

Fine Needle Aspiration Cytology Of Thyroid Nodule(S): A Nigerian Tertiary Hospital Experience

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Citation

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Abstract

Fine needle aspiration cytology (FNAC) of the thyroid has been used as an initial investigative procedure of thyroid nodule(s) in the Department of Histopathology, University of Maiduguri Teaching Hospital for 10 years (1995-2004). This study is aimed at evaluating our experience of FNAC and correlating with histologic diagnosis. A total of 69 patients with 51 (73.9%) cases of benign, 18 (26.1%) cases of malignancy. There were four cases suspicious of malignancy, which were considered as malignant. The benign diseases include 34 (49.3%) nodular colloid goiter; 6 (8.7%) toxic goiter; 7 (10.1%) follicular adenoma; 2 (2.9%) cases each of Hashimoto's and subacute thyroiditis. The malignant cases were 10 (14.5%) follicular carcinoma; 3 (4.3%) cases each of medullary and papillary carcinomas, and 2 (2.9%) anaplastic carcinoma. The diagnostic accuracy is 94.2%, Sensitivity, 88.9%; Specificity, 96.1%; False Negative rate, 11.1% and false positive rate, 3.9%. In conclusion, FNAC of the thyroid nodule(s), is sensitive, specific, accurate and the initial investigation of thyroid diseases in our tertiary hospital. We therefore encourage our clinicians to embrace this investigative procedure in the management of our patients.

INTRODUCTION

Fine needle aspiration cytology (FNAC) is a well-established technique for pre-operative investigation of thyroid nodule(s)₁. The technique is the most noninvasive, cost-effective and efficient method of differentiating benign and malignant thyroid nodules_{2,3}. Many investigators have shown that fine needle aspiration cytology is the single most sensitive, specific and cost-effective method in the investigation of solitary cold thyroid nodule_{4,5}. FNAC of the thyroid is gaining popularity among the pathologists and clinician in University of Maiduguri Teaching Hospital (UMTH). It is the initial investigation in the management of thyroid disease in our center. However, this study is aimed at evaluating our experience of FNAC and correlating the finding with tissue biopsy diagnosis of thyroid nodules.

MATERIALS AND METHODS

This is a retrospective study of 69 diagnosed cases of thyroid nodule(s) in the University of Maiduguri Teaching Hospital (UMTH), Nigeria between the periods of January 1995 and December 2004 inclusive. The case notes were retrieved and information about the Age, Sex, Fnac and histological diagnosis were extracted. The duplicate copies of all histological reports and their corresponding original slides were reviewed. The data were analysed in simple statistical

tables.

During the period of study, all patients were referred by the surgeons to histopathology department for cytopathological diagnosis. A fine-needle was then introduced and the pathologists took the thyroid-swelling aspirate. Each of the patients had one or two aspirates obtained using a 10 ml plastic syringe fitted with a 23-25-gauge disposable needle 1½ inches long. The procedure took a fraction of a minute. The aspirated contents of the needle are expelled on to glass slides. Four slides smear were made, two were immediately fixed in 95% ethyl alcohol for about 30 minutes and the remaining two were air-dried and then fixed. The slides were stained with Haematoxylin and Eosin (H&E), and MayGrunwald Giemsa (MGG) stains respectively and examined with light microscope. The microscopic diagnostic interpretation includes:- Benign, Malignant and Suspicious.

RESULTS

A total of 116 cases of cytopathology and 140 cases of histopathological diagnosis of thyroid nodules were independently made within the study period. Sixty-nine (54.4%) cases were recruited for this study, both had cytopathological and histopathological diagnosis and therefore recruited for this study while the remaining either had cytopathological or histopathological diagnoses were

excluded from the study.

Table 1 shows the histological types of thyroid nodule(s) with 51(73.9%) cases benign and 18 (26.1%) cases malignant. The benign diseases include 34(49.3%) nodular colloid goiter; 6(8.7%) toxic goiter; 7(10.1%) follicular adenoma; 2(2.9%) cases of Hashimoto's and subacute thyroiditis each. The malignant cases were 10(14.5%) follicular carcinoma; 3(4.3%) cases each of medullary and papillary carcinomas, and 2 (2.9%) anaplastic carcinoma.

Table 2 shows the four (4) cases of cytological interpretation errors. Two cases were false negative (follicular and papillary carcinomas). And two cases were false positive (Hashimoto's thyroiditis and colloid goiter with focal area of adenomatous hyperplasia).

Table 3 shows the Summary of 69 cases of FNAC with histopathological correlation. The suspicious cases of malignancy are considered as malignant.

Figure 1

Table 1: Histopathological types of 69 cases of Thyroid nodules.

	Frequency
Benign	51
Nodular goiter	34
Toxic goiter	6
Hashimoto's thyroiditis	2
Subacute thyroiditis	2
Follicular adenoma	7
Malignant	18
Follicular carcinoma	10
Papillary carcinoma	3
Medullary carcinoma	3
Anaplastic carcinoma	2
TOTAL	69

Figure 2

Table 2: The 4 cases of Interpretation errors.

	Cytologic diagnosis	Histologic diagnosis
False Negative	Nodular goiter Follicular neoplasm	Follicular carcinoma Papillary carcinoma (follicular and papillary)
False Positive	Lymphoma Follicular neoplasm	Hashimoto's thyroiditis Nodular goiter with Hyperplasia

Figure 3

Table 3: Summary of 69 cases of FNAC with histopathological correlation

Accuracy or Concordance	94.2%
Sensitivity	88.9%
Specificity	96.1%
False Negative Rate	11.1%
False Positive Rate	3.9%

DISCUSSION

Thyroid diseases are not uncommon in our environment of study and being a referral hospital in the northeast sub-region of Nigeria. Patients are referred for FNAC as well as tissue/specimens diagnosis for various thyroid swellings. The investigations of thyroid nodules in our study have shown that 54.4% of patients were subjected to both fnac and histopathological diagnosis. The remaining 45.6% had either one of the investigations and the reasons may be due to the fact that not all thyroid lesions are subjected to surgery, some of the patients who had an initial FNAC never turn up for surgery and on the other hand some patients especially those operated from other hospitals and private clinics only send their lobectomy or thyroidectomy specimens for diagnosis.

FNAC is a sensitive and highly specific method of evaluating thyroid nodules for malignancy^{6,7}. FNAC of the thyroid nodule is reported to have a sensitivity ranges from 65% -98% and a specificity of 72%-100%⁸. In our series, the analysis of the data revealed the sensitivity of 88.9% and specificity of 96.1%, which translate into a diagnostic accuracy of 94.2%. This shows that FNAC is more specific than sensitive in detecting thyroid malignancy and therefore it use, as a reliable diagnostic test cannot be overemphasized.

The Papanicolaou society of cytopathology has published a guideline for the examination of thyroid nodule fine needle aspiration specimen⁹. These guideline suggested a false

negative and false positive rate of < 2% and 3% respectively should be achieved.

The false negative rate (FNR) is defined as the percentage of patient with benign cytology in whom malignant lesions are later confirmed on thyroidectomy. Some authors^{7,8,10,11} reported FNR ranging from 1.5% to 11.5%. Ashcraft and van Herle noted that FNR results varied in reported series from 2% to 50% and that among 1330 patients, all of whom had a histologic examination, the FNR was 1.7%¹². Campbell and Pillsbury¹³ analyzed combined data from 912 patients with benign cytologic results who had a histologic examination and found a FNR between 0.5% and 11.5%, with a pooled rate of 2.4%. In our series we reported 2 cases which translated to 11.1% FNR. These two cases were however confirmed histopathologically as follicular carcinomas and papillary carcinoma. Our value is high, and was due to improper sampling, experience with the procedure and with cytologic interpretation by an expert cytopathologist. Again, the FNR may be higher if patients with negative cytologic results were followed up for months or years. In study by Boey and colleagues¹⁴ shows that the 365 patients with benign cytologic results were followed for a mean of 30 months and they found two cancers. Grant and colleagues¹⁵ also studied 439 patients with benign cytologic results who were followed-up for 6.1 years and found three patients with malignancies. These findings have definitely increased the FNR.

The false positive rate (FPR) indicates that a patient with malignant FNAC result was found on histological examination to have benign lesion. Caruso and Mezzaferri⁷ reported less than 6% FPR while Campbell and Pillsbury¹³ reported 1.2% rate. In our series we reported 2 cases as malignant but turnout to be Hashimoto's thyroiditis and Nodular colloid goiter with focal areas of adenomatous hyperplasia. The FPR is 3.9% which agreed with other series^{7,8,11} that ranges from 0-8%. The two suspicious cases in our study revealed hypercellularity with some atypia, which raised an index of malignancy.

The overall accuracy for cytologic diagnostic was 94.2% which agrees with other studies of 95%^{7,11}. However, the interpretation error from this study can be reduced if aspirate were obtained from different portions of the nodules, an expert cytopathologists to review and interpret the slides, the use of Ultrasound- guided FNA procedure and the use of immunohistochemical and genetic markers.

In conclusion, FNAC of the thyroid nodule(s), is sensitive,

specific, accurate and the initial investigation of thyroid diseases in our tertiary hospital. We encourage our clinicians to embrace this investigative procedure in the management of our patients.

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