DIAGNOSTIC ACCURACY OF PRE-OPERATIVE FINE NEEDLE ASPIRATION BIOPSY IN AMELOBLASTOMA

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ABSTRACT

Ameloblastoma is the most common odontogenic tumor of the jaw. Preoperative fine needle aspiration biopsy (FNAB) is one of diagnostic modalities in establishing diagnosis of ameloblastoma. Until present time, diagnostic accuracy of FNAB in ameloblastoma of the jaw had not been determined. The aim of this study is to determine the accuracy, sensitivity, and specificity of FNAB in ameloblastoma. Histopathology archives of jaw bone lesions between January 2005 and December 2007 in Pathology Department Dr. Soetomo Hospital Surabaya were retrieved. One hundred and ninety two cases of jaw bone lesions were collected. Preoperative FNAB results were available for 65 cases. Retrospective review of 65 consecutive preoperative FNAB slides was compared with the corresponding histopathology diagnosis. The accuracy of FNAB in ameloblastoma was 76.9%, with sensitivity and specificity value were 53.1% and 100% respectively. Despite the low sensitivity value, FNAB had sufficient diagnostic accuracy, thus could be considered in preoperative diagnosis of ameloblastoma.

Keywords: ameloblastoma, FNAB, diagnostic accuracy

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INTRODUCTION

Ameloblastoma (adamantinoma) is the most common odontogenic tumor (Rosai 2004). Aggressive odontogenic tumors are rare, the most common tumor of this kind with aggressive growth potential is the intraosseus ameloblastoma (Mills 2004). This tumor has local aggressive in nature, although rarely metastases. In addition to aggressive growth, ameloblastoma tends to recur (Rosai 2004). Indeed, adequate treatment is necessary to prevent recurrences.

Precise preoperative diagnosis is important in determining type of surgery in jaw bone lesion, in order to give appropriate treatment for the patients. Incisional biopsy is one of the diagnostic modalities, but this kind of biopsy is more traumatic, require anesthesia, and the pathology result need more time for processing the tissue.

Nowadays, fine needle aspiration biopsy (FNAB) has become a routinely diagnostic tool in certain tumors due to its less traumatic and rapid result. Previous reported revealed that ameloblastoma can be diagnosed cytologically by mean of FNAB (Günhan 1993, Artes-Martinez 2005). Unfortunately, until present time there are no reported data about the diagnostic accuracy of FNAB in ameloblastoma.

This study was conducted to determine the diagnostic accuracy of FNAB in ameloblastoma and also the sensitive and specific value.

MATERIALS AND METHODS

This study used observational analytic study with cross sectional approach. Research sample was all jaw bone lesions cases with diagnosis as ameloblastoma and non-ameloblastoma which had prior FNAB examination in Pathology Department, Dr. Soetomo hospital, during January 2005 until December 2007.

One hundred and ninety two cases of jaw bone lesions during January 2005 until December 2007 were found, but only 65 cases had prior FNAB examination. Cytology slides of all 65 cases of jaw bone lesions were retrospectively reviewed by two pathologists separately without knowing the previous diagnosis, and compared with the corresponding histopathology diagnosis. In case of disagreement, the cases were reviewed together using multi-headed microscope.
The FNA diagnosis was categorized as (1) ameloblastoma: if the smears showed clusters of basaloid epithelial cells with peripheral palisading, myxoid material, and spindle cells; (2) non-ameloblastoma: if the smears did not fulfill the diagnostic cytologic criteria for ameloblastoma. In this study, the histopathology diagnosis of jaw bone lesions was categorized as ameloblastoma and non-ameloblastoma.

The definitions used in the statistical analysis were: (1) sensitivity (for FNAB of ameloblastoma) was defined as the percentage of ameloblastoma cases which were correctly diagnosed as ameloblastoma on FNABs; (2) specificity (for FNAB of ameloblastoma) was defined as the percentage of non-ameloblastoma cases which were correctly diagnosed as non-ameloblastoma on FNABs; (3) accuracy (for FNAB of ameloblastoma) was calculated as the number of true positive plus true negative results divided by the sum of true positive, true negative, false positive and false negative results.

**RESULTS**

The age of jaw bone lesions patients of 65 samples in this study were ranged from 6 years to 74 years, with the mean age was 32.2 years. There were 32 cases of ameloblastoma, with the age range from 8 years to 66 years (table 1). Table 1 showed that ameloblastoma in this study most commonly occurred in the age of 30 to 39 years, with no differences between male and female.

<table>
<thead>
<tr>
<th>Patients (n)</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Sex</td>
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</tr>
<tr>
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</tr>
<tr>
<td>female</td>
<td>14</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>1-9</td>
<td>1</td>
</tr>
<tr>
<td>10-19</td>
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<tr>
<td>60-69</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
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</table>

Table 1. Ameloblastoma Patient Characteristics

There were 15 cases of 32 ameloblastoma cases that could not diagnosed by FNABs. Three of those cases were not adequate which slides only showed blood cells; 7 cases only contained myxoid material and macrophages; 2 cases only contained macrophages. Two cases contained myxoid material with spindle cells and macrophages, but no epithelial clusters were found. One case although contained myxoid material, spindle cells, macrophages, and basaloid epithelial cells, but diagnosis of ameloblastoma could not be made because the smear showed only one cluster of epithelial cells. Table 2 showed that 33 cases of non-ameloblastoma were correctly diagnosed as non-ameloblastoma on FNABs. This meant that none of non-ameloblastoma cases diagnosed as ameloblastoma. So that, pre-operative FNAB had high specificity value (100%), with positive predictive value as 100% and negative predictive value as 68.8%. Overall, the accuracy of pre-operative FNAB was 76.9%.

<table>
<thead>
<tr>
<th>FNAB</th>
<th>Ameloblastoma</th>
<th>Non-ameloblastoma</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameloblastoma</td>
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<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Non-ameloblastoma</td>
<td>15</td>
<td>33</td>
<td>48</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>33</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 2. FNAB examination compared with histopathology results

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Figure 1. Basaloid epithelial cells with peripheral palisading (F. 1044/05, Diff-Quik 400x)
DISCUSSION

In this study, ameloblastoma occurred in childhood until the 6th decade of life, and there were no differences between male and female. This is in keeping with literatures (Pindborg 1971, Mills 2004, Rosai 2004).

Table 2 showed that diagnosis ameloblastoma by mean of preoperative FNAB could be made in 17 cases of 32 ameloblastoma cases, and the sensitivity value was 53.1%. No previous study reported about the sensitivity value of FNAB in ameloblastoma. The low value of sensitivity in this study was probably due to inadequate aspiration or puncture. Positive cytology diagnosis of ameloblastoma was influenced by the content of aspiration material. Adequate smear is important in determining the cytologic diagnosis. The cytologic criteria for ameloblastoma are epithelial cells with basaloid appearance and peripheral palisading, spindle cells and myxoid material. If the smears did not contain all the criteria, the cytologic diagnosis of ameloblastoma can not be established. In this study, the smears from fifteen cases of histopathologically proven ameloblastoma did not show all the diagnostic criteria.

Puncture location is important in order to get adequate sample for diagnosis. Ameloblastoma is located within the jaw bone, so the puncture should penetrate the bone to get material from the target tumor. Determination of puncture location on the thinning or destructive cortical bone (so called “window”) is also important to make diagnosis of ameloblastoma by mean of FNAB. Aspiration into solid area of the tumor may yield more cells, so the possibility to get adequate / representative smear is higher (Günhan 1993, Radhika 1993, Mathew 1997, Okada 2002, Bokun 2003, Artes-Martinez 2005). Several ameloblastoma cases in this study were misdiagnosed as non-ameloblastoma on FNABs.

Puncture into the cystic area of the tumor might be the cause of this misdiagnoses. Aspiration in the cystic area may be less specific than FNAB of solid lesions due to the paucity of specific lesion cells in the former (Günhan 1993).

Radiologic feature is also important in FNAB of ameloblastoma. In addition to its diagnostic value, radiologic feature may give information about the solid and cystic area of the tumor, and also can show the thinning or destructive cortical bone (“window”) which permits the penetration of the needle.

Pre-operative FNAB can not totally replace the incisional biopsy as diagnostic procedure of ameloblastoma, because the low sensitivity value of this examination. But this study showed that pre-operative FNAB had high specificity (100%) and sufficient accuracy (76.9%). In addition to those, FNAB has several benefits such as less traumatic and rapid result. Thus, pre-operative FNAB is still can be considered as diagnostic tool in suspicious case of ameloblastoma. In case of discrepancy between the clinical diagnosis and FNAB diagnosis, incisional biopsy is must performed.

The pathologist experience is also play important role. It is can not be denied that the experience pathologist can do better puncture and has more competence in recognize the cells from the aspiration and makes diagnosis.

CONCLUSIONS

Despite the low sensitivity value, FNAB had sufficient diagnostic accuracy and high specificity value, so that FNAB could be considered in preoperative diagnosis of ameloblastoma. In order to increase the sensitivity of FNAB, it is suggestive to perform FNAB under the guidance of radiologic pictures.

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REFERENCES