

The predictivity of thyroid fine-needle aspiration biopsy varies depending on the radiologist experience: A retrospective cohort study

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Abstract

Aim: To compare thyroid fine-needle aspiration biopsy with histopathological examination results.

Material and Methods: Postoperative histopathological examination results of 361 patients, who were thyroidectomized between December 2010 and October 2017 in Inonu University Turgut Ozal Medical Center Department of General Surgery and whose preoperative FNAB registries we could reach were evaluated retrospectively. Biopsies made in external centers were included in preoperative FNAB results. FNAB results were examined according to Bethesda 2007 in 6 categories: unsatisfactory, benign, atypia of undetermined significance, follicular lesion-neoplasm or suspicious for a neoplasm, suspicious for malignancy and malignant. Histopathological results of patients with incidental malignancy were presumed benign.

Results: Among the 361 patients that were included in the study, 274 were female (75.9%), 87 were male (24.1%). Mean age of the patients in the benign group was 49.1±12.5 years, and 48.6±13.5 years in the malignant group. It was found that FNAB's sensitivity was 83.9 %, specificity was 92.4%, false positive rate was 16.1% and false negative rate was 7.6%.

Conclusion: FNAB is reported as the gold standard for preoperative evaluation of thyroid nodules. In our study, however, it was seen that FNAB was not adequate alone to detect malignancy. This situation suggests the importance of collaboration between radiologist, cytopathologist and clinician.

Keywords: Thyroid; fine-needle aspiration biopsy; bethesda classification.

INTRODUCTION

Thyroid nodules are very common thyroid pathologies. Thyroid nodules, which can be detected by palpation at a rate of 5%, can be detected by high resolution ultrasonography at a rate of 19-67% and in autopsy series by 50% (1). Thyroid function tests used in the diagnosis of thyroid nodules, mostly known to be benign, can give clues indicating they might be malignant with scintigraphy and ultrasonography, nevertheless, the distinction of benign and malignant lesions cannot be made precisely.

Although thyroid nodules are very common, thyroid malignancies are rare and account for 1% of all malignant neoplasms (2). Most of the thyroid malignancies are slowly progressive and early diagnosis is important so

that the process could prolong life following the treatment. The aim of the diagnosis of thyroid nodules is to quickly and accurately diagnose and treat a small number of malignant nodules and to protect the patients with benign nodules from unnecessary surgical procedures (3).

The most valuable method used today in the diagnosis of thyroid nodules is fine-needle aspiration biopsy (FNAB) (4). FNAB protects patients from unnecessary surgery by allowing us to decide whether treatment will be surgical or conservative by separating benign nodules from malignant nodules (5). However, FNAB may not always give adequate or accurate information regarding the characteristic of the thyroid nodule. In such cases, histological compliance of thyroid cytology results with tissue specimen such as surgical or core biopsy should be examined (6).

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In this study, we aimed to determine the efficiency of FNAB by comparing the histopathological results of thyroidectomy materials with preoperative thyroid FNAB made in our hospital.

MATERIAL and METHODS

Postoperative histopathological examination results of 361 patients whose preoperative FNAB registries could be reached and who were thyroidectomized between December 2010 and October 2017 in Inonu University Turgut Ozal Medical Center Department of General Surgery were evaluated retrospectively. Biopsies made in external centers were included in preoperative FNAB results. FNAB results were examined according to Bethesda 2007 in 6 categories as: unsatisfactory, benign, atypia of undetermined significance, follicular lesion-neoplasm or suspicious for a neoplasm, suspicious for malignancy and malignant. Histopathological results of patients with incidental malignancy were considered to be benign.

RESULTS

Of 361 patients that were included in the study, 274 were female (75.9%), and 87 were male (24.1%). Mean age of the patients in the benign group was 49.1 ± 12.5 years, and 48.6 ± 13.5 years in the malignant group (Table-1).

As a result of the cytological examination of the patients, it was found that the rate of inadequate material was 16.7% (n=60), the benign result was 32.9% (n=119), the malignant result was 8.6% (n=31), the suspicious result was 22.4% (n=81), the rate of atypia of undetermined significance was 5.5% (n=20), follicular neoplasia or suspicion was 13.8% (n=50). The histopathological results of patients who underwent surgery were compared with

FNAB results. It was seen that malignancy was detected as a result of histopathological examination in 9 of the patients which were evaluated as benign in cytological examination (7.6 %), and in 5 (8.3%) of the patients with inadequate material, in 3 (15%) of the patients with atypia of undetermined significance, in 16 (32%) of the patients with follicular neoplasia or suspicion, in 40 (49.4%) of the patients with malignancy suspicion and in 26 (83.9%) of the patients reported as malignant (Table-1). As a result of histopathological examination of 31 patients evaluated as malignant in cytological examination; 24 were diagnosed with papillary carcinoma (PC), 3 with nodular colloid hyperplasia, 2 with chronic lymphocytic thyroiditis, 1 with follicular carcinoma (FC) and 1 with lung adenocarcinoma metastasis. Histopathological diagnosis of 81 patients with cytologically suspected malignancy were 31 with PC, 4 with FC, 2 with anaplastic carcinoma (AC), 2 with medullary carcinoma (MC), 2 with differentiated thyroid carcinoma, 1 with minimally invasive Hurthle cell carcinoma, 19 with colloid hyperplasia, 7 with follicular adenoma (FA), 7 with Hashimoto's thyroiditis, 4 with chronic lymphocytic thyroiditis, 1 with dysmorphogenetic goiter and 1 with adenomatous Hurthle cell goiter. Histopathological examinations of 102 patients with benign cytology: 75 was nodular colloid hyperplasia, 11 was chronic lymphocytic thyroiditis, 10 was FA, 3 was adenomatous Hurthle cell nodules, 2 was well-differentiated tumors, 1 was Hashimoto's thyroiditis. Histopathological examinations of 102 patients with atypia of undetermined significance cytology; 13 was nodular colloid hyperplasia, 5 was papillary microcarcinoma (PMC), 2 was FA. The sensitivity of FNAB was 83.9%, specificity was 92.4%, false-positive rate was 16.1% and false-negative rate was 7.6%.

Table 1. Characteristics of the patients included in the study

	Benign	Malign*	Risk of malignancy according to Bethesda system (%)	Total
Age	49.1 ± 12.5	48.6 ± 13.5		
Gender				
Male	66 (75.9%)	21 (24.1%)		87
Female	181 (66.1%)	93 (33.9%)		274
Bethesda System				
1 (Nondiagnostic or Unsatisfactory)	54 (90%)	6 (10%)	1-4	60
2 (Benign)	102 (85.7%)	17 (14.3%)	0-3	119
3 (AUS**or FLUS***)	15 (75%)	5 (25%)	5-15	20
4 (Follicular neoplasm or Suspicious for a follicular neoplasm)	32 (64%)	18 (36%)	15-30	50
5 (Suspicious for malignancy)	39 (48.1%)	42 (51.9%)	60-75	81
6 (Malign)	5 (16.1%)	26 (83.9%)	97-99	31
Total	247 (68.4%)	114 (31.6%)		361

* Malignancy subgroups: Papillary carcinoma n: 66 (57.9%), Papillary microcarcinoma n: 32 (28.1%), Follicular carcinoma n:10 (8.8%), Anaplastic carcinoma n: 3 (2.6%), medullary carcinoma n: 2 (1.8%), Lung adenocarcinoma metastasis n:1 (0.9%)

** AUS: Atypia of undetermined significance

*** FLUS: Follicular lesion of undetermined significance

DISCUSSION

Although thyroid nodules are common, there is no definitive algorithm for diagnosis and treatment. Thyroid nodules, which can be detected by palpation at a rate of 5%, can be detected by high resolution ultrasonography at a rate of 19-67% and in autopsy series by 50% (1). Thyroid malignancies are rare and constitute 1% of all malignant neoplasms (2). The rate of malignancy in patients after thyroidectomy is reported in the literature between 2.6-10.7% (7). While evaluating thyroid nodules, the aim is to differentiate the benign from the malignant and to protect the patient from unnecessary surgical procedures if there are no pressure symptoms. When performing thyroid nodules, a comprehensive medical history should be taken, and a physical examination should be performed for the indication of surgery. Afterwards, methods such as thyroid scintigraphy, ultrasonography, thyroid suppression response therapy and FNAB are used. Thyroid FNAB is a reliable, easy to apply, cheap and sensitive diagnostic method, so it is recommended as a preliminary diagnostic test (8).

Thyroid FNAB cases are divided into 6 groups according to the Bethesda system and each group carries the risk of malignancy at varying rates. These rates are 1-4% in the unsatisfactory group, 0-3% in the benign group, 5-15% in the atypia of undetermined significance/follicular lesion of undetermined significance group, 15-30% in the follicular neoplasm/suspicious group, 60-75% in the suspicious for malignancy group and 97-99% in the malignant group (9). In our study malignancy was detected at the rates as: 8.3 % in unsatisfactory group, 7.6 % in the benign group, 15 % in the atypia of undetermined significance/ follicular lesion group, 32 % in the follicular neoplasm/ suspicious group, 49.4 % in the suspicious for malignancy group and % 83.9 in the malignant group. While in our study, histological malignancy emergence rate was found to be higher in the cytologically unsatisfactory and benign group compared to the literature, histologically malignancy rate was lower in cytologically malignancy group. We think that this situation depends on the continuous change of radiology team of thyroid FNAB in our hospital and thus failure to obtain diagnostic biopsy material from the appropriate lesion due to inexperience.

The sensitivity of thyroid FNAB, which is seen as the first step in the evaluation of thyroid nodules, varies between 80-89% and its specificity varies between 47.4-100% (10). In our study, the sensitivity and specificity of thyroid FNAB were 83.9% and 92.4% respectively. Sensitivity rate decreases to 58.9% when suspicious for malignancy cases are included in malign cases. Our findings are consistent with the literature.

The affecting factors are FNA results include the nodule size, tumor type, US features, operator experience, number of passes needed for FNA, and experience available for cytologic interpretation (14). The most important factor affecting the sensitivity of thyroid fine needle aspiration biopsy is the magnitude of the thyroid nodule when the

experience of the ultrasound examiner and the cytological evaluation are excluded. For large nodules (>40 mm) and tiny nodules (≤5 mm), nondiagnostic and false-negative FNA results remain a problem(14-16). While in our study, histological malignancy emergence rate was found to be higher in the cytologically unsatisfactory and benign group compared to the literature, histologically malignancy rate was lower in cytologically malignancy group. We think that this situation depends on the continuous change of radiology team of thyroid FNAB in our hospital and thus failure to obtain diagnostic biopsy material from the appropriate lesion due to inexperience.

It has been reported that instead of the sensitivity and specificity ratios, false negative and false positive rates should be used in evaluating the success of FNAB (11). Some researchers found the false negative rate of FNAB to be 0-1% and false positive rate to be less than 5% (12,13). In our study, false positivity rate was 16.1% and false negativity rate was 7.6%, which is higher than the literature. Among the reasons might be: inadequate cytological sampling, failure to take cytology from the dominant nodule and/or insufficient evaluation.

CONCLUSION

In conclusion; FNAB is reported as the gold standard for preoperative evaluation of thyroid nodules. In our study, however, FNAB was seen to be not enough alone to detect malignancy. According to our results, malignancy rate in benign group was higher than expected (7.6% vs. 0-3%) compared to Bethesda classification, malignancy rate in suspicious for malignancy and malign groups were lower than expected compared to Bethesda classification (% 49,4 vs. 60-65%, 83.9% vs. 97-99%). This situation suggests the importance of collaboration between radiologists, cytopathologists and clinicians.

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