

An analysis of role of FNAC for diagnosing thyroid cancer

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ABSTRACT

Background: FNAC has been considered as gold standard investigation tool for diagnosing thyroid disorders. Majority of studies in past had included both benign and malignant thyroid disorder to evaluate the role of FNAC. This article analyses the role of FNAC in diagnosing thyroid carcinoma.

Materials and Methods: The patients who underwent surgery for thyroid cancer from January 2005 to January 2011 were evaluated retrospectively.

Results: There were 4 (6.1%) false-positive, and 17 (26.1%) false negative FNAC results. Sensitivity and specificity were 71.2% and 33.3% respectively. Positive predictive value and negative predictive values were 91.3% and 10.5% respectively. The FNAC showed only papillary and follicular malignancy. The medullary and anaplastic carcinomas were not diagnosed on FNAC.

Conclusion: FNAC has low sensitivity and specificity for diagnosing thyroid cancer and histological subtypes.

Keywords: Fine needle aspiration cytology, thyroid carcinoma, sensitivity, specificity.

INTRODUCTION

A thyroid nodule is a common condition (clinical and radiological prevalence of 7% and 40%, respectively). The yearly incidence of carcinoma thyroid is 0.004% while that of thyroid nodule is 0.1%.¹ Soderstorm described fine needle aspiration cytology (FNAC) in 1952.² Now it is the gold standard investigation for carcinoma thyroid. There are many articles on the role of FNAC in thyroid disorders including benign & malignant both. While, there are very few articles in which only thyroid carcinoma cases suspected clinically or by FNAC has been correlated with the histopathology. We analysed the role of FNAC in diagnosing thyroid carcinoma.

MATERIALS AND METHODS

The present study was conducted in the department of surgery and surgical oncology at Pt. B. D. Sharma University of Health Sciences, Rohtak. The patients who underwent surgery for thyroid cancer from January 2005 to January 2011 were evaluated retrospectively. Total 65 patients were operated with age ranged between 13-80 years & female to male ratio of 3.9:1. Of total 65 patients operated for suspected thyroid cancer, 46 presented with Goitre only, 13 with Goitre along with Neck Nodes while 6 presented with Neck Nodes only without thyroid enlargement. All patients underwent FNAC prior to surgery. FNAC was preferably done from goitre and from lymph nodes if it was negative from goitre or patient presented with neck nodes without goitre. The patients were operated for thyroid cancer on the basis of strong clinical suspicion of malignancy and/or positive fine needle aspiration cytology (FNAC) for malignancy. Surgical specimen was sent to department of pathology for final histopathology evaluation. Then we analysed the FNAC and the final histopathology diagnosis.

RESULTS

Out of the 65 patients who underwent surgery for suspected thyroid cancer, 3 patients turned out have benign goitre but were reported to have thyroid cancer on FNAC while 3 patients who presented with goitre along with enlarged neck nodes which reported metastatic thyroid cancer on FNAC turned out to have malignancy other than thyroid. Total 59 patients who had thyroid malignancy on final histopathology, FNAC from goitre was positive for malignancy in 36 patients while negative in 17 patients. FNAC from enlarged neck nodes was done in 6 patients who presented with neck nodes without goitre and all of them reported to have metastatic thyroid cancer [table 1].

Table 1: Analysis of patients operated for suspected thyroid cancer (N=65)

Final Histopathology	Cytology from Goitre		Cytology from neck nodes	
	Positive for thyroid cancer	Negative for thyroid cancer	Positive for thyroid cancer	Negative for thyroid cancer
Thyroid cancer (N=59)	36	17	6	0
Benign (N=3)	3	0	0	0
Non thyroidal malignancy (N=3)	0	0	3	0
Total (N=65)	39	17	9	0

FNAC was positive for malignancy in 46 (70.7%) patients, negative for malignancy in 11 (16.9%) patients, indeterminate for malignancy in 7 (10.7%) patients and inconclusive in 1 (1.5%) patient. Forty six patients in whom FNAC positive for thyroid malignancy, 42 (91.3%) patients had thyroid cancer, 3 (6.5%) patients had non thyroid malignancy while 1 (2.2%) patient had benign disease on final histopathology after surgery. Eight out of 11 patients in whom FNAC was negative for malignancy had positive excision biopsy elsewhere, underwent completion surgery while 3 out of 11 were operated on strong clinical diagnosis, had thyroid malignancy on final histopathology after surgery. Seven patients whose FNAC was indeterminate had thyroid malignancy in 5 (71.4%) and benign lesion in other 2 (28.6%) patients on histopathology. One patient who had inconclusive FNAC had thyroid malignancy on histopathology [Table 2].

Table 2: Correlation of FNAC with final histopathology (N=65)

FNAC report		Final histopathology report		
		Thyroid malignancy (59)	Non-thyroid malignancy (3)	Benign thyroid lesion (3)
Positive for malignancy (46)		42 (91.3%)	3 (6.5%)	1 (2.2%)
Negative for malignancy (11)		11 (100%)	0	0
Inconclusive (1)		1 (100%)	0	0
Indeterminate (7)	Follicular neoplasm (2)	1 (50%)	0	1 (50%)
	Hurthle cell neoplasm (2)	1 (50%)	0	1 (50%)
	Suspicious for malignancy (3)	3 (100%)	0	0

The false-positive and false negative FNAC results are shown in [Table 3].

Table 3: Showing FNAC results (N=65)

FNAC results	Final histopathology		Total
	Positive for thyroid cancer	Negative for thyroid cancer	
Positive	42 (64.6%)	4 (6.1%)	46
Negative	17 (26.1%)	2 (3.0%)	19
Total	59	6	65

Sensitivity, specificity, positive predictive value and negative predictive values of FNAC are shown in [Table 4].

Table 4: Showing FNAC results (N=65)

FNAC results	Percentage
Sensitivity	71.2%
Specificity	33.3%
Positive predictive value	91.3%
Negative predictive value	10.5%

The FNAC showed only papillary and follicular malignancy. The medullary and anaplastic carcinoma was not diagnosed on FNAC

DISCUSSION

The assessment of the patient with a thyroid disease includes triple assessment by clinical examination, cytology and imaging. Thyroid function tests are helpful to diagnose hyper or hypo thyroidism while serum Calcitonin levels are diagnostic for medullary thyroid cancer. Facilities of thyroid scan are not available widely and specificity is also very low for diagnosis of malignancy. Therefore, FNAC is being performed on an increasing number of patients who are suspected to have thyroid malignancy clinically due to simplicity, low cost and absence of major complications. Thus, when malignancy is suspected clinically, aspiration cytology is the important factor governing the management decision but high false positive, false negative and indeterminate FNAC results complicate the management of patients.

In the present study there were 4 (6.1%) false-positive, and 17 (26.1%) false negative FNA results. There were 10.8% indeterminate FNAC results. Davidson retrospectively analysed the malignant thyroid histopathology reports and preoperative thyroid FNAC reports of same patients.^[4] He found that total 26% FNAC reports were negative for malignancy and 74% FNAC were reported as positive for thyroid malignancy. He concluded that FNAC could underestimate the true incidence of thyroid malignancy.

In a similar study by Sclabas et al the false positive, false negative and indeterminate results were 4%, 4% and 42% respectively.^[5] Sensitivity and specificity were 71.2% and 33.3% respectively. Positive predictive value and negative predictive values were 91.3% and 10.5% respectively. The FNAC showed only papillary and follicular malignancy. The medullary and anaplastic carcinomas were not diagnosed on FNAC.

In the present study, the sensitivity and specificity of FNAC of thyroid were 71.2% and 33.3% respectively. Positive predictive value and negative predictive values were 91.3% and 10.5% respectively. The FNAC showed only papillary and follicular malignancy. The medullary and anaplastic carcinomas were not diagnosed on FNAC.

Cap et al reported 86% sensitivity, 74% specificity, 34% positive predictive value and 97% negative predictive value of thyroid FNAC.^[6] They had both benign and malignant disorders of thyroid to evaluate these results. Most of the studies on cytological diagnosis of thyroid disorder have included those patients which are clinically diagnosed as benign as well as malignant thyroid nodules. There are very few studies in literature where the results of only clinically malignant thyroid nodules have been analysed for FNAC results and final histopathology correlation.

Furthermore, these differences in reporting are those related to sampling techniques, the skill of physician performing the aspiration, the experience of pathologist interpreting the aspirate and overlapping cytological features between benign and malignant follicular neoplasm. In our study all patients who were clinically diagnosed as thyroid cancer underwent thyroid surgery despite negative FNAC results. In other studies very small percentage of patients with FNAC results negative for malignancy undergo surgery. Hence true incidences of false negative results are not known in these studies.

Apart from low sensitivity and specificity, there are two more problems associated with thyroid FNAC as evident from the present study. One is that it diagnosed other malignancy as thyroid cancer and other is that it failed to diagnose the type of thyroid cancer. All these problems resulted in to the wrong treatment of patients. In those situations where FNAC is positive for malignancy from nodes only, thyroid scan can be of great help in diagnosing the thyroid malignancy accurately. So, despite cost-effective and rapid diagnostic tool, FNAC has poor sensitivity and specificity for diagnosing thyroid cancer and its histological type. Thyroid scan and frozen section should be used before contemplating the surgery. Since PET scan is increasingly available its role in diagnosis of thyroid cancer should be evaluated in future.

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