

Efficacy of Fine Needle Aspiration Cytology in the Diagnosis of Thyroid Swellings in Red Sea State, Sudan

Ali K. Ageep¹

Abstract

Background:

Fine needle aspiration cytology (FNAC) is a safe, easy to perform, cost effective and an accurate procedure used in the diagnosis of thyroid lesions.

Objective: In this study we aimed to demonstrate the effectiveness of FNAC in the diagnosis of thyroid swellings in Red Sea State, Sudan.

Methods: FNAC from one hundred and fifty six patients presented with thyroid swelling were examined in the period from February 2009 to August 2011 in a histopathology laboratory in the Red Sea Medical center, Port Sudan, Sudan. This is the only regional laboratory, to which FNAC and histopathological samples were sent. The cytological results were classified as inadequate when the aspirate was not enough to reach a diagnosis; benign which included different goiters, cysts and thyroiditis; follicular which included cases showing features of follicular or Hurthle cell neoplasms; and malignant that included non-follicular malignant tumors of the thyroid. The histopathology diagnosis was classified as benign and malignant.

Results: The results of the FNA cytological diagnosis showed that three (1.9%) of the patients had inadequate samples for cytological assessment, 138 (88.5%) patients had benign lesions, 6 (3.8%) had follicular pattern, and nine (5.8%) had malignant neoplasms. The sensitivity, specificity and accuracy of FNAC for the diagnosis of thyroid swellings were 89.7%, 96.7% and 93.2% respectively. Commonest malignancy detected was papillary carcinoma in seven patients.

Conclusions: The findings of this study are consistent with the current published data and demonstrate that FNA cytology is a sensitive, specific and accurate initial diagnostic test for evaluation of patients with thyroid swellings. Clinicians should be encouraged to embrace this procedure as a first line investigation for the diagnosis of thyroid swellings.

Keywords: papillary carcinoma, Hurthle, FNAC, follicular pattern.

Fine needle aspiration cytology (FNAC) is a technique that is practiced worldwide and it is the investigation of choice in thyroid, breast, and lymph node swellings¹. Although there is a large body of world literature claiming the accuracy and usefulness of thyroid cytology, there is also evidence showing possible limitations and pitfalls of this procedure^{2,3}.

This technique gains many advantages, because it is a safe, easy to perform, cost effective, accurate and minimally invasive procedure⁴.

Different imaging techniques are now used

for preoperative diagnosis of thyroid nodules like radionuclide scanning, high-resolution ultrasonography etc. Although, ultrasound can be used to detect non-palpable nodules, ultrasound cannot differentiate between benign and malignant lesions. Ultrasound typically used for evaluating complex cystic masses and nodules that are difficult to palpate⁵. However, FNAC is still regarded as the single most accurate and superior procedure, and other tests like ultrasound and nuclear scan should be used in conjunction with FNAC⁶. FNAC is usually performed without local anesthesia and the patient does not require any previous preparation⁷. Clinically significant complications after FNA have hardly ever been reported^{8,9}.

1. Department of Pathology Faculty of Medicine, Red Sea University, Port Sudan, Sudan.

* E- mail: aleykh@yahoo.com

The distinction of the benign and malignant thyroid swelling is fundamental, as malignancy necessitates surgery, while strict patient follow-up is necessary in the case of a benign mass. The main aim of FNAC is to identify nodules that require surgery and those benign nodules that can be observed clinically and decrease the overall thyroidectomy rate in patients with benign diseases¹⁰.

Though thyroid swellings are very common incidental findings in Red Sea State, Sudan, no previous work has been reported in the diagnosis of thyroid diseases in this region. So, this study aimed to demonstrate the efficiency (in the form of sensitivity, specificity and accuracy) of FNAC in the diagnosis of thyroid swellings in Red Sea State.

Methods:

FNAC from one hundred and fifty six patients presented with thyroid swelling were examined in the period from February 2009 to August 2011 in a histopathology laboratory in the Red Sea Medical center, Port Sudan, Sudan.

FNA technique: The conventional method of the aspiration with 10 ml syringe was used. Six smears were prepared from the product of the aspirate. The smears were then stain by May-Grunewald Giemsa (MGG) stain. The diagnosis of the diseases was evaluated by single pathologist.

Histopathology specimens: Paraffin embedded blocks were first prepared. Sections from these blocks were stained by Haematoxylin and Eosin (H &E).

Cytological reporting system: As shown in table 1, the cytological results were classified as inadequate when the aspirate was not enough to reach a diagnosis; benign which included different goiters, cysts and thyroiditis; follicular which included cases showing features of follicular or Hurthle cell neoplasms; and malignant that included non-follicular malignant tumors of the thyroid. The histopathology diagnosis was classified as benign and malignant.

Statistical analysis: Data were analyzed by using a computer Statistical Package for Social Sciences (SPSS) program version 16. Results were presented as frequency and percentage.

Ethical clearance: Informed consent was taken from all patients participating in this research. Ethical clearance was approved from the local Ethical Review Committee (ERC).

Results:

FNA cytology was carried out in 156 patient presented with thyroid swelling. Table 2 shows the results of the FNA cytological diagnosis. Three (1.9%) of the patients had inadequate samples for cytological assessment, 138 (88.5%) patients had benign lesions, six (3.8%) had follicular pattern, and nine (5.8%) had malignant neoplasms.

Eighty nine patients underwent surgical excision to their thyroid swellings and biopsies were sent for histopathology. 78 (87.6%) of these patients turned to have benign lesions, whereas 11(12.4 %) had malignant lesions (Table 3).

The commonest benign thyroid lesions were colloid thyroid goiter (48%) and colloid cyst (37%). On the other hand papillary carcinoma represented the commonest (63.6%) malignant thyroid tumor.

The sensitivity, specificity and accuracy of FNAC for the diagnosis of thyroid swellings, when compared to the histopathological results, were 89.7%, 96.7% and 93.2% respectively.

Discussion:

According to guidelines from the American Association of Clinical Endocrinologists, it is "believed FNA to be the most effective method available for distinguishing between benign and malignant thyroid nodules,"¹¹. Fine needle aspiration cytology of the thyroid gland has radically changed the management of patients with thyroid disease. The number of thyroid surgical procedures has decreased by 50% whereas the percent yield of cancers for patients undergoing surgery for thyroid

Table 1: Shows the system for reporting thyroid cytopathology

Cytological Findings	Features
Inadequate	Non-diagnostic or unsatisfactory Cyst fluid only Virtually acellular specimen Other (eg, obscuring blood, clotting artifact)
Benign	Benign Consistent with a benign follicular nodule (eg, adenomatoid nodule, colloid nodule) Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context Consistent with granulomatous (subacute) thyroiditis Other Atypia of undetermined significance or follicular lesion of undetermined significance
Follicular	Follicular neoplasm or suspicious for a follicular neoplasm Specify whether Hürthle cell (oncocytic) type
Malignant	malignancy papillary carcinoma medullary carcinoma Squamous cell carcinoma Carcinoma with mixed features Undifferentiated (anaplastic) carcinoma metastatic carcinoma lymphoma Other

Table 2: show results of FNAC for thyroid swellings.

Thyroid disease	Number of cases	Frequency (%)
Benign	138	88.5
Follicular	6	3.8
Malignant (Nonfollicular)	9	5.8
Inadequate	3	1.9
Total	156	100

Table 3: show results of histopathology for thyroid swellings

Thyroid disease	Number of cases	Frequency (%)
Benign	78	87.6
Malignant	11	12.4
Total	89	100

nodules has increased from 10- 15% to 20-50%¹².

In the published data, the sensitivity, specificity and accuracy of thyroid FNAC in detecting malignancy ranges between 65 - 98%^{13,14}. The determinant factor for such a wide range of sensitivity, specificity and accuracy may be due to the way the cytopathologists classify thyroid swellings as well as false positive and negative samples. Some authors include follicular lesion in malignant/neoplastic group, whereas others exclude them from the calculations. In our study, the sensitivity, specificity and accuracy of FNAC for the diagnosis of thyroid swellings, when compared to the histopathological results, were 89.7%, 96.7% and 93.2% respectively.

The results of our study are comparable with the published data from different parts of the world. In 1995, Agarwal et al, in the Tata

Memorial Hospital, Mumbai, evaluated thyroid nodules in 100 cases. FNAC demonstrated an accuracy of 90.9%, a sensitivity of 76.5%, and a specificity of 95.9%¹⁵. Kumar et al in their study of 89 patients with enlarged thyroid gland reported a sensitivity of 77%, specificity of 100%, and diagnostic accuracy of 97.7%¹⁶. Similarly, a study conducted by Nggada et al. in a teaching hospital in Nigeria reported a sensitivity of 88.9%, specificity of 96.1%, and diagnostic accuracy of 94.2%¹⁷.

We have classified our cytological results into inadequate, benign, follicular, and malignant. This division is very helpful to clinicians in the management of patients, with specific reference to the need of thyroid surgery. As most of the benign conditions can be managed medically, it saves the patients unnecessary surgeries. In our study, only 89 out of a total of 156 cases underwent surgery for cytologically follicular / malignant diagnosis, compression symptoms or cosmetic reasons and a cytopathological correlation was established in these cases.

Inadequate samples may be because of sclerotic or calcified lesions and more commonly when there are large areas of cystic degeneration or necrosis. FNA of three patients (1.9%) yielded inadequate samples, which again correspond to other studies in which inadequate sampling had been reported¹⁸.

In our study, we classify follicular pattern separately, mainly due to the limitation of thyroid cytology to distinguish follicular adenoma from follicular carcinoma. The diagnosis of follicular carcinoma required a detailed histopathological examination for vascular and capsular invasion. As the incidence of malignancy in follicular lesions was high, surgical removal of the nodules should be considered strongly in these cases. Mundasad et al also concluded in their study that follicular and intermediate results prove to be an area of uncertainty, often resolved by diagnostic surgical resection¹⁹.

In our study, 11 cases were found to be malignant on histopathological examination (seven were papillary carcinoma). It is to be

stressed that all cases of papillary carcinoma diagnosed by FNAC were papillary carcinoma on histopathological examination also. This is in accordance with previous studies^{20,21}. The incidence of malignancy in this study was 12.4 % which is in accordance with other studies²². The incidence of malignancy can be as high as 43.6%²⁰. The incidence of papillary carcinoma in the present study was 63.6%. In the literature, incidence of papillary carcinoma varies from 50% to 80%^{20,22}.

In our experience, we observe that all patients presented with simple thyroid cyst (37%) were completely aspirated without recurrence of their cyst. So, FNA should be evaluated as a method for treating simple thyroid cysts.

Conclusions:

The findings of this study are consistent with the current published data and demonstrate that FNA cytology is a sensitive, specific and accurate initial diagnostic test for evaluation of patients with thyroid swellings. Clinicians should be encouraged to embrace this procedure as a first line investigation for the diagnosis of thyroid swellings.

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