Should FNAC be Restricted to an Elite Estigation-an Experience of 20,237 Aspirations Including More than 8000 Aspirations from Head and Neck Region

By Sudip Kumar Das, Sanjay Sengupta, Senjuti Dasgupta, Malabika Misra, Mamata Guha Mallick & Pranab Kumar Biswas

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Method: This study was done in pathology department of Medical College & Hospital, Kolkata for a period of 10 years. Aspirates were classified into one of the three interpretation groups (easy, moderately difficult, and highly difficult) according to set up criteria. Cytohistological correlations were done in all possible cases.

Results: Out of total 20,237 cases undergoing cytological evaluation during study period, 1774 cases (8.77%) needed guidance for aspiration. 3.16% of the rest 18,463 cases could not be reported for lack of adequate aspirate.

Keywords: fnac, interpretative categorization, large series.

GJMR-C Classification: NLMC Code: WC 209

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Results: out of total 20,237 cases undergoing cytological evaluation during study period, 1774 cases (8.77%) needed guidance for aspiration.3.16%of the rest 18,463 cases could not be reported for lack of adequate aspirate. Rest 17879 cases were categorized in 3 interpretation groups as follows: easy- 90.03% (16098 cases), moderately difficult- 6.72% (1203 cases), highly difficult- 3.25% (578 cases). Breast aspirates seemed comparatively easier to interpret whereas salivary aspirates were much difficult. Cytohistological correlations were possible in 5807 cases yielding 84.78% correlation. The study was also quite sensitive and specific in detecting malignancy with 14.93% false positive and 10.48% false negative results.

Conclusion: it is evident from the present study that FNAC is not only a useful method of tissue diagnosis but also the only cheap method requiring moderately trained personnel for interpretation in majority of cases. So its blessings should be extended to the block level.

Keywords: fnac, interpretative categorization, large series.

1. Introduction

Needle aspiration cytology was successfully utilized by Greig and Gutheri as early as 1904 for diagnosis of sleeping sickness from cervical lymphnode aspirates. but for the next 50 years this method of diagnosis was largely ignored due to complications like tissue injury and needle track dissemination. Later on Cardoza (1954), Franzen, Geirtz and Zajicek (1960) etc workers introduced the technique of FNAC with lesser complications and reasonable success rate.

Last 4 decades experienced spectacular developments in the field of aspiration cytology and now it has emerged as diagnostic method of preoperative assessment of any type of swelling. Use of thinner needle has reduced tissue injury to a minimum enabling aspiration from vascular hamartomas or large thyroid lesions. Reported incidence of needle track dissemination after FNAC was also negligible. Even testicular malignancies can now be aspirated safely.

FNAC is also a reasonably accurate method of diagnosis. Different workers reported more than 75% accuracy in predicting a definite diagnosis on cytological evaluation. This is quite comparable with success rate of modern radiological or serological investigations. FNAC can also be used in tandem with modern radiological procedures like USG, mammography, CT scans with improved diagnostic accuracy in comparison to outcome of any single procedure employed.

Principal limiting factor of accurate cytodiagnosis is adequacy of aspirate. In spite of repeated aspirations every worker has reported variable percentage of failed aspirations in their series. Radiological guidance often helps in obtaining enhanced amount of aspirates at the cost of increased expenditure. Another major handicap of FNAC is diagnosis of a large lesion with heterogeneous tissue composition. In those cases variability of aspirates from different sites causes considerable confusion. Guiding methods can be helpful in choosing appropriate site for aspiration in these cases.

In spite of those two serious drawbacks, FNAC became an important wing of diagnostic medicine because it delivers report with minimum expenditure of money and time in comparison to any other method with comparable safety and accuracy. In our series, a large number of aspirate from all parts of body were evaluated to establish the reliability of this method of diagnosis. Aspirates from head and neck region accounted for almost half of the cases. Our main objectives were:
• To show that interpretation of aspiration in majority of the cases are simple and straight forward.
• To establish that FNAC is a cheap procedure capable of predicting final tissue diagnosis with reasonable accuracy and should be encouraged to be done at grass root level.

II. MATERIAL AND METHODS

This method was conducted in the Pathology department of Medical College Hospital, Kolkata for a period of 10 years (1st January, 2000 to 31st December 2010). All cases coming to pathology department for FNAC during the mentioned period were included in our study group. FNAC was done using standard procedures and aspirates were stained with May–Grunwald–Giemsa (MGG) stain, Haematoxylin and Eosin (E & O) stain, Papanicolaou stain. Stained slides of each case were evaluated by two separate observers simultaneously to be categorized into one of the three groups mentioned below:
• Interpretation easy: Two observers reached same definitive diagnosis on initial assessment separately without consultation of any reference material.
• Interpretation moderately difficult: two observers reached same definitive diagnosis only after consultation of reference books or journals individually and after discussion between each other.
• Interpretation highly difficult: two observers failed to substantiate a unanimous definitive diagnosis even after consultation of books and discussion between each other.

Cytological correlations were done in all the cases with available histology considering histological diagnosis as 100% accurate.

III. OBSERVATION

Table 1: No of cases

<table>
<thead>
<tr>
<th>Total cases</th>
<th>No. of cases needed guidance</th>
<th>%</th>
<th>No of cases without guidance</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20237(100%)</td>
<td>1774</td>
<td>8.77</td>
<td>18463</td>
<td>91.23</td>
</tr>
</tbody>
</table>

Out of 20237 cases 1774 (8.77%) needed guided aspiration.

Table 2: Adequacy of aspiration

<table>
<thead>
<tr>
<th>No of cases aspirated without guidance</th>
<th>No. of inadequate aspirates</th>
<th>%</th>
<th>No. of adequate aspirate</th>
</tr>
</thead>
<tbody>
<tr>
<td>18463(100%)</td>
<td>584</td>
<td>3.16</td>
<td>17879</td>
</tr>
</tbody>
</table>

Despite repeated aspiration 584 (3.16%) cases was failed.

Table 3: Categorization of aspirates

<table>
<thead>
<tr>
<th>No. of adequate aspirate</th>
<th>Interpretative categorization</th>
</tr>
</thead>
<tbody>
<tr>
<td>17879 (100%)</td>
<td>Interpretation easy</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>16098</td>
<td>90.03</td>
</tr>
</tbody>
</table>

Moderately difficult interpretation was in 8.72% (1203) and highly difficult in 3.25% (578).

Table 4: Region wise distribution of cases

<table>
<thead>
<tr>
<th>No. of cases adequately aspiration</th>
<th>Regions aspirated</th>
</tr>
</thead>
<tbody>
<tr>
<td>17879(100%)</td>
<td>Head and neck</td>
</tr>
<tr>
<td>8466 (47.30%)</td>
<td>4119 (23.10%)</td>
</tr>
</tbody>
</table>

Maximum no of cases (8466 / 17879) 47.30% were done from head and neck region followed by thorax (23.1%) & superior extremity (15.1%). Out of the 8466 head and neck aspirates lymph node biopsy are the most common (37.8%). Closely followed by thyroid (34.5%).
Table 5: Organ wise distribution of head and neck lesion

<table>
<thead>
<tr>
<th>Total no. of aspirates from head and neck region</th>
<th>Organ wise distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymph node</td>
<td>3205 (37.8%)</td>
</tr>
<tr>
<td>Thyroid</td>
<td>2923 (34.5%)</td>
</tr>
<tr>
<td>Salivary gland</td>
<td>978 (11.5%)</td>
</tr>
<tr>
<td>Nasal, naso &amp; oropharyngeal</td>
<td>439 (5.2%)</td>
</tr>
<tr>
<td>Skin and soft tissue and oral</td>
<td>386 (4.5%)</td>
</tr>
<tr>
<td>Orbital</td>
<td>276 (3.3%)</td>
</tr>
<tr>
<td>Multiple sites</td>
<td>259 (3.2%)</td>
</tr>
</tbody>
</table>

8466 (100%)

Table 6: Organ wise distribution of all cases with interpretation categorization

<table>
<thead>
<tr>
<th>No of adequate aspirates</th>
<th>Sites of aspiration</th>
<th>No of cases</th>
<th>%</th>
<th>Easy</th>
<th>Moderately difficult</th>
<th>Highly difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>17879 (100%)</td>
<td>Lymph node</td>
<td>5134</td>
<td>28.71</td>
<td>4433</td>
<td>86.3</td>
<td>402</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>3961</td>
<td>22.15</td>
<td>3749</td>
<td>94.64 (max)</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>Thyroid</td>
<td>2923</td>
<td>16.35</td>
<td>2648</td>
<td>90.6</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>Skin and soft tissue</td>
<td>1957</td>
<td>10.94</td>
<td>1836</td>
<td>93.82</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Bone and joints</td>
<td>1186</td>
<td>6.63</td>
<td>1076</td>
<td>90.72</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Salivary glands</td>
<td>978</td>
<td>5.47</td>
<td>761</td>
<td>77.8 (min)</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Nasal &amp; naso/oropharyngeal</td>
<td>439</td>
<td>2.45</td>
<td>396</td>
<td>90.2</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Orbital</td>
<td>276</td>
<td>1.54</td>
<td>257</td>
<td>93.11</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Intra-abdominal</td>
<td>138</td>
<td>0.77</td>
<td>117</td>
<td>84.78</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Intra-thoracic</td>
<td>65</td>
<td>0.36</td>
<td>54</td>
<td>83.07</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Multiple sites</td>
<td>822</td>
<td>4.59</td>
<td>771</td>
<td>93.79</td>
<td>35</td>
</tr>
</tbody>
</table>

Lymph nodes were the single most common target of aspiration (28.71%), followed by breast; thyroid, skin etc. intra-abdominal, intra-thoracic sites are the least common. Breast aspirates are easier to interpret (94.64%) but salivary gland aspirates are least easy to interpret (77.8%). Intra-abdominal cases are the most difficult (8.70%) to interpret.

Table 7: Cytohistological correction

<table>
<thead>
<tr>
<th>No. of cases with histology</th>
<th>cytodiagnosis</th>
<th>No of cases</th>
<th>Histological diagnosis</th>
<th>Cases with correction</th>
<th>Cases with disparity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-neoplastic</td>
<td>Benign</td>
<td>Malignant</td>
</tr>
<tr>
<td>Non-neoplastic</td>
<td>906</td>
<td>752</td>
<td>109</td>
<td>45</td>
<td>4923</td>
</tr>
<tr>
<td>Benign</td>
<td>2282</td>
<td>50</td>
<td>1943</td>
<td>289</td>
<td></td>
</tr>
<tr>
<td>Malignant</td>
<td>2619</td>
<td>38</td>
<td>353</td>
<td>2228</td>
<td></td>
</tr>
</tbody>
</table>

Table 8: Detection of malignancy

<table>
<thead>
<tr>
<th>No of cases with histology</th>
<th>cytodiagnosis</th>
<th>No</th>
<th>Histological diagnosis</th>
<th>False positive malignant cases</th>
<th>False negative malignant cases</th>
<th>sensitivity</th>
<th>specificity</th>
<th>Predictive value</th>
<th>Negative predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non</td>
<td>Neoplastic</td>
<td>Benign</td>
<td>Malignant</td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Non-neoplastic</td>
<td>906</td>
<td>752</td>
<td>109</td>
<td>45</td>
<td>4923</td>
<td>84.78</td>
<td>884</td>
<td>15.22</td>
<td></td>
</tr>
<tr>
<td>Benign</td>
<td>2282</td>
<td>50</td>
<td>1943</td>
<td>289</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>2619</td>
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<td>2228</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It shows the efficacy in detecting malignancy of FNAC. It has sensitivity of 85.07% and specificity of 59.52%.
IV. Discussion

In the present study, 1774 cases (8.77%) were aspirated under various radiological guidance (CT scan, USG, fluoroscopy). These cases were not included in final analysis because of higher expenditure and poor availability of the guiding techniques at peripheral levels. Among the cases aspirated without guidance (18463), 3.16% (584 cases) could not be reported due to inadequate aspirate. Reported incidence of inadequate aspirate in various studies ranges from 32.2% to 2.5%7, 8, 14. Comparatively lower incidence in our series could be attributable to repeated aspiration attempts by multiple persons in more than one sitting.

More than 90% cases (16098 out of 17879) of present group were categorized into easy to interpret, 6.72% cases were moderately difficult and 3.25% were highly difficult demanding highest level of collective expertise – only available at referral centers. Different workers reported incidence of misdiagnosis during cytological evaluation of large number of cases in their series ranging from 0% to as high as 33%10, 9, 15, 16.

Head and neck lesion accumulated for majority of the cases (47.3%) in our series. Lymph nodes were the commonest target (37.8%) among head and neck aspirates. Similar data was also published by other researchers10, 12.

In our study breast aspirates were comparatively easy with less than 2% cases belonging to highly difficult. Similar results were shared by other workers8, 9. We faced maximum difficulty during distinction between proliferative breast disease with variable dysplasia and breast carcinoma in situ as also by other researchers17. In cases of salivary glands only 77.8% were easy to interpret. Different workers admitted various pitfalls and problems during salivary gland aspiration study18, 19. 8.7% of abdominal aspirates were highly difficult to interpret.

In this study we achieved almost 85% Cyto-histological correction. Reported incidences of false positive and false negative malignant cases were 14.93% and 10.48% respectively. Sensitivity, specificity, positive and negative predictive value for detection of malignancy was between 85.07% to 89.52%. These data’s quite clearly establish the diagnostic value of aspiration cytology. Comparable results were published by a lot of cytopathologists dealing with large number of cases7, 8, 10, 16.

V. Conclusion

from the above discussion it is quite clear that FNAC is a reliable method of pathological diagnosis, for lesion of all parts of body including head and neck region.

But we want to interpret our results from another angle. During the last 4 decades diagnostic medicine has undergone a sea of changes. Unfortunately all the diagnostic approaches of recent discovery are much costly. But apart from human resources one has to spend less than Rs 1000 for FNAC. But with routine stains cost is less than Rs 20. FNAC can quickly diagnose malignancy around 90% of cases. In developing countries FNAC is a very useful tool for tissue diagnosis.

Cytopathology should not be treated as a highly sophisticated diagnostic procedure but a cheap and efficient measure that can be used routinely by trained persons. Hope this change of approach should come soon from our community to bloom the fullest potentiality of this unique diagnostic tool.

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