THYROID NODULE: EVALUATION WITH ULTRASOUND AND ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY: A SERIES OF 217 PATIENTS

By
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ABSTRACT

Aim of Work: In the present study we examined the role of both ultrasonography and fine needle aspiration cytology in patients with thyroid nodules.

Patients and Methods: A retrospective study of 217 patients with thyroid nodules who underwent neck ultrasonography and diagnostic fine needle aspiration cytology preoperatively. Preoperative clinical, ultrasonography and cytological diagnoses have been compared with the histological post-operative assessment.

Results: Thyroid US had sensitivity, specificity and accuracy of 89.7%, 89.4% and 89.4% comparable to FNAC results of 96.6%, 95.7% and 99.5%.

In conclusion: In the present study we evaluated 217 patients for whom histopathology results were available and we found that FNAC gives a sensitivity of 96.6% and specificity of 95.7%. However, a combination of US and FNAC, rather than any single modality, will give optimal results and avoid unnecessary surgery in a great number of patients without missing malignancy.

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using a real-time ultrasonographic scanner (Logic 500 Pro Series, General Electric medical systems, Milwaukee, USA) with a 7-12 MHz linear transducer for morphological study and 4.7 MHz for colour-Doppler evaluation according to a standard procedure. The patients were placed in supine position with the head extended over a pillow.

Sonographically patients were divided into benign and possibly malignant. The following criteria suggest malignancy: presence of microcalcification, solid nature, irregular or blurred margins and intranodular hypervascularity (5).

FNAC was performed as an outpatient procedure without local anesthetic using a 19 gauge needle on a 10 ml disposable syringe. At least two smears were made and stained using the Papanicolaou and May-Grunwald-Giemsa techniques from suspicious nodule/s either US guided or free hand by the surgeons. If the aspirate was fluid smears were made before and after centrifugation. None of these patients developed any type of complications during the procedures.

The aspirates were classified into three categories:

1. *Non-neoplastic*: aspirates were specimens of low or moderate cellularity in a follicular pattern of whole follicles or monolayered sheets, with follicles of varying size, uniform cell nuclei, and a large amount of colloid and with or without features of degeneration or inflammation.

2. *Possibly neoplastic*: aspirates were specimens with increased cellularity in a predominantly microfollicular or trabecular pattern with some loss of cell cohesion and variation in nuclear size, accompanied by little or no colloid.

3. *Malignant*: aspirates were specimens containing either differentiated cells with features characteristic of specific malignant tumors or undifferentiated cells with unequivocally malignant nuclei.

Fluid aspirate with macrophages and scanty normal epithelial cells was classified as non-neoplastic rather than inadequate. We consider non-neoplastic smear as benign and we
Table 1: sensitivity, Specificity, predictive value and accuracy of US for thyroid pathology

<table>
<thead>
<tr>
<th>US diagnosis</th>
<th>Histopathology</th>
<th>S</th>
<th>Sp</th>
<th>PPV</th>
<th>NPV</th>
<th>DA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>Benign</td>
<td>89.7%</td>
<td>89.4%</td>
<td>43.5%</td>
<td>98.2%</td>
<td>89.4%</td>
</tr>
<tr>
<td>171(78.8%)</td>
<td>168(77.4%)</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Malignant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3(1.3%)</td>
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<td></td>
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<tr>
<td>Possibly</td>
<td>Benign 20 (9.2%)</td>
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<tr>
<td>Malignant</td>
<td>Malignant</td>
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<tr>
<td>46(21.2%)</td>
<td>26(12%)</td>
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</tbody>
</table>

S = sensitivity; Sp = specificity; PPV = positive predictive value; NPV = negative predictive value; DA = diagnostic accuracy.

Table 2: sensitivity, Specificity, predictive value and accuracy of FNAC for thyroid pathology

<table>
<thead>
<tr>
<th>FNAC</th>
<th>Histopathology</th>
<th>S</th>
<th>Sp</th>
<th>PPV</th>
<th>NPV</th>
<th>DA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>Benign</td>
<td>96.6%</td>
<td>95.7%</td>
<td>77.8%</td>
<td>99.4%</td>
<td>95.9%</td>
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<tr>
<td>181(83.4%)</td>
<td>180(83%)</td>
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<tr>
<td></td>
<td>Malignant</td>
<td></td>
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<tr>
<td></td>
<td>1(0.5%)</td>
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<tr>
<td>Malignant</td>
<td>Benign 8 (3.7%)</td>
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<td></td>
</tr>
<tr>
<td>36(16.6%)</td>
<td>Malignant</td>
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<td></td>
<td>28(13%)</td>
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</table>

S = sensitivity; Sp = specificity; PPV = positive predictive value; NPV = negative predictive value; DA = diagnostic accuracy.
Figure 2: B-mode

A) a well-defined hypoechoic partially solid partially cystic nodule.

B) Colour Doppler showed no intra-nodular colour flow.

Proved to be benign by FNAC & post-operative pathology.

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Figure 3: B-mode

A) an ill-defined nodule of mixed (hypo & hyperechogenic) echogenicity.

B) Colour Doppler showed peri & intra-nodular colour flow signals. Proved to be papillary carcinoma by FNAC & post-operative pathology.

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ty and specificity of US to be 89.7% and 89.4% respectively with an overall diagnostic accuracy of 89.4% for differentiating between the benign and malignant nodules. In consistency with our study (but a little bit lower), Watters & Ahiya, (8) found that the sensitivity and specificity of US in suggesting a malignant lesion were 74% and 83% respectively. They interpreted and emphasized that the US has added advantage of allowing the whole gland to be examined rather than the dominant nodule but was limited by the fact that no features were pathognomonic for malignancy so that it should be regarded as a complementary rather than an alternative investigation to FNAC in the management of solitary thyroid nodules. Jones et al. (9) found the sensitivity and specificity of US to be 75% and 61% respectively while Fukunari (10) found diagnostic accuracy of 81.0%, a sensitivity of 88.9% and a specificity of 74.2%. US can deliver a diagnostic accuracy over than 90% in thyroid carcinoma, especially papillary carcinoma. However, in the case of follicular carcinoma, neither conventional B-mode US nor FNAC can deliver satisfactory results (11).

The sensitivity of FNAC for the detection of thyroid malignancy has been reported between 80% and 93.5%., Reported specificity has been between 56% and 94%, with overall diagnostic accuracy between 79.6% and 92%. (12-18) Determinations of sensitivity and diagnostic accuracy are affected by how the author of a given study chooses to define and classify suspicious FNAC results. The inclusion of suspicious FNAC diagnoses with clearly malignant FNA cases tends to increase the sensitivity of FNAC for detecting thyroid cancer, while decreasing the specificity and overall accuracy of the test (15,16). In the present study, sensitivity, specificity, and accuracy were 96.6%, 95.7% and 99.5% respectively that is a little bit higher than the reported results.

SUMMARY AND CONCLUSION

In the present study we evaluated 217 patients for whom histopathology results were available and we found that FNAC gives a sensitivity of 96.6% and specificity of 95.7%. However, a combination of US and FNAC, rather than any single modality, will give optimal results and avoid


