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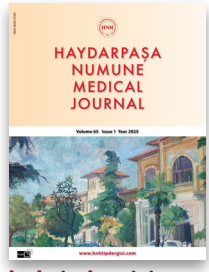

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ORIGINAL ARTICLE

Diagnostic Adequacy of Thyroid Biopsy Performed by the Surgeon with a 25-Gauge Needle Under Ultrasound Guidance

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Abstract

Introduction: The aim of this study was to investigate the adequacy of ultrasound-guided biopsies of thyroid nodules performed by a surgeon.

Methods: The study included ultrasound-guided biopsies performed on 96 nodules in 71 patients between August 2021 and September 2024. The results were evaluated retrospectively.

Results: A total of 96 nodules in 71 patients underwent ultrasound-guided 25-gauge needle thyroid biopsy. The diagnostic adequacy rate was 91.6% (88 nodules), and the non-diagnostic rate was 8.33% (8 nodules). Of the patients included in the study, 11 were male (15.5%) and 60 were female (84.5%) with a mean age of 47.04±14.76 years.

Discussion and Conclusion: Ultrasound-guided thyroid fine needle aspiration biopsy can be performed successfully by experienced and adequately trained surgeons. Biopsies performed by the surgeon have many benefits, such as time and cost savings. Therefore, we believe that providing ultrasonography training during surgical residency is important. In addition, the 25-gauge needle is a reliable option in terms of diagnostic accuracy.

Keywords: Biopsy; thyroid; ultrasound.

The incidence of thyroid nodules in the general population is between 3-8%, is more common in women, and increases with age.[1] Approximately 5% of thyroid nodules are malignant, and there are studies suggesting that this rate may be as high as 10-15%.[2,3] Since it is not possible to differentiate nodules as benign or malignant by physical examination, ultrasound-guided thyroid fine needle aspiration biopsy (USG-FNAB) is accepted as the gold standard for diagnosis.[4,5]

USG-FNAB is widely used by surgeons, radiologists, endocrinologists, and pathologists due to its advantages, such as high diagnostic accuracy, ease of implementation, and low cost.[6] However, despite the definitive diagnosis provided by the method, the non-diagnostic sample rate can reach up to 20%.[7]

Cytologic results of thyroid biopsy are affected by several factors, such as biopsy method, needle thickness, and sample preparation.[8] Needle selection is one of the key technical aspects of biopsy and an important factor affecting cytology results.[9] Biopsy with a large-bore needle is not recommended as it may increase the risk of local pain and bleeding.[10,11]

In order to reduce the rate of non-diagnostic or inadequate cytology, 2-5 needle passes to the nodule and on-site microscopic evaluation are recommended.[12] Although the use of ultrasound-guided thyroid biopsy is justified, the

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presence of on-site microscopic evaluation should also be discussed.[7] There are many studies evaluating the impact of needle choice on diagnostic adequacy.[9,13-15]

In this study, the diagnostic results of thyroid biopsies performed by a single surgeon with a 25-gauge needle under ultrasound guidance were evaluated in comparison with the literature.

Materials and Methods

Ethical permission was obtained from the Mersin University Medical Faculty Clinical Research Ethics Committee for this study, with the date 16/10/2024 and number 2024/984. All the patients signed informed consent before undergoing ultrasound-guided fine needle biopsy. The study was conducted in accordance with the Declaration of Helsinki. Between August 2021 and September 2024, ultrasound-guided thyroid biopsy was performed on 96 nodules in 71 patients, and the results were evaluated retrospectively. The data of the patients were obtained from hospital records.

The biopsy procedure was performed by a single surgeon (with 9 years of experience in intervention), and no patient received local anesthesia before starting the procedure. Biopsy was performed on nodules that met the indications for biopsy defined in the American Thyroid Association guidelines.[5]

In the USG-FNAB procedure, a 25-gauge needle was attached to a 10 ml syringe. When the fine needle reached the target location of the nodule, the operator moved the needle back and forth with suction applied until the sample material was aspirated into the hub of the needle.

Table 1. Specimen evaluations

Nondiagnostic	8
Benign	63
Atypia of undetermined significance	15
Follicular neoplasm	4
Suspicious for malignancy	4
Malignant	2
Total	96

Table 2. Characteristics of patients and nodules

Gender (male/female)	11 M/60 F
Mean age (years)	47.04±14.76
Nodule diameter (mm)	23.84±12.65 mm
Diagnostic/Non-diagnostic	88 (%91.67)/8 (%8.33)
Number of slides per nodule 2/4/6	62 (64.58%)/22 (22.92%) / 12 (12.5%)
Complications	0

The obtained material was smeared on glass slides and sent for cytopathological examination. Cytology results were reported using Bethesda criteria (Table 1).

Statistical Analysis

Study findings were evaluated using SPSS (Statistical Package for Social Sciences) v. 21.0 statistical software. Descriptive statistical methods, such as mean, standard deviation, and percentage, were used to evaluate the data.

Results

A total of 96 nodules in 71 patients underwent ultrasound-guided 25-gauge needle thyroid biopsy. The diagnostic adequacy rate was 91.6% (88 nodules), and the non-diagnostic rate was 8.33% (8 nodules). Of the patients included in the study, 11 were male (15.5%) and 60 were female (84.5%) with a mean age of 47.04±14.76 years. The mean diameter of the nodules was 23.84±12.65 mm. A minimum of 2 and a maximum of 6 slides were used for biopsies performed for each nodule; 2 slides were sufficient for most of the nodules (62). No complications were observed after the biopsy (Table 2).

Discussion

USG-FNB is considered the gold standard in the diagnosis of thyroid nodules.[5] The method is widely used due to its reliability, high diagnostic accuracy, and low complication rate.[6,16] Despite the proven benefit of USG-FNAB, the non-diagnostic rate is undeniable.[17,18] Although USG-FNAB cytologic results in thyroid nodules can be affected by many factors, the most important factor affecting the results is needle selection.[8]

There are many studies in the literature comparing different needle sizes, most of which compared the 25-gauge needle with needles of different sizes. In our study, the diagnostic adequacy rate of biopsies performed with a 25-gauge needle was 91.67%, and the adequacy rate is consistent with the literature.[5,9,13,15,19-21]

In many studies, no significant difference was observed in the comparison of needle thicknesses in terms of adequacy.[9,13,14,15,19,22] In some studies, the adequacy rate of thick needles was reported to be higher, and this was attributed to the fact that large diameter needles aspirate more cells. However, with the aspiration of more cells, bloody samples are obtained, which affect cytologic interpretation.[20,23,24] Complications such as pain, cervical bleeding, and vasovagal reactions are more common with large-bore needles, and therefore thyroid nodule biopsy

with large-bore needles is not recommended.[10,11,21]

The use of a 25-gauge needle seems to be advantageous because it provides sufficient cellular material, complications such as pain and bleeding are less, and patients tolerate thyroid biopsies better.[9,21,25] In our study, all biopsies were performed by a single surgeon, which provides an important advantage in terms of technical standardization. In addition, the fact that no complications were observed supports the reliability of the 25-gauge needle.

Although an on-site pathologist is recommended to increase the adequacy of the biopsy, controversy continues.[7,9,12] Adequate experience of the specialist performing the biopsy is similar to that of on-site evaluation.[26] Thyroid biopsy performed by experienced specialists did not require on-site evaluation.[27] In addition, on-site assessment prolongs the time of the procedure and imposes additional financial burden.[28] In our study, no on-site assessment was conducted, and the qualification results are similar to the results of the on-site assessment.

Diagnostic adequacy also depends on the experience of the operator.[29] Biopsy performed by trained specialists is similar to on-site evaluation.[27] USG-FNAB performed by experienced surgeons has a high level of adequacy.[27]

A surgeon with cervical anatomy knowledge, a complete understanding of thyroid pathophysiology, and sonographic expertise is a suitable candidate for thyroid biopsy.[30] Armed with a full understanding of thyroid and parathyroid pathophysiology, the surgeon can make more appropriate decisions about which lesions should and should not be biopsied.[27] USG-FNAB performed by the surgeon shortens the duration of surgery, reduces the cost by performing each step of diagnosis in a single visit, and increases patient satisfaction.[27,30-33] Surgeons who are skilled in sonography and ultrasonography performed before thyroid surgery may also provide useful information to predict disease extent before the operation.[34]

Although there are many benefits to the surgeon having ultrasonography and biopsy skills, they need special training to perform this procedure.[29] It is recommended to include ultrasonography training during surgical residency.[27]

However, the single-center, small number of patients, and retrospective nature of the study are the most important limitations. The effect of different needle diameters on diagnostic adequacy can be evaluated more comprehensively with larger patient groups and prospective studies.

Conclusion

USG-FNAB can be performed successfully by experienced and adequately trained surgeons. Biopsies performed by the surgeon have many benefits, such as time and cost savings. Therefore, we believe that it is important to provide ultrasonography training during surgical residency. In our study, it was shown that biopsies performed with a 25-gauge needle provided a high diagnostic yield and did not cause complications. These results support that the 25-gauge needle is a reliable option in terms of diagnostic accuracy. We suggest that the effect of needle choices on diagnostic accuracy should be evaluated in more detail in larger and multicenter studies.

Ethics Committee Approval: The study was approved by Mersin University Medical Faculty Clinical Research Ethics Committee (No: 2024/984, Date: 16.10.2024).

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