. However, a cytological study can provide valuable insights into the etiology of lymphadenopathy.

### Discussion

Cytological diagnosis plays a crucial role in the management of cervical lymphadenopathy. The accuracy of this diagnostic approach depends on the expertise of the cytologist and the type of lesion. In this study, a total of 790 patients were evaluated, and the following observations were made:

- **Cytological Diagnosis**: The most common cytological diagnosis was reactive lymphadenitis, followed by tuberculosis and metastasis.
- **Topographical Distribution**: The distribution of lymphadenopathy varied with age and anatomical location. For instance, the most common sites involved were upper deep cervical lymph nodes, followed by submandibular, preauricular, and postauricular lymph nodes.
- **Histopathological Correlation**: A correlation between cytological and histopathological findings was noted, with a specificity of 97.6% and sensitivity of 96%.
- **Metastatic Potential**: In all age-groups above 40 years, metastasis outnumbered the reactive lymphadenitis and contributed to 33.4%, 74.6%, 67.4%, 68.1% and 100% cases in 41-50, 51-60, 61-70, 71-80 and 81-90 years age-groups, respectively (Table 2).

Reactive lymphadenitis was observed to be the most common cytological diagnosis at all sites except for supraventricular region, where metastasis was the commonest cause of enlargement (n=203, 80%). Lymphomas, both Hodgkin’s lymphomas (HL) and non-Hodgkin’s Lymphomas (NHL) constituted to only 6.8% cases of cervical lymphadenopathy, affecting most frequently upper deep cervical lymph nodes. Tuberculosis also involved upper deep cervical lymph nodes most commonly (48.3%) followed by submandibular lymph nodes (16.5%) while as acute suppurative lymphadenitis involved mainly submandibular lymph nodes (43.3%) (Table 3).

Squamous cell carcinoma (36.4%) followed by adenocarcinoma, (25.8%) and poorly differentiated carcinoma (13.6%) were the most common tumors to metastasize cervical lymph nodes (Figures 1-3).

### Summary

The study highlights the importance of cytological evaluation in the management of cervical lymphadenopathy. Cytological diagnosis, when correlated with histopathological findings, can provide valuable information about the nature of the lesion, its likely cause, and the need for further diagnostic steps. The results also emphasize the need for early detection and intervention to prevent complications associated with lymphadenopathy.

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**Table 1**: Age and topographical distribution of 790 patients.

<table>
<thead>
<tr>
<th>Age (in yrs)</th>
<th>Upper Cervical</th>
<th>Mid-Cervical</th>
<th>Lower Cervical</th>
<th>Supra-clavicular</th>
<th>Sub-mandibular</th>
<th>Pre-aortic</th>
<th>Post-aortic</th>
<th>Sub-mental</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 (n=78)</td>
<td>47</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>14</td>
<td>1</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>11-20 (n=128)</td>
<td>71</td>
<td>15</td>
<td>7</td>
<td>9</td>
<td>13</td>
<td>4</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>21-30 (n=117)</td>
<td>58</td>
<td>16</td>
<td>7</td>
<td>17</td>
<td>11</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>31-40 (n=112)</td>
<td>48</td>
<td>15</td>
<td>5</td>
<td>30</td>
<td>8</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>41-50 (n=103)</td>
<td>29</td>
<td>11</td>
<td>1</td>
<td>50</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>51-60 (n=134)</td>
<td>32</td>
<td>11</td>
<td>2</td>
<td>75</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>2</td>
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<tr>
<td>61-70 (n=95)</td>
<td>21</td>
<td>9</td>
<td>1</td>
<td>56</td>
<td>5</td>
<td>2</td>
<td>1</td>
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<tr>
<td>71-80 (n=22)</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>81-90 (n=1)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total (n=790)</td>
<td>308</td>
<td>85</td>
<td>30</td>
<td>254</td>
<td>63</td>
<td>12</td>
<td>28</td>
<td>10</td>
</tr>
</tbody>
</table>

**Table 2**: Cytological Diagnosis in different age-groups of patients of cervical lymphadenopathy.


Table 3: Cytological diagnosis in different groups of cervical lymph nodes.

<table>
<thead>
<tr>
<th>Site</th>
<th>Reactive</th>
<th>AL</th>
<th>Tuberculosis</th>
<th>HL</th>
<th>NHL</th>
<th>Metastasis</th>
<th>LCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper cervical (n=308)</td>
<td>174</td>
<td>7</td>
<td>44</td>
<td>7</td>
<td>20</td>
<td>56</td>
<td>-</td>
</tr>
<tr>
<td>Mid-Cervical (n=85)</td>
<td>36</td>
<td>1</td>
<td>14</td>
<td>4</td>
<td>7</td>
<td>23</td>
<td>-</td>
</tr>
<tr>
<td>Lower cervical (n=30)</td>
<td>22</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Supraclavicular (n=254)</td>
<td>24</td>
<td>5</td>
<td>13</td>
<td>3</td>
<td>5</td>
<td>203</td>
<td>1</td>
</tr>
<tr>
<td>Submandibular (n=63)</td>
<td>22</td>
<td>13</td>
<td>15</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Preauricular (n=12)</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Postauricular (n=28)</td>
<td>18</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Submental (n=10)</td>
<td>8</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Total (n=790)</td>
<td>311</td>
<td>30</td>
<td>91</td>
<td>16</td>
<td>38</td>
<td>302</td>
<td>2</td>
</tr>
</tbody>
</table>

HL: Hodgkin’s Lymphoma; NHL: Non-Hodgkin’s Lymphoma; LCH: Langerhan cell histiocytosis; AL: Acute Lymphadenitis

Table 4: Correlation of FNAC and Histopathology.

<table>
<thead>
<tr>
<th>FNAC Diagnosis</th>
<th>No. of cases</th>
<th>Histopathological Diagnosis</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Reactive</td>
<td>Tuberculosis</td>
<td>Lymphoma</td>
<td>Mets: Metastasis</td>
</tr>
<tr>
<td>Reactive</td>
<td>41</td>
<td>38</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>37</td>
<td>1</td>
<td>35</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>98</td>
<td>3</td>
<td>2</td>
<td>93</td>
<td>-</td>
</tr>
<tr>
<td>Metastasis</td>
<td>112</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>110</td>
</tr>
<tr>
<td>Total</td>
<td>288</td>
<td>42</td>
<td>38</td>
<td>98</td>
<td>110</td>
</tr>
</tbody>
</table>

Mets: Metastasis

or secondary malignancy or just a response to a trivial infection or inflammatory process, and therefore, requires thorough evaluation. FNAC is a simple, safe, rapid, accurate, minimally invasive and relatively pain free procedure which is of particular relevance in cervical lymphadenopathy because of easy accessibility of target sites and thus excellent patient compliance [2,6]. Since this technique lends itself to out-patient diagnosis, it is eminently suited for use in peripheral medical centers and places where facilities for histopathology are not available [7].

In our study, the youngest patient with cervical lymphadenopathy was a 4 month old infant and the oldest one was 87 years old. Similar figures were noted in other studies [4,8-10]. A male preponderance was noted in the current study with a male to female ratio of 1.5:1 which
patients less than 40 years of age, upper deep cervical lymph nodes were more common in males than females; and in adults than children. In conclusion, Nepal [7] and India [16] reported tubercular lymphadenitis as the most common cause of cervical lymphadenopathy. In our study, reactive lymphadenitis followed by tuberculosis and metastasis were the most common causes of cervical lymphadenopathy. In another study, metastasis was the most common cause of cervical lymphadenopathy in children while metastasis contributed significantly to major reasons of lymph node enlargement. However, a female predominance was seen in other studies [2,12].

In an Egyptian FNAC study on cervical lymphadenopathy, the commonest site of involvement was the upper deep cervical lymph nodes (37.6%) followed by supraclavicular lymph nodes (28%); 0-20 years age-group involved the upper deep cervical lymph nodes much more frequently (88.9%) than supraclavicular lymph nodes (11.1%) while the later were predominantly involved after 41 years of age [5]. Similar results were obtained in our study also where the upper deep cervical lymph nodes (38.9%) followed by supraclavicular lymph nodes 32.1% contributed to majority of cases; and 0-20 years age-group involved the upper deep cervical lymph nodes (54.4%) while the supraclavicular lymph nodes were preferentially involved after 40 years of age. Results of another FNAC study on pediatric cervical lymphadenopathy also correlated well with our study [10].

Many studies from Bangladesh, Nepal [9,14] and India [8] reported reactive lymphadenitis followed by tuberculosis and metastasis as the most common causes of cervical lymphadenopathy. In our study also, reactive lymphadenitis (39.4%) was the most common cytological diagnosis, however, metastasis (38.2%) was found to be much more common than tuberculosis (11.5%). Other studies from Pakistan, Nepal [7] and India [16] reported tubercular lymphadenitis as the most common cause of cervical lymphadenopathy. In contrast, metastasis was the most common cytological diagnosis in some other studies [17,18].

The etiological factors of lymphadenopathy in adults are likely to be different from that in children. While metastatic cancer is documented widely as a major cause of lymphadenopathy in adults, a contrasting rarity of metastatic cancer has been consistently reported in children. Moreover, reactive hyperplasia to minor stimuli has been reported as a significant cause of lymphadenopathy in children with a yet developing immune system [19]. This correlated well with our study where reactive lymphadenitis (68.4%) followed by tuberculosis (13.1%) and acute suppurative lymphadenitis (6.7%) were the most common causes of cervical lymphadenopathy in children while metastasis contributed to majority of cases in adults (more than 40 years of age). Consistent results were reported by many other studies [1,10,20].

In our study, reactive lymphadenitis was the most common cytological diagnosis at all topographical sites of cervical lymph nodes except for supraclavicular region, where metastasis was the dominant diagnosis (80% cases). Similar findings were reported by other researchers [21].

Squamous cell carcinoma followed by adenocarcinoma were found to be the most common tumors to metastasize to cervical lymph node in many studies [5,9,16,21] similar to our study. However, adenocarcinoma was found to be the most common metastatic tumor followed by squamous cell carcinoma in some other study [22].

Overall, a sensitivity of 98.5%, specificity of 93.7%, positive predictive value of 97.6%, negative predictive value of 96% and accuracy of 97% were observed in our study. The results were comparable with that of other studies. [2,4,8-10,18,23]

Conclusion
In the present study, cervical lymphadenopathy was found to be more common in males than females; and in adults than children. In patients less than 40 years of age, upper deep cervical lymph nodes were involved more frequently and lymphadenopathy occurred mostly in response to inflammatory and infectious disorders. Whereas, more than 40 years old patients involved supraclavicular nodes most commonly with metastasis being the commonest reason of their enlargement. Thus, an increasing trend towards involvement of supraclavicular lymph nodes with malignancy was observed with increasing age. Although FNAC cannot replace histopathology, because of the easy accessibility of cervical lymph nodes and simplicity of the procedure, it is possible to establish a rapid and accurate diagnosis with FNAC in majority of patients of cervical lymphadenopathy with maximum patient compliance, minimal trauma and complications.

References

