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Correlatıon of The Results of FNAC and Hıstopathologıcal Examınatıons in Thyroıd Nodules

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ABSTRACT

We aimed to evaluate the effectiveness of Fine Needle Aspiration Cytology(FNAC) in thyroid nodules by comparing the thyroid FNAC results and histopathological results of patients who underwent thyroidectomy surgery in our clinic.

FNAC results of 1229 patients who underwent thyroidectomy for various indications in the General Surgery Clinic at Van Yuzuncu Yil University, Faculty of Medicine Hospital between January 2014 and December 2020 were categorized according to the Bethesda reporting system and compared with histopathological results.

The cases were between ages of 18-78 with the mean age of 45.22 years and the female/male ratio was 1032(%84) /197(%16). According to the FNAC results, 8% of the patients were Bethesda-3, 12% were Bethesda-4, 33% were Bethesda-5, and 47% were Bethesda-6. According to histopathological results, malignancy was detected in 9.2% of patients in Bethesda-3, 22.8% of patients in Bethesda-4, 78.8% of patients in Bethesda-5, and 97.9% of patients in Bethesda-6. Malignancy detection rates were compatible with Bethesda 4, 5 and 6, but were incompatible with the Bathesda 3 category. We found a sensitivity of 95.4%, a specificity rate of 67%, a positive predictive value of 90% and a negative predictive value of 82%, and an accuracy rate of 89%.

FNAC is an effective and reliable method in the evaluation of thyroid nodule.

Keywords: Thyroid nodule, FNAC, histopathology

Introduction

Thyroid nodules are a common endocrine problem in the clinic (1). Its incidence increases with age and low iodine intake; nodules are detected ultrasonographically in more than half of adults (2, 3). The incidence of nodules in the female population is four times higher than in men (3). The incidence of thyroid cancer has increased in the last 2 decades due to the more frequent radiological imaging, (4, 5). Ultrasound(USG) is used as a clinical examination and imaging method in the evaluation of thyroid nodules. The radiological gold standard method for assessing cancer risk is USG, which is superior to CT or MRI (6).

FNAC is used to reveal whether suspicious nodules detected by USG are malignant or not. FNAC is a simple, safe and inexpensive method. The success rate increases when FNAC is performed under USG guidance (7, 8). The Bethesda System for Reporting Thyroid Cytopathology, was developed in 2009 with the aim of reducing uncertainty in the evaluation of thyroid nodules, providing standardization in terms of language and expression, and creating appropriate treatment plans for patients. This system defined the cytological results in a standard and categorical way into 6 separate categories and malignancy rates for each category and includes recommendations. The reporting system, which has been used extensively after its definition was revised twice in 2017 and 2023. (9-11).

This study aimed to compare the FNAC results which was performed in our clinic with histopathological results by categorizing them according to the Bathesda reporting system and to evaluate the effectiveness of FNAC in thyroid nodules.

Material and Methods

Patients who underwent thyroid surgery, aged between 18-80 years, at Van Yüzüncü Yıl University Faculty of Medicine, Department of General Surgery, between January 2014 and December 2020, were scanned and patients who underwent bilateral total thyroidectomy and unilateral thyroidectomy (Hemithyroidectomy) were included in the study. The medical records of patients were retrieved from the hospital patients' database system. Patients in which

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Table 1: The 2023 Bethesda System for Reporting Thyroid Cytopathology: Diagnostic Categories

I. Nondiagnostic
Cyst fluid only
Virtually acellular specimen
Other (obscuring blood, clotting artifact, drying artifact, etc.)
II. Benign
Consistent with follicular nodular disease (includes adenomatoid nodule, colloid nodule, etc.)
Consistent with chronic lymphocytic (Hashimoto) thyroiditis in the proper clinical context
Consistent with granulomatous (subacute) thyroiditis
Other
III. Atypia of undetermined significance
Specify if AUS-nuclear atypia or AUS-other
IV. Follicular neoplasm
Specify if oncocytic (formerly Hürthle cell) type
V. Suspicious for malignancy
Suspicious for papillary thyroid carcinoma
Suspicious for medullary thyroid carcinoma
Suspicious for metastatic carcinoma
Suspicious for lymphoma
Other
VI. Malignant
Papillary thyroid carcinoma
High-grade follicular-derived carcinoma
Medullary thyroid carcinoma
Undifferentiated (anaplastic) carcinoma
Squamous cell carcinoma
Carcinoma with mixed features (specify)
Metastatic malignancy
Non-Hodgkin lymphoma
Other

AUS, atypia of undetermined significance

FNAC results and histopathological results could not be obtained and cases in which completion thyroidectomy was performed were excluded from the study.

FNAC results were compared with The Bethesda System for Reporting Thyroid Cytopathology (table 1) and histopathological results. The study was initiated with the decision number 08 and dated 30.09.2020 of the Clinical Research Ethics Committee of Van YYU Faculty of Medicine.

Results

1801 patients underwent thyroid surgery during the study period. According to the exclusion criteria, 572 patients were excluded from the study and 1229 patients were included in the study. 1032 (84%) of the patients were female and 197 (16%) were male. The cases were between the ages of 18-78 and the mean age was 45.22. Bilateral total thyroidectomy was performed in 971 (79%) patients and hemithyroidectomy was performed in 258 (21%) patients (Table 2). Multinodule was detected in 909(%74) patients and single nodule was detected in 320(%26) patients. According to the FNAC results, 8% of the patients were Bethesda-3, 12% were Bethesda-4, 33% were Bethesda-5, and 47% were Bethesda-6 (table 3).

When cytology results were compared with histopathological results, malignancy was detected in 9.2% of patients in Bethesda-3, 22.8% in patients in Bethesda-4, 78.8% in patients in Bethesda-5, and 97.9% in patients in Bethesda-6 (table 3). The malignancy risk ratio of the Bethesda scoring system and the malignancy rates in our case series and their

Table 2: Distribution of Surgeries By Gender

Surgery type	Female	Male	Total
Bilateral total thyroidectomy	814	157	971
Hemithyroidectomy	218	40	258

Table 3: FNAC Results and Histopathology Results of The Patients İncluded İn The Study

	Histopathology results		
FNAC Results	Benign	Malign	Total
Bethesda-3	88	9 (%9,2)	97(%8)
Bethesda-4	115	34 (%22,8)	149(%12)
Bethesda-5	86	320 (%78,8)	406(%33)
Bethesda-6	12	565 (%97,9)	577(%47)

Table 4: Comparison of Malignancy Risk Rates In The Bethesda System With Malignancy Risk Rates In Our Study

Diagnostic category	ROM Mean % (range)	Malignancy rates according to our results, %	Result
Nondiagnostic	13 (5–20)		
Benign	4 (2–7)		
Atypia of undetermined significance	22 (13–30)	9.2	P=0,012
Follicular neoplasm	30 (23–34)	22.8	P=0,210
Suspicious for malignancy	74 (67–83)	78.8	P=0,319
Malignant	97 (97–100)	97.9	P=0,610

ROM, risk of malignancy
P<0,05 shows statistical significance

compatibility are shown in table 4. Malignancy detection rates were compatible with Bethesda 4, 5 and 6, but were incompatible with the Bathesda 3 category. Sensitivity was found to be 95.4%, specificity rate was 67%, positive predictive value was 90% and negative predictive value was 82%, and the accuracy rate was 89%.

Statistical Analysis: Descriptive statistics were presented as count and percentages for the categorical variables. Z test was used for comparison of two proportions of for the groups. In addition, diagnostic statistics (Sensitivity, Specifity etc.) also computed to evaluate of FNAC compared to gold standard test histopathology results. Statistical significance level was considered as 5% and MINITAB for windows (ver:14) statistical program was used for all statistical computations.

Discussion

The incidence of thyroid nodules is reported to be 5-33%; and the incidence of cancer in nodules is reported to be 5-15%. (12-16) . Due to the risk of serious complications of thyroid surgery, such as recurrent nerve paralysis and hypoparathyroidism, nodule-related robust evaluations should be made to avoid unnecessary surgeries in patients with nodules.

The main purpose of evaluations for a nodule detected by palpation or radiologically is to determine whether the nodule contains malignancy. The gold standard method in nodule evaluation which is also the same method that we are using is Ultrasound(USG). FNAC, a simple and safe method, is performed to reveal whether suspicious nodules detected by USG include cancer. Thyroid FNAC can be performed on the nodule detected by palpation and also it can be performed under USG guidance. It has been shown in the literature that USG-guided thyroid needle biopsy has a higher success rate and lower inadequate sample rate. (17-19). FNABs were performed under USG guidance in our series.

The Bethesda System for Reporting Thyroid Cytopathology is widely used by pathologists. This reporting system provides clarity and consistency in communication between healthcare professionals, reducing the potential for confusion or

misinterpretation of results. When we compared our cancer detection rates in our series with this system (table 4), we found that Bathesda was compatible for the 4th, 5th and 6th categories, but our cancer detection rates for the 3rd category were lower. Since the 3rd category (Atypia of undetermined significance) is a difficult situation to decide on, the Bathesda reporting system recommends 4 different options for this category, such as Repeat FNA, molecular testing, diagnostic lobectomy, or surveillance. We think that our malignancy rates in our series were low because of the number of cases in this group constitutes only 8% of our total number of cases, our institution does not have molecular testing facilities, and there are 4 different treatment options for this group. We think that performing rebiopsy in patients whose FNAC results are compatible with Bethesda 3 will increase the malignancy detection rates and reduce the unnecessary surgery rates.

When we look at the literature, many studies show a strong correlation between thyroid needle biopsy cytology and histopathology results. In Banstola (2018)(20) study, 93.33% sensitivity and 100% specificity, (Brahma et al., 2013) 90% sensitivity and 74% specificity, Thapa (2014)(21) 75% sensitivity and 98.6% specificity. , Hathila (2016)(22) reports (87.5%) sensitivity and (96.15%) specificity. Considering the data in our country, Turan, G. (23) reported 92% sensitivity, Şimşek E. (24) found 65.96% sensitivity and 92.61% specificity, while Turkkan E. (25) found 47% sensitivity and 99.1% specificity. Consistent with the literature, we found a sensitivity rate of 95.4% and a specificity rate of 67% in our series.

In this study, we found a positive predictive value of 90% and a negative predictive value of 82%, and an accuracy rate of 89%. Our data were consistent with the literature as; Turan, G.(23) reported 97% positive predictive value and 92% negative predictive value, Şimşek E.(24) reported 70.45% positive predictive value and 91.06% negative predictive value and 87% accuracy rate, Çiftci F. (26) reported 32.1% positive predictive value and 86% negative predictive value and 51% accuracy rate, while Turkkan E. (25) reported 93.9% positive predictive value and 85.8% negative predictive value.

USG-guided FNAC cytology results are an effective method to determine the possibility of malignancy. We found that our Thyroid FNAC cytology results were compatible with the Bathesda reporting system and the literature. It would be appropriate to increase rebiopsy rates to obtain a better malignancy rate and reduce unnecessary surgery rates in the Bethesda 3 group (Atypia of undetermined significance).

Conflicts of interest: The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Patient permission/consent declaration : Verbal consent was obtained from the cases included in the study by calling the contact numbers registered in the system.

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