Original article
Evaluation of Role of Ultra Sound Guided Fine Needle Aspiration Cytology for Diagnosis of Ovarian Lesions with Particular References to Diagnostic Pitfalls.

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Abstract:
Background: Ovarian lesions are quite common among females of all age groups. Ovarian cancers account for 6% of female malignancy. ULTRASONOGRAPHY (USG) can help in proper identification and categorization of these lesions. Fine needle aspiration cytology (FNAC) under USG guidance can be an effective modality for early diagnosis of ovarian masses. Aims And Objectives: To evaluate the role of USG guided FNAC over ovarian space occupying lesions (SOLs) for proper categorization into non-neoplastic, benign & malignant variants and to identify possible underlying causes of cytological misdiagnosis, if any, in comparison to histopathological diagnosis. Materials and Methods: FNAC under USG guidance were performed over one hundred and sixteen cases with radiologically proved ovarian SOLs during a period of five years. Aspirated materials were interpreted as non-neoplastic, benign or malignant lesions. Histopathological study was possible in 47 of these cases. Results: Out of 116 aspirations, non-neoplastic, benign and malignant diagnosis were given in 51, 42 & 23 cases, respectively. During histopathological correlation 41 out of 47 cases (87.2%) show exact cyto-histological parity. Rest six cases with cytological misdiagnosis were discussed in detail. Conclusion: USG guided FNAC can effectively diagnose ovarian lesions in more than 87% cases. Scrutiny about failed diagnosis will help to improve accuracy in future.

Key Words: FNAC, USG guidance, ovarian lesions, diagnostic pitfalls

Introduction:
Cytology is a simple and reliable method for diagnosis of a variety of female genital tract lesions1. Previous workers also successfully utilized FNAC for assessment of ovarian SOLs2-3. Still gynaecologists all over the world are reluctant to accept this procedure for diagnosis of malignant ovarian lesions due to potential risk of intra-peritoneal tumor implantation1. However a lot of studies have clearly documented that risk of tumor spreading by needle tract is negligible in comparison to the potential benefits of this simple, quick and effective modality of diagnosis4-6. Geier and Strecker7 strongly recommended cytology for diagnosis of non-malignant ovarian lesions as well as inoperable, recurrent or metastatic ovarian malignancies. Aspiration of ovarian lesions can be done under the guidance of USG or computed tomography (CT)8. MRI is considered to be the best method for pre-operative assessment of possible nature of ovarian masses9. Higher cost limits its use in routine cases and it is also unsuitable for guiding purposes. CT is better regarding assessment of stage of tumors but is not only costly but also associated with significant risk of radiation9,10. USG is relatively cheap, easy to perform and as a guiding method free from radiation.

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hazards. It provides real time guidance and multiple attempts can easily be made. FNAC under USG guidance effectively enhances the chance of aspirating adequate material from ovarian SOLs without any hazardous effects and at a reasonable expense\cite{8,11}. In the present study, USG guided FNAC has been utilized for primary assessment of ovarian lesions.

**Aims and Objectives:**
Aims and Objectives of the present study are –
1. To evaluate the role of USG guided FNAC for diagnosis of ovarian mass lesions.
2. To compare the cytological evaluation with final confirmatory histopathological diagnosis of available biopsied samples and to discuss possible causes of cytological misdiagnosis in cases with cytohistological diagnostic inconsistency.

**Materials and Methods:**
This study was done in the Department of Pathology, Bankura Sammilani Medical College, Bankura, WB, for a period of five years (1st January 2007 to 31st December 2012) in collaboration with department of Radiodiagnosis of the same institute. All patients with USG proved ovarian lesions were included in the study group, only after receiving proper consent. Aspirations were done by 22-23guage needles fitted to 10ml disposable syringes. Lumber puncture needles were utilized for deep seated lesions according to standard recommendation\cite{8}. Multiple passes were attempted in all cases. Smears or aspirated fluids were dealt following recommendations of other workers\cite{8} and examined under microscope for cytological diagnosis.

Biopsy samples were obtained in all possible cases and processed routinely. Finally, comparison between cytology and histological diagnosis were made and cases with disparity were identified and evaluated for probable causes of misinterpretations.

**Observation:**
Table no.1 shows that, out of 125 total cases undergoing USG guided aspiration of ovarian SOLs, adequate materials were obtained in 116 cases (92.8%). Cases with inadequate aspirates (7.2%) were not included in final study. Maximum no of cases with adequate aspirates belonged to 21 to 40 years age group (59 out of 116 i.e 50.86%) followed by 41 to 60 years age groups (36/116 i.e 31.03%). Cytological categorization of 116 adequate aspirates yielded 51 (43.96%) non-neoplastic cysts, 42 (36.2%) benign neoplasms and 23 (19.84%) malignant tumours. Attempts were made to further classify 65 neoplastic lesions according to cell of origin – surface epithelial, germ cell or sex cord stromal cells. Surface epithelial tumours were most commonly diagnosed (43 out of 65 i.e 66.1%), followed by tumours of germ cell origin (26.1%) and sex cord stromal cell neoplasms (7.8%), (Table no -2).

Majority of tumours (67 out of 116 i.e 57.8%) produced one or more sign or symptoms with approximately two-fifth asymptomatic cases. Overwhelming majority of the malignant tumours and most of the benign neoplasms were symptom producing with few non-neoplastic cysts as well. Pain abdomen was the most frequent complaint in all categories followed by menstrual irregularities and abdominal palpable lump as seen in the table no 3. Biopsy samples were available in 47 out of 116 cytodiagnosed cases. In 41 cases (87.2%) final histopathological diagnosis were consistent with cytological categorization. But 6 cases (12.8%) failed to show correlation. In the non neoplastic group, out of 12 cytodiagnosed cases two cases were proved to be benign neoplasms on histology. Three cases of cytodiagnosed benign lesions were confirmed as malignant tumours on histopathology. Among malignant cases, one case was identified as benign neoplasm during histological evaluation (Table no 4).

Table no.5 describes 6 cases with cytohistological diagnostic disparity. 2 cases of cytodiagnosed follicular cysts proved to be serous cystadenomas on histology. Two cases of serous cystadenomas as diagnosed on cytology, were proved to be serous cystadenocarcinoma or border line serous tumour. One case of mucinous cystadenocarcinoma was wrongly interpreted as mucinous cystadenoma on cytology. On the other hand, another case with cytological diagnosis of mucinous cyst adenocarcinoma was diagnosed to be benign mucinous neoplasm after histopathological evaluation. So in the present study 1 false positive and 3 false negative cases were reported regarding cytomolecular detection of malignancy. Sensitivity and specificity of cytodiagnosis for diagnosis of malignancy, as evidenced in our study were 85.71% and 96.55%, respectively.

**Discussion:**
In the present study, 7.2% cases were excluded due to inadequate aspirates. Even after repeated aspirations under guidance, no diagnosis could be offered in those cases. Failure rate of upto 20% for similar
cause is reported by various workers\textsuperscript{12}. More than half the cases in our series, belonged to 21 to 40 years age group, as also the experience of other researchers\textsuperscript{12}.

**Table 1: Age distribution of cases.**

<table>
<thead>
<tr>
<th>Age group</th>
<th>No of cases undergoing aspiration</th>
<th>No &amp;% of inadequate aspiration</th>
<th>No &amp;% of adequate aspiration</th>
<th>Age of adequate aspiration (n=116)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20yr</td>
<td>125</td>
<td>9(7.2%)</td>
<td>116(92.8%)</td>
<td>0-20yr 21-40yr 41-60yr 60yr+</td>
</tr>
<tr>
<td>21-40yr</td>
<td></td>
<td></td>
<td></td>
<td>13 (11.2%) 59 (50.86%) 36 (31.03%) 8 (6.89%)</td>
</tr>
<tr>
<td>41-60yr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60yr+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-neoplastic and benign lesions were much frequent than malignant neoplasms, as evidenced during cytological evaluations. Among the neoplastic lesions surface epithelial tumours were commonest, quite consistent with the findings of other workers\textsuperscript{12,13}.

**Table 2: Cytodiagnosis.**

<table>
<thead>
<tr>
<th>Cytological diagnosis</th>
<th>No of adequate aspirate</th>
<th>No &amp;% of cases (cytological diagnosis)</th>
<th>Categorization of neoplastic cases according to cell of origin (n=65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-neoplastic</td>
<td>51</td>
<td>43.96%</td>
<td>Surface epithelial (25)  Green cell (2)  Sex cord stromal cell (4)</td>
</tr>
<tr>
<td>Benign</td>
<td>31</td>
<td>26.2%</td>
<td></td>
</tr>
<tr>
<td>Malignant</td>
<td>23</td>
<td>19.84%</td>
<td></td>
</tr>
<tr>
<td>Total and %</td>
<td>105</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Almost two-fifth of the cases of ovarian SOLs were asymptomatic, as also reported by previous workers\textsuperscript{12,13}. Among the symptomatic cases, pain abdomen was the commonest symptom (91.04%) followed by menstrual irregularities (23.9%) and abdominal palpable lump (20.9%). Similar experiences were also published previously\textsuperscript{8,12,13}.

**Table 3: Common clinical presentation of various categories.**

<table>
<thead>
<tr>
<th>No of adequate aspirate</th>
<th>Cytological diagnosis</th>
<th>Clinical presentation</th>
<th>No. of adequate aspirate</th>
<th>Cytological diagnosis</th>
<th>Total &amp; %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>Pain abdomen</td>
<td>lump abdomen</td>
<td>15</td>
<td>Non-neoplastic</td>
<td>34</td>
</tr>
<tr>
<td>Symptomatic</td>
<td></td>
<td></td>
<td></td>
<td>Benign</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Malignant</td>
<td>02</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>118</td>
<td></td>
<td>49(42.2%)</td>
</tr>
</tbody>
</table>

During cytohistological correlation, we achieved 87.2% consistent result. Higgins RV et al\textsuperscript{14} and Goel S et al\textsuperscript{12} reported 90% specificity of cytodiagnosis during assessment of ovarian lesions.

6 cases with faulty cytological interpretation are now discussed in detail.

**Table 4: Cytohistological correlation.**

<table>
<thead>
<tr>
<th>No. of cases with histological evaluation</th>
<th>Cytological diagnosis</th>
<th>Histological diagnosis</th>
<th>Categorization</th>
<th>Consistent</th>
<th>Inconsistent</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-neoplastic</td>
<td>12</td>
<td>10</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>Total</td>
</tr>
<tr>
<td>Benign</td>
<td>16</td>
<td>13</td>
<td>3</td>
<td>13</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Malignant</td>
<td>19</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>40</td>
<td>29</td>
<td>41(87.2%)</td>
<td>6(12.8%)</td>
<td></td>
</tr>
</tbody>
</table>
Table 5: Inconsistent cases [categories of error: non neoplastic to benign ;non neoplastic to malignant (false-ve);benign to malignant(false-ve);benign to nonneoplastic; malignant to benign or nonneoplastic(false positive).]

<table>
<thead>
<tr>
<th>Total no of cases undergoing histological evaluation</th>
<th>Cases showing false-ve diagnosis</th>
<th>Category of error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Smears were moderately cellular containing numerous columnar cell clusters and vague glandular structures often with multi-layering in a background of thick mucinous material. Few cells show nuclear hypercromasia. Smears were interpreted as mucinous cystadenocarcinoma. But subsequent histopathology confirmed the lesion as mucinous cystadenoma. Suggestive clinical presentation and presence of small glandular clusters and cell balls, giving impression of multi-layering, as seen in smears were the causes behind over diagnosis of malignancy as also observed by Roy et al [18].</td>
<td></td>
</tr>
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</table>

**Case No-6:** 52 year female presented with a large multiloculated cyst (7.5cm in diameter) of left ovary. Mucoid material was aspirated. Smears were moderately cellular containing numerous columnar cell clusters and vague glandular structures often with multi-layering in a background of thick mucinous material. Few cells show nuclear hypercromasia. Smears were interpreted as mucinous cystadenocarcinoma. But subsequent histopathology confirmed the lesion as mucinous cystadenoma. Suggestive clinical presentation and presence of small glandular clusters and cell balls, giving impression of multi-layering, as seen in smears were the causes behind over diagnosis of malignancy as also observed by Roy et al [18].

**Conclusion:**
USG guided FNAC is a quick, inexpensive and safe procedure for preliminary assessment of ovarian lesions. Present study also proved the effectivity of this diagnostic tool, achieving almost 90% accuracy in comparison to histopathology. Cases of misdiagnosis were dealt in detail and attempts were made to identify possible underlying causes. We sincerely hope that future workers will try their best for correction of those possible causes of failures. Thus, our knowledge will be enriched and cytology will become more and more effective for evaluation of ovarian lesions.

**Fig. 1:** Photomicrograph showing cytological aspirates from Papillary mucinous cyst adenocarcinoma of ovary (400x Leishman-Giemsa stain)

**Fig. 2:** Photomicrograph showing cytological aspirates from Dysgerminoma of ovary (400x Leishman-Giemsa stain)

**Fig. 3:** Photomicrograph showing cytological aspirates from Benign cystic teratoma of ovary (400x Leishman-Giemsa stain)
References:


