Comparative Studies on Fine-needle Aspiration Cytology with Ultrasound Scanning in the Assessment of Thyroid Nodule

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The clinical usefulness of ultrasound scanning in the assessment of thyroid nodule was examined. The total diagnostic accuracy for aspiration biopsy cytology (ABC) in the differentiation of benign from malignant thyroid nodules was 92.4% in 26 patients, which is similar to that of previous reports when compared with the findings of pathological examination by surgery. Additionally, the diagnostic efficacy of high resolution ultrasonography was evaluated based on the results of ABC. When the echogram of 90 patients with a thyroid nodule was divided into eight patterns according to Obara's classification, only 64.3% of the carcinoma exhibited the typical malignant pattern of ultrasonography and 21.4% of the carcinoma exhibited the ultrasonographically homogenous nodule with a clear margin, which was often observed in the benign nodules. Therefore, it is necessary to be very careful when differentiating malignant from benign thyroid nodules by ultrasonography.

In conclusion, although high resolution ultrasonography provides useful information for the assessment of most thyroid nodules, all ultrasonography (including high resolution ultrasonography) should be combined with ABC for the final diagnosis.

Key words: Benign thyroid nodule, Malignant thyroid nodule, Thyroid cyst, Thyroid carcinoma

Fine-needle aspiration biopsy cytology (ABC) is simple, inexpensive and accurate for the differentiation of benign and malignant thyroid lesions (1, 2). In the present study, the accuracy of ABC in the differentiation of benign from malignant disorders was investigated based on the pathological results. Although ultrasonographic examination is now widely used for the diagnosis of thyroid disorders, the definitive use of ultrasonography (US) in patients with thyroid diseases has not been thoroughly investigated (3-5). From 1985, we have employed high resolution ultrasound equipment with a 7.5 MHz transducer. It is thought that diagnostic accuracy of US has been improved by using a US system combined with a 7.5 MHz transducer. The ultrasound examiner must focus primarily on the question of the nodular lesions, either manifest on palpation or occult. Here, the US cases were divided into eight patterns of ultrasonography according to the report by Obara and Fujimoto (6). Then the diagnostic efficacy of ultrasound was evaluated based on the results of ABC. Various ultrasonographic characteristics of thyroid nodules were analyzed in order to evaluate the usefulness and limitations of ultrasonography in the differential diagnosis of benign and malignant diseases.

MATERIALS AND METHODS

Ninety patients with a thyroid nodule were examined using both ultrasonography and aspiration biopsy cytology. Pathologic confirmation was obtained in 26 patients by excisional surgery. Serial sections were examined if necessary for pathological diagnosis. The direct correlations between patho-
Diagnosis of Thyroid Nodule by US & ABC

Table 1. Comparison of the cytological and pathological diagnoses.

<table>
<thead>
<tr>
<th>Pathological diagnosis</th>
<th>Cytological diagnosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Malignant</td>
<td>Benign</td>
</tr>
<tr>
<td>Malignant</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Benign</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>15</td>
</tr>
</tbody>
</table>

Sensitivity, 11/13 = 84.6%; Specificity, 13/13 = 100%; Total accuracy, 24/26 = 92.3%

RESULTS

(1) Accuracy of aspiration biopsy cytology (ABC)

Histological confirmation was obtained in 26 cases by surgery. The sensitivity can be expressed as the number of patients with malignant diseases who were diagnosed as malignant from ABC divided by the total cases with malignant diseases. Specificity is expressed as the number of patients with benign disease who were diagnosed to be benign from ABC divided by the total patients with benign diseases as shown in Table 1. In the present 26 cases, the sensitivity and specificity for ABC were 84.6% and 100%, respectively. The accuracy for the total 26 cases was 92.4%. Two false negative cases were both pathologically proven to be follicular carcinoma.

(2) Classification of ultrasound characteristics in thyroid nodule

We classified thyroid nodule ultrasonographic findings of 90 cases into eight patterns according to the report by Obara and Fujimoto (6), and then compared each with the results of ABC. As shown in Fig. 1, only 64.3% of thyroid carcinoma exhibited the typical malignant pattern H, while 21.4% and 7.1% of carcinoma showed patterns G and E or D, respectively, which were often observed in the benign thyroid nodules (6, 8).

Fig. 1. Classification of ultrasonographic patterns of thyroid nodules based on that of Obara and Fujimoto (6), and diagnosis by cytology. Numbers in parentheses indicate the percent of the total (90 cases).

DISCUSSION

Aspiration biopsy cytology (ABC) is an accurate
diagnostic technique for the differentiation of malignant and benign thyroid nodules; it provides valuable preoperative information which can be a basis for the decision of the appropriate operation. The accuracy of ABC has been reported to be greater than 90% (9), although the major limitation of this technique has been the inability to differentiate benign from malignant follicular neoplasms (10). In the present study, although the number of operated cases was small, the total accuracy for ABC was calculated to be 92.4% which nearly equals that of previous findings (9). Two false negative cases in our study were both follicular carcinoma, which is similar to another report (10).

As determined according to Obara’s classification, 64% of malignant thyroid nodules showed the pattern of H on ultrasound. Thus, the H pattern rather than other patterns on ultrasound appears to suggest a high possibility of the presence of malignant thyroid nodules. It is well known that cystic components are frequently found in benign thyroid nodules (2, 6). In the present study, malignancy was also found by ABC in two cases showing pattern D and pattern E, which have cystic components. Furthermore, 21.4% of malignant nodules presented pattern G, which is a solid nodule with a homogeneous internal echo pattern; this pattern was often observed in the benign nodules. Therefore it is critical to carefully differentiate between the malignant and benign nodules when a homogeneous and solid sonography pattern is found. The present data were similar to those of Obara and Fujimoto (6), regarding the ultrasonographic classification of benign and malignant nodules. However, even by high resolution ultrasonography, the differentiation of malignant and benign nodules still seems to be limited.

In conclusion, ultrasonography is certainly useful to determine the nature of most thyroid nodules, but sequential studies using ultrasound combined with needle aspiration cytology are necessary to properly diagnose thyroid nodules.

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REFERENCES