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Research Article

The Effect of Ultrasonography and Fine-Needle Aspiration Biopsy on the Decision of Thyroidectomy

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Abstract

Objectives: We aimed to reveal the effects of these two diagnostic methods on the decision of thyroidectomy by evaluating the preoperative ultrasonography (USG) and FNA results together and evaluating the treatment options and results.

Methods: In this study, patient files pathology results and operative notes of 342 patients who had thyroid surgery in the General Surgery Clinic of Diskapi Yıldırım Beyazıt Training and Research Hospital between January 2010 and December 2013 were retrospectively analyzed.Preoperative USG, diameter and character of the dominant nodule, FNAB results, surgery types and postoperative pathology results were recorded.

Results: 131 of 342 patients (38%) presented as undetermined cytology; In the literature, 20-30% of undetermined cytology has a malignancy risk, while in our study it was found to be 43%. In our study, atypia of undetermined significance and follicular lesion malignancy rate were found to be 55.5% in the result of FNAB cytology (5-10% in the literature).

Conclusion: When deciding on the type of surgery, it would be more appropriate to consider the malignancy criteria in USG along with the result of FNAB. FNAB results with USG performed in our center were found to be similar to the literature, except for two values. Different results will be more qualified with the increase of USG and FNAB experience.

Keywords: Thyroid nodules, FNAB, AUS

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Pathology related to the thyroid gland is commonly seen as endocrine pathology worldwide, and it is assumed that approximately 6,6 percent of the population has a pathology associated with the thyroid gland. These pathologies can be inflammatory, infectious autoimmune diseases of the thyroid gland and benign and malignant tumors of the thyroid gland. In this sense, nodular thyroid pathologies are the most common thyroid pathology and affect app-roximately 500-600 million people. On the other hand, single or Multinodular pathologies are the most common benign conditions in the thyroid gland, and It occurs almost as frequently as cancers in the thyroid gland. Especially since a significant part of thyroid cancers are slowly progressing, patients have a long life expectancy if they are treated early. Although many laboratory radiological and scintigraphic methods are used to diagnose these cancers, these methods are often insufficient in the differentiation of a malignant lesion. Therefore, fine-needle aspiration biopsy, an interventional procedure, is essential to differentiate benign or malign pathology.

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Therefore, performing appropriate diagnostic methods guides determining the type of treatment for the patient.

In this study, we aimed to reveal the effects of these two diagnostic methods on the decision of thyroidectomy by evaluating the results of preoperative ultrasonography (USG) and fine-needle aspiration biopsy (FNAB) together and assessing the treatment options and effects based on these results.

Methods

In this study, the files, pathology results, and operative notes of 289 female (84.5%) and 53 male (15.5%) total 342 patients who had thyroid surgery in the General Surgery Clinic of the Ministry of Health Diskapi Yýldýrým Be-yazýt Training, and Research Hospital between January 2010 and December 2013 were retrospectively analyzed. Demographic data of the patients, number of nodules in preoperative USG, diameter, and character of the dominant nodule, FNAB results, types of surgery, and postoperative pathology results were recorded.

Statistical Analysis

Statistical analyzes of our research were made using the SPSS for Windows 17.0 package program. Descriptive statistics; shown as a number of cases and (%). Categorical variables; Examined with Pearson's Chi-Square, Likeli-hood Ratio, or Fisher's Exact tests. For $P<0.05$, the results were considered statistically significant.

Results

Of the 342 patients in our study, 289 (84.5%) were female, and 53 (15.5%) were male. Of the patients, 4 (1.2%) were under the age of 20, 62 (18.1%) were between the ages of 21-40, 231 (67.5%) were between the ages of 41-65, 45 (% 13.2) was over 65 years old. There was no statistically significant difference between the group with benign FNAB results and the group with malignant results in terms of the mean age of the cases (p=0.529). The gender distribution of the patients was also homogeneous between the group with benign FNAB results and the group with malignant results (p=0.057). No USG examination in 17 (5%) patients (could not be found), single solid nodule in USG in 19 (5.9%) patients, a single cystic nodule in 1 patient (0.3%), single mixed nodule in 32 (9.4%) patients nodule, multinodular and dominant nodule were solid in 38 (11.1%) patients, multinodular and prevalent nodule cystic in 12 (3.5%) patients, multinodular and dominant nodule were mixed in 216 patients (63.2%).7 patients (2.0%) had diffuse hyperplasia. When USG findings and pathology results were compared, 13 (68.4%) of 19 patients with a single solid nodule were reported as malignant, and 6 (31.6%) as benign. one patient with a single cys-tic nodule was reported as malignant. Of the 32 patients with a single mixed nodule, 24 (75%) were reported as benign and 8 (25%) malignant. Twenty (52.6%) of 38 patients who were multinodular and had solid dominant no-dules were reported as benign, and 18 (47.4%) were reported as malignant. Ten (83.3%) of 12 patients who were multinodular and whose dominant nodule was cystic were reported as benign, and 2 (16.7%) as malignant. Of the 216 multinodular patients with mixed dominant nodules, 130 (60.2%) were reported as benign and 86 (39.8%) ma-lignant. When the nodule diameter and pathology results were compared; 11 (39.3%) of 28 patients with a dominant nodule less than 1 cm in diameter were reported as benign, and 17 (60.7%) as malignant.91 (59.9%) of 152 patients whose dominant nodules were between 1-3 cm in diameter were reported as benign and 61 (40.1%) as malignant. According to the results of FNAB, the number of patients is; 39 patients (11.4) nondiagnostic, 130 patients (38%) benign cytology, 90 (26.3%) atypia of undetermined significance, 15 (4.4%) follicular neoplasia, 18 (5.3%) malig-nancy suspected, eight patients (12.3%) were malignant, and 42 patients (12.3%) had no biopsy and could not be reached. When the patients are classified according to the type of surgery performed, 42 patients (12.3%) underwent lobectomy, 280 patients (81.9%) total thyroidectomy, 20 (5.8%) complete thyroidectomy. The distribution of age and gender of the cases was homogeneous when classified according to the operation types (p=0.362 and p=0.350); there was a statistically significant difference between the types of operations in terms of USG results. Compared to total thyroidectomy, both single solid nodule and single mixed nodule were significantly more common in patients who underwent lobectomy and complementary surgery ($p<0.05$).USG results were found to be determinative on histopathology. The rate of single solid on USG was statistically significantly higher in malignant patients than in benign ones (p=0.009). Observed that other USG findings were not determinative in differentiating malignant and benign cases ($p>0.05$).The solid rate on USG was statistically significantly higher in those with malignant histo-pathology than those with benign results (p=0.016). There was no statistically significant difference in the number of nodules (single, multinodule) ratio between the group with benign and malignant histopathology results (p=0.902).No statistically significant correlation was observed between the nodule diameter on USG and the histo-pathology results (p=0.158). Cytology results were found to be determinative on histopathology.The rate of being benign in cytology was statistically significantly lower in malignant patients than in benign ones (p=0.003); folli-cular neoplasia, suspected malignancy, and malignant rate were statistically significantly higher (p=0.007; p=0.004 and $p<0.001$) (Table 1).

Table 1. According to the histopathology results,the findings of the cases related to the examinations

Variables	Benign (n=205)	Malign (n=137)	p
USG, n (%)			0.013
None	9 (4.4)	8 (5.8)	
Single Solid	6 (2.9)[a]	13 (9.5)[a]	
Single cystic	0 (0.0)	1 (0.7)	
Single mixed	24 (11.7)	8 (5.8)	
Multinodular Solid	20 (9.8)	18 (13.1)	
Multinodular Cystic	10 (4.9)	2 (1.5)	
Multinodular Mixed	130 (63.4)	86 (62.8)	
Diffuse Hyperplasia	6 (2.9)	1 (0.7)	
Solid findings on USG	26 (12.7)	31 (22.6)	0.016
Number of Nodules, n (%)			0.902
Single	36 (18.4)	23 (17.8)	
Multiple	160 (81.6)	106 (82.2)	
Nodul Diameter on USG, n (%)			0.158
<1 cm	11 (5.4)	17 (12.4)	
1-3 cm	91 (44.4)	61 (44.5)	
3-5 cm	78 (38.0)	41 (29.9)	
>5 cm	13 (6.3)	9 (6.6)	
None	12 (5.9)	9 (6.6)	
Cytology, n (%)			<0.001
Nondiagnostic	26 (12.7)	13 (9.5)	
Benign	91 (44.4)[a]	39 (28.5)[a]	
Atypia of Undetermined Significance	50 (24.4)	40 (29.2)	
Follicular neoplasia	4 (2.0)[a]	11 (8.0)[a]	
Suspicion of malignancy	5 (2.4)[a]	13 (9.5)[a]	
Malign	0 (0.0)[a]	8 (5.8)[a]	
None	29 (14.1)	13 (9.5)	

[a]The difference between the benign and malignant groups is statistically significant (p<0.01).

Discussion

In benign multinodular goiters, which constitute the majority of benign thyroid diseases, there is no indication for surgery or even no treatment. Conditions that indicate thyroidectomy in these diseases are suspicion of malignancy, compression symptoms, hyperthyroidism, retrosternal goiter and cosmetic reasons.[1] The most common operation indication in clinical practice is suspicion of malignancy. Detection of malignant nodules is critical in the management of thyroid nodules.Medical history, physical examination, laboratory findings, thyroid ultrasonography, thy-roid scintigraphy and fine-needle aspiration biopsy are used. Undoubtedly, the definitive differential diagnosis is made by histopathological examination.Due to delayed diagnosis in malignant nodules, the damage to the patient increases in direct proportion to the delay time.[2] Also, 5% of thyroid nodules are malignant.[3] When a nodule is detected in the thyroid gland, the main thing to do is differentiate the nodule from benign to malignant to prevent unnecessary surgical interventions and decide on the surgical technique according to the FNAB result.Although me-dical history, age, gender, radiation history, family history are helpful in the evaluation of nodules, they are not a definitive diagnosis.In the differentiation of malignant and benign thyroid nodules, it is recommended to perform FNAB for a more accurate and reliable result in line with the criteria determined by ultrasonography and scintig-raphy.[4] Our study recorded the age, gender, nodule diameter and character on USG, FNAB result, type of surgery, and postoperative pathology results of 342 consecutive patients.In our study, the age and gender distribution of the cases was homogeneous between the group with benign histopathology results and the group with malignant results (p=0.529 and p=0.057), Uncertain cytology (follicular or Hurthle cell neoplasia, follicular lesion of undetermined significance, atypia) may be present in 15-30% of FNAB samples(5).In our study, 131 (38%) of 342 patients were found to have indeterminate cytology;In the literature, 20-30% of undeter-

mined cytology carries a risk of malig-nancy;[6] In our study, it was found to be 43%.Lesions reported as atypia of undetermined significance or follicular lesions of undetermined significance in the literature have been reported at varying rates and carry a 5-10% risk of malignancy;[6] in our study, 90 out of 342 patients were reported as atypia of undetermined significance and follicu-lar lesions of undetermined significance, and 50 patients were found to be malignant.In our study, the rate of atypia of undetermined significance and follicular lesion malignancy was 55.5% in the result of FNAB cytology.While some clinical features such as male gender and nodule size (>4 cm), advanced patient age, or the presence of atypia increase the diagnostic accuracy in terms of malignancy in patients with undetermined cytology, their predictive value is still low.In our study, 89.1% of patients over 40 years of age with a male nodule size >4 cm were found to be malignant and this is proportional to the literature.[4-6] If cytology is evaluated as "suspicious for papillary carci-noma" or "Hurthle cell neoplasm," either lobectomy or total thyroidectomy is recommended, depending on the size of the lesion and other risk factors.[4] In our study, 13 of 18 patients whose cytology results were suspected of ma-lignancy were reported as malignant and five as benign.All 18 patients with suspected malignancy had a total thyro-idectomy.If the nodule cytology is benign, further emergency diagnostic studies or treatment are not routinely requi-red.[4] However, in our study, the FNAB result was benign, and 30% of the operated patients were reported as ma-lignant. In the literature, this rate is around 5%.In this case, it should be discussed how the biopsy and cytology are performed and evaluated with the correct technique. The biopsy and cytology must be performed appropriately.[7,8] Frates et al. In a large-scale study conducted in 2005, it was found that the malignancy probability of a solitary nodule was higher than a non-solitary nodule ($p<0.01$).[9] In our study, the malignancy rate originating from multinodular goiter was 39.8%. The rate of malignancy originating from solitary nodules was 42% and was not statisti-cally significant. ($p=0.902$).The point to be noted here is the character of the nodule on USG. In our study, as the solidity rate of the nodule increased, the malignancy rate increased and was found to be statistically significant ($p=0.009$).In addition, other USG findings (number of nodules, diameter of dominant nodule) were not statistically significant in terms of malignancy. ($p=0.158$).After the initial nondiagnostic cytology result, repeated US-guided FNAB will reveal a diagnostic cytology pattern in 75% of solid nodules and 50% of cystic nodules.Therefore, such biopsies should be repeated under US guidance and, if possible, with on-site cytological evaluation, which will greatly increase the adequacy of the cytology sample.However, up to 7% of nodules show nondiagnostic cytology results despite repeated biopsies and may be malignant at surgery.[7,8] Chalov et al. In a study conducted by and published in 2013, it was emphasized that FNAB is the gold standard in terms of surgery indication and type. Still, this situation can be reviewed in cases with high suspicion, according to USG findings.[10]

Conclusion

FNAB has an important place in the diagnosis of thyroid malignancies. With FNAB, a malignant and benign dis-tinction can be made and unnecessary and incomplete surgeries can be prevented.Patients with malignant or suspici-ous FNAB results should undergo total thyroidectomy, and patients with benign findings should be followed up at specific intervals. Unfortunately, FNAB can give wrong results. The best way to prevent this is to have FNAB per-formed and evaluated by competent people according to the technique specified in the reference guides.Biopsy sho-uld be taken under USG guidance from the part of the nodule with solid and microcalcifications. The main reason for the widespread use of FNAB today is the increasing sensitivity and specificity rates and the decreasing false po-sitive and false negative rates.When deciding on the type of surgery, it would be more appropriate to consider the malignancy criteria in USG and the result of FNAB. FNAB results with USG performed in our center were found to be similar to the literature, except for two values. Different results will be more qualified with USG and FNAB experience.

Disclosures

Ethics Committee Approval: Ankara Dıskapi Yildirim Beyazit Training an Research Hospital Ethics Committee (18.10.2021-122/08).

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