Sensitivity and specificity of combined fine needle aspiration cytology and cell block biopsy versus needle core biopsy in the diagnosis of sonographically detected abdominal masses

Salah Abobaker Ali

Correspondence:
Dr Salah Abobaker Ali
Assistant Professor of Pathology
Hawler Medical University/ Medical College
Department of Pathology
Erbil, Iraq
Email: sala1955@yahoo.com

Abstract

Background: The management of patients with suspected neoplastic disease involving abdominal sites are dependent on obtaining an accurate tissue diagnosis, usually via percutaneous sampling including Fine needle aspiration cytology (FNAC), cell block histopathology and needle core biopsy (NCB). The aim of this study is to identify which of the above mentioned procedures is better to be performed for patients with abdominal masses.

Methods: Therefore, we have compared the sensitivity and specificity of FNA cytology, cell block histopathology and NCB in a consecutive series of 252 patients undergoing image guided sampling of abdominal masses in Welfare hospital in Erbil city during the period March 2010 till July 2015.

Result: The specificity and sensitivity of combined FNAC and cell block histopathology were 97.5% and 97% respectively while those for NCB were 91% and 75%.

Conclusion: Combined FNAC, Cell block examination for abdominal masses are better than NCB.

Key words: Abdominal masses, Sensitivity and specificity, FNAC, Cell block, NCB.

Introduction

Patients with abdominal lesions may present with clinically evident tumour masses; at present the increasing use and sensitivity of radiological techniques has led to the identification of relatively small lesions, which require the use of image guidance for reliable targeting and obtaining samples for pathological study to reach the proper diagnosis to manage the patients correctly.

At present, there are two widely used and accepted methods for obtaining diagnostic material, namely fine needle aspiration (FNA) cytology and needle core biopsy (NCB). FNA specimens are usually acquired using 20-25 gauge needles and generally provide a sample for cytological examination, whereas NCB specimens are obtained using larger 14-18 gauge needles and primarily provide a tissue core for histological assessment. Because these are two different procedures and you have to put the needle in twice, we did a comparison study between FNAC and cell block histopathology with cases of needle core biopsy. In theory, each sampling method offers different advantages and limitations. Although both techniques are very safe, FNA is often preferred in sampling deeply placed lesions, sites adjacent to major vessels, or in situations in which needles are to be passed through the bowel wall. Cytological samples can be rapidly stained and examined. What remains from the sample is used for cell block histopathology examination. Cytology by itself is providing immediate assessment of adequacy, and in many cases a provisional diagnosis can be made while the patient remains in the radiology department(1). Furthermore, involvement by pathologists on site optimises clinical correlation and ensures that specimens are optimally handled and that appropriate samples are taken as required for ancillary investigations, such as microbiology or molecular studies. The advantages of NCB include the greater familiarity of histological preparations among some
pathologists, the preservation of tissue architecture, which may be important in the assessment and subtyping of some tumours, and the relative ease with which histochemical and immunohistochemical techniques can be applied to paraffin wax embedded biopsy material.

Therefore, although it might appear that cytological and histological examination would be complementary in the assessment of abdominal lesions, there are conflicting data in the literature regarding the accuracy and usefulness of these techniques. In particular, there are wide variations in the reported diagnostic sensitivities of FNA cytology, cell block biopsy and NCB(2) to the extent that some authors have suggested that core biopsy alone should be used or that FNA is the preferred technique with biopsy limited to cytologically indeterminate cases. These discrepancies may be partly explained by variations in the types of lesion subject to biopsy, and by the approach to cytological examination (such as the use of rapid staining techniques). Relatively few reports have evaluated FNA cytology and core biopsy obtained in combination in the investigation of patients with abdominal lesions.

Patients and Methods

This is a prospective study performed in the pathology department of Welfare hospital where we searched for all patients undergoing combined, image guided percutaneous core biopsy and FNA cytology and all cases of cell block pathology sampling of abdominal mass lesions during the five year period from March 2010 to July 2015. All patients had one or more radiologically detected lesions and the initial clinical suspicion in each case was of neoplastic disease. In total, 252 cases were identified, comprising approximately 70% of all abdominal lesions subject to biopsy in the study period (in all cases FNA, cell block pathology performed and in 11 cases NCB was also performed). There were 114 men and 138 women with an age range 1-92 years (mean 46). Coagulation screen was checked before biopsy in each case. All patients provided written informed consent for the procedure.

The lesions were situated within the liver (n = 82), pancreas (n = 36), kidney (n = 10), retroperitoneum (n = 3), or miscellaneous abdominal and pelvic sites (n = 121). Sampling was usually performed with ultrasound guidance but computed tomography scanning was used in a few cases. The decision to use FNA and/or core biopsy as a sampling technique was at the discretion of the radiologist performing the procedure. In general, FNAC samples were taken first and subject to immediate assessment(1). Briefly, the samples were obtained following local anaesthesia using a standard 21 gauge needle attached to a 20 ml syringe. After localisation, the needle was passed gently through the lesion five to ten times with aspiration(2). The needle was withdrawn and passed to the cytopathologist. Direct smears were prepared from part of the sample and one or more slides were stained using the Diff-Quick method in the scanning room. The smears were examined by the cytopathologist and the radiologist was informed of specimen adequacy. The remaining sample of fine needle aspiration is put in 10% neutral buffered formalin for cell block histopathology so all samples of FNA were also submitted for cell block pathology(3). The needle rinses were also submitted for microbiological study in those cases suspected to be of inflammatory or infective nature on rapid cytological assessment. After the FNA procedure, only 11 cases core biopsy samples were taken, 5 cases from liver masses and 6 cases from renal masses using an 18 gauge True-cut needle in those cases away from major vessels or away from bowels. In all cases after procedures a single injection of mesporin was injected; the patients were admitted to hospital for few hours and then discharged with stable good conditions. The adequacy of the specimens was judged visually and up to three separate core samples were taken as required. The core biopsies were fixed in 10% neutral buffered formalin, processed routinely, and stained with haematoxylin and eosin. The specimens were examined and reported by cytopathologist and histopathologist. Then the specificity and sensitivity were measured according to the following equations(2);

\[
\text{Specificity}=\frac{\text{number of true -ve}}{\text{number of true -ve}+\text{number of false +ve}}\times 100
\]

\[
\text{Sensitivity}=\frac{\text{number of true +ve}}{\text{number of true +ve}+\text{number of false -ve}}\times 100
\]

Statistical Analysis Used: Categorical and continuous variables were compared using independent t-test and identified standard deviation using Microsoft SSPS version 19 to measure. P value. P value less than 0.05 is regarded as significant, less than 0.01 highly significant and above 0.05 non significant.

Result

A total of 252 cases of patients presented with abdominal masses with M:F ratio 0.85:1 nearly equal, and the age distribution of different cases studied as shown in Table 1; the mean age (±SD) for cases of abdominal mass was 47.7 years. Out of 252 cases the majority of cases (54%) were above 60 years age group.

Among these diseases the majority of cases were malignant lesions especially carcinoma either primary or metastatic which constituted about 50.3%.

The relation between age group and types of diseases indicated that the majority of cases were metastatic carcinoma and most of them above 40 years with P value =0.008 highly significant.

The relation between age groups and site of lesion indicated that the majority of lesions occur above 40 years of age with P value =0.005 highly significant and also indicate that the majority of cases belong to the miscellaneous group most of them are malignant.
Table 1: Number and percentage of age group distribution of patients with abdominal mass

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Numbers</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>7</td>
<td>2.8</td>
</tr>
<tr>
<td>11-20</td>
<td>6</td>
<td>2.4</td>
</tr>
<tr>
<td>21-30</td>
<td>33</td>
<td>11.9</td>
</tr>
<tr>
<td>31-40</td>
<td>37</td>
<td>14.7</td>
</tr>
<tr>
<td>41-50</td>
<td>36</td>
<td>14.3</td>
</tr>
<tr>
<td>51-60</td>
<td>25</td>
<td>9.9</td>
</tr>
<tr>
<td>Above 60 years</td>
<td>108</td>
<td>44</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>252</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 2: Number and percentage of different types of neoplastic and non neoplastic diseases

<table>
<thead>
<tr>
<th>Type of lesion</th>
<th>number</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammations (acute &amp; chronic)</td>
<td>78</td>
<td>30.9</td>
</tr>
<tr>
<td>Adenoma</td>
<td>7</td>
<td>2.7</td>
</tr>
<tr>
<td>Benign cystic lesions</td>
<td>17</td>
<td>6.7</td>
</tr>
<tr>
<td>Hemangioma</td>
<td>17</td>
<td>6.7</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>7</td>
<td>2.7</td>
</tr>
<tr>
<td>Carcinoma</td>
<td>127</td>
<td>50.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>252</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 3: Relation between age group & site of lesions

<table>
<thead>
<tr>
<th>Site of lesion</th>
<th>Age ≤40 years</th>
<th>Age&gt;40 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>27</td>
<td>55</td>
<td>82</td>
</tr>
<tr>
<td>Pancreas</td>
<td>11</td>
<td>25</td>
<td>36</td>
</tr>
<tr>
<td>Renal</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Retroperitoneal</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>53</td>
<td>68</td>
<td>121</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>95</strong></td>
<td><strong>157</strong></td>
<td><strong>252</strong></td>
</tr>
</tbody>
</table>

Regarding specificity and sensitivity of procedures are as follows:

**Specificity:**
- Specificity of FNAC=96%
- Specificity of Cell block=99%
- Specificity of NCB=91%
- Specificity of both FNAC+cell block=97.5%

**Sensitivity:**
- Sensitivity of FNAC=96%
- Sensitivity of cell block=98%
- Sensitivity of NCB=75%
- Sensitivity of both FNAC+cell block=97%
Figure 1: Sonography of liver showing echogenic mass in the liver in A and showing True cut needle in B.
Figure 2: Sonography of liver showing site of needle (FNAC).

Figure 3: Sonography of liver is showing site of post FNAC cytology there is no any complication.
Discussion

Nowadays most cases of abdominal masses should undergo needle biopsy to establish the diagnosis in all conditions whether the treatment is surgical or medical(4) and most surgeons will not do an operation for any patient without preoperative cytopathology or histopathological diagnosis.

The decision to use FNAC, cell block histopathology and/or NCB as sampling techniques depends on many factors including the size, site of the lesion, the suspected likely diagnosis, and the risk of complications. Because most biopsies are performed using image guidance, the experience of individual radiologists is an important factor, and the preferred technique may be influenced by the availability of cytopathologists for on site specimen assessment. The sensitivity and specificity of FNAC, cell block histopathology and NCB should also be considered in choosing the optimal technique.

In this study because most of the lesions were located in the miscellaneous group which includes para aortic lymph nodes, pelvic organs and pancreatic masses which were located behind stomach and bowels (Table 3) that is why we preferred FNAC together with cell block pathology and we added NCB biopsy in liver and kidneys when lesions are located away from dangerous areas.

In this study we identified that sensitivity and specificity of FNAC and cell block pathology together were (97%, 97.5%) were higher than NCB (75%, 91%) which is similar to other studies in which sensitivity and specificity of even FNAC alone were higher than NCB (5,6,7); their sensitivity and specificity were (86% v80.6%, respectively) especially when the lesion was located near large vessels such as pancreatic masses (8,9,10) para aortic lymph nodes(11) and in pelvic organs or retroperitoneal (4) areas, even in safe anatomical sites such as liver(13) or kidney(14).

Conclusion

1- Fine needle aspiration cytology( FNAC) combined with cell block histopathology are more sensitive and more accurate than needle core biopsy (NCB) in diagnosis of abdominal lesion.

2- FNAC is more rapid for giving professional diagnosis and more useful for obtaining sufficient amount of tissue for assessment.

3- FNAC and cell block pathology are less dangerous with no complication, and more cost effective than NCB for evaluation of abdominal lesions.
Figure 5: Cell block of pancreas primary adenocarcinoma (H&E)X1000.

References

2- Koss’ diagnostic cytology and its histopathologic bases. LWW. ISBN:0781719283. Read it at Google Books - Find it at Amazon