

Marking the eye of the tiger: A Prospective Study Comparing USG aided surface marked FNAC versus blind FNAC in thyroid swellings

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ABSTRACT

Introduction: Thyroid swellings are one of the most common clinical findings in the neck region. It is important to diagnose the exact pathology prior to treating such conditions. FNAC is now an inexpensive, dependable and safe diagnostic test for the assessment of diffuse thyroid pathologies and thereby, avoiding the redundant surgeries. Ultrasound guided FNAC has the potential to reduce insufficiency rates and is considered as the optimal cytological method for diagnosis. Hence in our study we intend to compare the results of marked FNAC and ultrasound-guided FNAC of thyroid swellings and find out the diagnostic reliability of marked FNAC and ultrasound-guided FNAC using histological conclusion as the gold standard.

Methods: 100 subjects with thyroid swelling were selected. They were randomly divided into two groups - marked FNAC and ultrasound-guided FNACs were performed in them respectively. The obtained findings were compared with the histopathological diagnosis. These patients subsequently underwent surgery and followed up for over 2 and half years.

Results: Ultrasound guided FNAC results revealed 64% benign lesions and 29 % of malignant lesions, and marked FNAC revealed 54% benign and 20% malignant cases. Histological gold standard diagnosis included 57 % benign and 43 % malignant cases.

Conclusion: Marked FNAC of thyroid swellings is more expedient and economic as related to ultrasound guided FNAC. Nevertheless, the diagnostic output in ultrasound guided FNAC is significantly more in terms of accurateness.

Keywords: USFNAC, Thyroid cancer, FNAC, Thyroid nodule

Introduction

Thyroid nodules characterise a common pathology in ENT & HNS, with a probable prevalence of 4-7% in the adult populace for palpable nodules. The prevalence is higher in female (5%) than in male (1%).¹ The prevalence of nodules discovered at ultrasound

examinations, autopsies, routine surgeries is significantly higher and escalates with age.²⁻⁴ However benign nodules occupy the major share in the thyroid swellings. Cancer can be seen in approximately ten percent of these nodules, based on the age, sex, radiation exposure history, family history and further factors.⁵ Recently many advances have been accomplished in thyroid nodules diagnosis. Additionally, various clinical and radiological features have been studied to increase detection rate of differentiated thyroid carcinoma. Regrettably, these features lack specificity and sensitivity,⁶⁻⁹ and none have been so far suggested for a routine use.¹⁰ FNAC has been recognized as the first line diagnostic test for thyroid lesions and has established as most valuable test for preoperative distinction of benign from malignant nodules and to endorse the diagnosis.¹¹ The precision of FNAC and the insufficiency rates are predisposed by operative technique, experience and the consistency of inserting the needle into the area of interest chiefly in cystic nodules. Ultrasound guided FNAC has the potential to lessen inadequacy rates, to facilitate accurate targeting of the lesion, to sample the part most likely to yield diagnostic material and to sample the solid portion of cystic nodules which are too small for palpation.¹² Lately, ultrasound guided FNAC augmented the sensitivity ranging from 65% to 98%, while; the specificity ranges from 72% to 100%, with overall precision for cytological diagnosis approaches 95%.¹³⁻¹⁸ However not all centers have USG guided FNAC facility. This study was done to compare the results of a marked FNAC (FNAC site , pre marked by a radiologist and FNAC done later at the site) v/s live ultrasound-guided FNAC for the diagnosis of thyroid swellings, taking the gold standard as the histopathological findings.

Materials and Methods

Our study was done for one year at the department of ENT, Believers Church Medical College Hospital. We selected 137 subjects with the thyroid swelling with TIRADS III or above USG score. After informed consent and the exclusion of few subjects the final sample was a total 100 patients were included in study. Only those subjects who subsequently underwent surgery were considered. Subjects were randomly divided into two groups – the marked FNAC group and the ultrasound guided FNAC. FNAC was done as per the group they were allotted to and subjects subsequently underwent surgery and histopathological examination of the specimen was done and subsequently compared with FNAC findings.

Results

In our study the age of patients ranged from 10 to 70 years, with majority between 20-40 years. 80 patients were females and 20 patients were males. The male: female ratio was 1: 4. Durations of symptoms ranged from 1 month to 3 years. At the time of surgery all patients were euthyroid. The findings of the marked FNAC group suggest that, majority (64%) were benign, 20% were malignant; the USG guided FNAC group shows 62% were benign and 38 % were malignant; histopathological 57% subjects had benign lesions and 43% had malignant lesions. (Table 1)

Sensitivity, specificity, positive predictive value and negative predictive value:

Comparison of marked FNAC with histopathology showing Sensitivity and specificity of marked FNAC as compared to HPE was 91.48% and 87.7% respectively. Positive Predictive Value (PPV) and Negative Predictive Value (NPV) was 84.31% and 93.4% respectively. (Table 2)

Comparison of USG guided FNAC as compared to HPE was 97.7%, 92%, 89.58% and 98.27% respectively. (Table 3)

Table 1: Comparison of the findings by the FNAC and the USFNAC.

Variable	Findings	Frequency		Percentage %			
Age	10-70 years	10-19	20-40	41-70	17	43	40
	FNAC (n=100)	USFNAC (n=100)		Histological			
	Frequency	%	Frequency	%	Frequency	%	
No material	15	15%	-	-	-	-	
Colloid, Macrophages, lymphocytes, follicular cells no	10	10%	-	-	-	-	
Thyroiditis	2	2%	4	4%	3	3%	
Colloid goiter	42	42%	51	51%	3	3%	
Colloid goiter with papillary hyperplasia	7	7%	1	1%	51	51%	
Follicular neoplasm	4	4%	6	6%	6	6%	
Medullary carcinoma	1	1%	1	1%	1	1%	
Papillary carcinoma	19	19%	37	37%	36	36%	

Table 2: Predictive value for the FNAC.

Sensitivity=a/a+b	43/43+4= 91.48
Specificity=d/d+c	57/57+8= 87.7%
PPV =a/a+c	43/43+8= 84.31
NPV =d/b+d	57/57+4= 93.4%

Table 3: Predictive value for the USFNAC

Sensitivity= $a/a+b$	$43/43+1= 97.7$
Specificity= $d/c+d$	$57/57+5= 92\%$
PPV = $a/a+c$	$43/43+5= 89.58$
NPV = $d/b+d$	$57/57+1= 98.27\%$

Discussion

Although, Papillary thyroid cancer (PTC) is one of the common thyroid malignancy, they are often diagnosed as incidental discoveries when operated on for indications other than alleged malignancy.²² Thus diagnosing PTC prior to surgery is the requirement of the hour. Fine needle aspiration (FNA) is the key tool in diagnosing PTC; but false negative results are very common particularly in deep seated lesions. USG guided FNA (US FNA), is an established technique in precisely obtaining positive samples for diagnosis of swellings.²³ However, US FNA is a highly trained and operator dependent process. Dynamic live USG guided FNAC requires an ambidextrous radiologist. Thus, US FNACs are time consuming and costly. USG guidance will have clear advantage over blind FNA in small lesions, deep seated lesions, multiple lesions and proximity of great vessels. The importance of FNAC investigation in the diagnosis of thyroid tumours has been well established as this is a safe and cost effective diagnostic procedure; the cost of FNAC is minimal, equipment is inexpensive and the technique is simple.^{19,20} FNAC is a well-established method and its reliability depends on multiple factors, such as the skill of the physician or the experience of the cytopathologist. Use of ultrasonography in FNAC increases significantly the sensitivity, specificity and accuracy compared with conventional palpation-guided FNAC.¹⁷ In our study, it was perceived that majority of patients presented between age group of 21 to 40 years with mean age of 34 years. Youngest patient was 11years old boy and eldest was 68 years old male. Our observation was in unison with study of M. Morris et al⁹ who had mean age of 36.5 years and RD Bapat et al who had median age 35 years. Many studies report the majority of the patients with thyroid swellings to be women. In this study also we observed that the majority subjects were women. In our study 80% patients were female and 20% were male with female: male ratio of 4:1. In a study conducted by Morris et al⁹ they found 46 (83.6%) females and 9(16.4%) males. Söderstrom et al¹¹ in their study also observed that 90% of the patients were females and males comprised of only 10%. In our study marked FNAC of thyroid swelling in 15 (15%) cases sample obtained was inadequate; in 54(54%) cases lesions were benign and 20 (20%) cases were malignant. On USG guided FNAC 64 (64%) subjects had benign pathology, 29 (29%) subjects had malignant disease. Mundasad B et al reported that FNAC analysis showed 13.88% non-neoplastic, 65.27% neoplastic and 4.16% suspicious aspirate; 13.88% samples were inadequate and 2.77% samples were indeterminate. The inadequate (non-diagnostic) sampling rate of 15% was similar to 14.55% by Morris et al⁹, 12 to 19 % rates stated by Cai et al¹² and 14% by Gharib¹³. In our study the sensitivity and specificity of marked FNAC and USG guided FNAC in predicting thyroid malignancies was 91.48%, 87.7% and 97.7%, 92% respectively. This was similar to that of Morris et al⁹, who obtained values as 56.25 % and 100 %; and 63.64% and 96.97% respectively. The positive predictive value and negative predictive for blind FNAC and ultrasound guided FNAC with histopathology as the gold standard was 84.31%, 93.4%; and 85.58% , 98.27% respectively were found to be similar to 100 % and 75.86%; and 93.3% and 80 % respectively; as obtained by M Morris et al. These findings were also comparable to the findings of the study conducted by Moon H et al who reported that ultrasound guided FNAC has a high diagnostic accurateness with the sensitivity and specificity of 65% to 98% and 72% to 100% respectively⁽²¹⁾. Ogawa Y et al in their retrospective⁽²¹⁾ study of 1012 samples from 806 thyroid nodules by USG guided method reported that the precision of FNAC as 75 % and the rate of indeterminate diagnosis as 16 %. The false negative rate was 13 % and the positive

malignancy rate was 99 %.¹ We propose that surface marking of the suspected thyroid nodule with respect to bony / cartilaginous prominences in two planes along with depth, can increase the efficiency of the usual FNAC. Testing this technique with different operators, can evaluate the reproducibility of the same in different neck conditions.

Conclusion

Although FNAC has been established as the first line diagnostic test for thyroid lesions and has proven to be the most valuable modality for preoperative distinction of benign from malignant nodules and to confirm the diagnosis. Nevertheless, the diagnostic yield in ultrasound guided FNAC is significantly greater in terms of accuracy especially in cystic lesions and small swellings. Marked FNACs can help bridge the gap between the two, especially in developing countries where USG guided FNACs are not routinely available.

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