

Fine Needle Aspiration Cytology in Thyroid Lesions: a Personal Experience

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Abstract

Background: Different invasive and non-invasive investigations are used in the diagnosis and management of thyroid. Fine needle aspiration cytology (FNAC) is a safe test, technically easy to perform and cost effective. This study was conducted to throw a light on practicing FNAC in Baghdad, Iraq.

Aim of the study: This study was conducted to throw a light on FNAC from a personal experience with thyroid disorders in Baghdad, Iraq.

Methods: A total of 79 patients of clinically diagnosed thyroid swelling was included in the study. FNAC performed and then all patients subjected to surgery. Thyroidectomy specimens were evaluated by histopathological exam.

Analysis of variance ANOVA (Is a collection of statistical models used to analyze the differences between group means and their associated procedures such as variation among and between groups) was used to examine the effect of age and duration on FNAC results.

Chi square was used to examine the effect of histopathological diagnosis on FNAC readings. Accuracy of the FNAC was assessed using 2X2 table.

Results: FNAC results was significantly affected by age of the patients ($p=0.005$), duration of thyroid swelling ($p=0.0001$) and histopathological diagnosis ($p = 0.0001$). Sensitivity, specificity, positive predictive value and negative predictive value were 75%, 57%, 94.7% and 18.2%, respectively.

Conclusion: Low negative predictive value for FNAC was reported. the accuracy of FNAC affected by the experience of the histopathologist.

Key words: FNAC, thyroid goiter, histopathology.

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Introduction

Thyroid gland disorders show a geographical variation all over the world and being higher in the endemic areas. Iraq is an endemic area [1]. Different invasive and non-invasive investigations are used in diagnosis and management of thyroid swelling. Fine needle aspiration cytology (FNAC) is a safe test, technically easy to perform and cost

effective [2]. After surgery the histopathological report may be different from FNAC.

Materials and Methods

A total of 79 patients of clinically diagnosed thyroid swelling was included in the study for a period of two year since June 2011 to July 2013.

45 patients were from a governmental surgical department and 34 patients were from a private surgical clinic in Baghdad. All patients were evaluated by thorough clinical examination, followed by routine investigations (ultrasound, Haematological study, renal function test, thyroid function test, chest X-ray, lateral neck X-ray and FNAC).

FNAC was performed with 23 gauge needle; smears were fixed by ether-95% alcohol solution and stained. After FNAC, all patients were subjected to surgery. Thyroidectomy specimens were evaluated by histopathological examination. Specimens were processed in automated tissue processing and stained. Sensitivity of FNAC in detecting benign and malignant lesions calculated.

The study population was patients with thyroid swelling looking for diagnosis, therefore, this study was carried out according to intention to diagnose design [3,4]. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) were calculated using 2 X 2 table.

Analysis of variance (ANOVA) was used to examine the effect of age of patients and duration of lesions and histopathological diagnosis on FNAC findings. Chi-square was used to examine the association between FNAC and histopathological findings. P value < 0.05 was considered as significant. FNAC can diagnose all type of thyroid lesions except follicular carcinoma because it depend on capsular invasion which only diagnosed by histopathological exam. And for this reason histopathological diagnosis affect the FNAC result.

FNAC can be classified as: C1 Insufficient for diagnosis. C2 Benign. C3 Atypia. C4 Suspicious for malignancy. C5 Malignant.

Results

The age of the patients was 38.6 ± 12.3 years with male to female ratio of 0.3:1.

FNAC findings showed that 54 (68.4%) were benign lesions, 22 (27.8%) were atypical lesions and 3 (3.8%) were suspicious malignant. The age of those diagnosed with benign lesions on FNAC was 35.6 ± 10.7 years, atypical was 42.1 ± 12.9 years and suspicious malignant was 55.3 ± 10.6 years.

There were significant differences in age of patients between different diagnostic items of FNAC ($F= 5.7$, d.f.= 2,76, $p = 0.005$). The duration of the lesions in those diagnosed with benign lesion was 5.7 ± 1.8 years, atypical lesion was 8.4 ± 2.7 years and suspicious malignant was 10.7 ± 5.1 years. There were significant differences in the duration of lesions between different diagnostic FNAC items

($f= 16.6$, d.f.= 2,76, $p = 0.0001$). These findings are shown in table 1.

The histological diagnosis of lesions were multiple nodular goiter (MNG) in 43 (54.4%) patients, toxic MNG in 8 (10.1%) patients, follicular adenoma in 11 (13.9%) patients, Hashimoto's thyroiditis in 5 (6.3%) patients, undifferentiated carcinoma in 1 (1.3%) patients, benign cyst in 5 (6.3%) patients, papillary carcinoma in 4 (5.1%) patients and Grave's disease in 2 (2.5%) patients.

There was a significant association between FNAC and histopathological diagnosis ($\chi^2= 59.5$, def. =16, $p = 0.0001$) (Table 2).

The sensitivity, specificity, PPV and NPV of FNAC for diagnosis of benign or malignant lesion were 75%, 57%, 94.7% and 18.2%, respectively, (Table 3).

Table (1): Age and duration distribution of thyroid nodule according to FNAC diagnosis.

Variable	Frequency		Age	Duration
	No.	%	Mean \pm SD	Mean \pm SD
Benign	54	68.4	35.6 \pm 10.7	5.7 \pm 1.8
Atypical	22	27.8	42.1 \pm 12.9	8.4 \pm 2.7
Suspicious malignant	3	3.8	55.3 \pm 10.6	10.7 \pm 5.1
Total	79	100.0	F= 5.7, d.f. = 2,76, p= 0.005	F= 16.6, d.f.= 2,76, p= 0.0001

Table (2): distribution of histopathological items and FNAC diagnosis.

Histopathology	FNAC diagnosis		
	Benign	Atypical	Suspicious malignant
MNG	34	9	0
Toxic MNG	3	5	0
Graves disease	1	0	0
Hashimoto's thyroiditis	3	2	0
Follicular adenoma	11	3	0
Undifferentiated ca	0	0	1
Benign cyst	4	1	0
Papillary ca	1	1	2
Total	54	22	3

$$\chi^2 = 59.5, \text{ d.f.} = 16, \text{ p} = 0.0001$$

Table (3): Accuracy of FNAC.

indicator	%
Sensitivity	(54/72) 75%
Specificity	(4/7) 57%
Positive Predictive value	(54/57) 94.5%
Negative Predictive Value	(4/22) 18.2%

Discussion

In the line of previous studies [5,6], this study showed a female predominance and the patients were in the 4th decades of their life.

In contrast with that in literature [7-10], FNAC findings classified as benign, atypical and suspicious malignant. This difference might be attributed to deterioration in health system in Iraq due to wars and widespread violence [11,12]. Deterioration in health system affects training of the medical staff

and monitoring of health services. Factors for satisfactory FNAC result include representative specimen from the lesion and experienced cytologist to interpret findings [13]. Paksoy et al [14], in their review of their private cytopathology practice of FNAC, enumerate the descriptive terminology in the clinical practice in their medical community as benign (adenomatous nodule, thyroiditis), hypercellular nodule, atypical nodule of undetermined nature, follicular lesion, Hurthle cell lesion,



suspicious for malignancy and malignant) and subtypes provided whenever possible.

The study revealed that sensitivity and specificity of FNAC in diagnosis of thyroid swelling were 75% and 57%, respectively. This finding is agreement with than that reported in literature [6,7,14]. In a previous communication, FNAC was not highly sensitive in detecting hashimoto's thyroiditis [15]. The finding of low NPV (18.2%) might be attributed to the fact that FNAC practiced in Iraq without the aid of ultrasound scanning (USS) as an aid for diagnosis. Factors implicated for this rate include technique, slide preparation and interpretation results by cytopathologist. It was also mentioned that certain thyroid pathologies have similar cytopathological features which make the diagnosis extremely difficult [16,17]. Guidance taken from recent British Thyroid Association / Royal College of Physicians [18] and the American Association of Clinical Endocrinologists (AACE) / Association Medici Endocrinologi (AME) [19] publication implicate the use of USS as an aid for diagnosis.

A significant difference in age of patients between the diagnostic items of FNAC was observed. This finding may reflect the change in epidemiology of goiter in Iraq post-iodization. Several workers [20,21] reported a change in age of patients post-iodization phase.

The finding of a significant difference in duration of thyroid lesions between FNAC diagnostic items may reflect the pathological picture of benign and malignant diseases.

The significant association between FNAC findings and histopathological picture is in agreement with that of other workers [6-8].

Conclusion

Low sensitivity of FNAC was reported. Deterioration of health system after wars, widespread violence affect training of

medical staff, which in turn affect the result of FNAC.

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