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Comparison of 1869 thyroid ultrasound-guided fine-needle aspiration biopsies between general surgeons and interventional radiologists

Hilmi Bozkurt [a], Oktay İrkörücü [a], Mehmet Aziret [b, *], Enver Reyhan [a], Mehmet Kemal Okuyan [c]

[a] Health Sciences University Adana Numune Training and Research Hospital, Department of General Surgery, Adana, Turkey
[b] Sakarya University Faculty of Medicine, Department of General Surgery, Sakarya, Turkey
[c] Health Sciences University Adana Numune Training and Research Hospital, Department of Interventional Radiology, Adana, Turkey

HIGHLIGHTS

- Thyroid nodules are commonly encountered problems in clinical practice.
- FNAB is the most reliable diagnosis method for distinguishing between benign and malignant thyroid nodules.
- The non-diagnostic rates may decrease with the increase of experience in administering USG-guided thyroid biopsies.

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ABSTRACT

Background: Thyroid nodules are commonly encountered problems in clinical practice. For patients who have a thyroid nodule, the fine-needle aspiration biopsy (FNAB) is the most important test, as it is the most reliable diagnostic method for distinguishing between benign thyroid nodules and cancerous nodules. FNAB is able to be performed either via an ultrasound (USG) or alone and is the first choice when it comes to diagnosing thyroid nodules, given that it is cheap, safe and provides accurate results.
Objective: In this study-a retrospective analysis of FNAB via USG - our aim is to evaluate the multiple variables related to FNAB procedures, including the experience of the person performing the biopsy, the age and gender of the patient, the number of nodules, the size of the nodule(s) and the number of lams recorded from the cytopathology report on non-diagnostic rates, conducted at an invasive radiology clinic and at a general surgery clinic.
Materials and methods: A total of 1062 patients involving 1869 nodules, examined using FNAB via USG, were reviewed retrospectively from records dated between November 2011 and July 2014 and from pathology reports taken from the ANEAH General Surgery clinic and Interventional Radiology clinic. Cytopathology results were classified according to the 2007 Bethesda System for Reporting. Gender, age, number of nodules, diameter of the nodules, biopsied nodules, location of the nodules, number of lams, symptoms and the date of biopsies were the parameters used to examine the factors involved in non-diagnostic cytopathology invasive radiology. These parameters were inspected at both of the clinics (ANEAH General Surgery clinic and Interventional Radiology clinic). In analyzing the results, the statistical significance level was set at 0.05, where in cases that the p value was under 0.05 ($p < 0.05$), it was determined that no significant relationship existed. In this study, data were analyzed using SPSS 20 software.
Results: Of the nodules reviewed, 1620 were found on females and 249 on males. The age of the patients ranged from 10 to 87 years, with the mean age being 50 years. In the general surgery clinic, 470 nodules of 341 patients were aspirated, and in the interventional radiological clinic, 1399 nodules of 721 patients were aspirated. In the literature review conducted to compare statistical assessments of FNAB via USG, no significant difference was found between the ANEAH General Surgery clinic and the Invasive Radiology

* Corresponding author. Adnan Menderes Street, Sağlık Sok. No: 195, Adapazarı, Turkey.
E-mail address: mhmtaziret@gmail.com (M. Aziret).

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clinic ($p > 0.05$). In the invasive radiology clinic, non-diagnostic rates decreased with the increase in experience of the person who conducted the biopsy ($p = 0.001$).

Conclusion: The results from both of the clinic's rates of non-diagnostic FNAB, performed via USG, were found to be acceptable. Our study also demonstrates that USG-guided FNAB can be performed with a low non-diagnostic rate as experience grows.

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1. Introduction

Thyroid nodules are a commonly seen problem in clinical practices around the world. Thyroid nodules are observed in 5% of females and in 1% of males in non-endemic areas that are supplied with sufficient iodine. However, thyroid nodules can be identified in 19–67% of randomly selected individuals, particularly women and older individuals, through a high resolution USG [1,2]. A fine-needle aspiration biopsy (FNAB) is recommended in cases of dominant or painless growing nodules, solid nodules and nodules larger than 1 cm in diameter, due to the 5–10% malignancy risk in multinodular goiters [2].

An FNAB, which can be performed either with or without an USG, is the most important examination method for patients with thyroid nodules [3]. It is generally accepted that FNAB is the most reliable diagnosis method for distinguishing between benign and malignant thyroid nodules. In addition, as it is a safe, reliable and less costly method, providing accurate results and less complications, and is well-tolerated by patients, FNAB is the first choice when it comes to diagnosing thyroid nodules [4]. FNAB was first described by Martin and Ellis in 1930 [5]. In the 1950s, it began to be more commonly used, particularly in Sweden and other Scandinavian countries [6]. For the past two decades, it has enjoyed widespread use throughout the world [5,6]. The performance of FNABs accompanied with an USG has recently been increasing, and it has been reported that the execution of an FNAB under ultrasound imaging has a diagnostic value higher than that of an FNAB without an USG. The USG-aided FNAB has certain advantages, such as enabling the needle to be advanced to the desired location, avoiding any major vascular fields, and allowing the needle to access the remote fields of central necrosis areas [7].

Today, the main purpose of FNABs is to determine whether a thyroid nodule requires surgical treatment or not and thereby possibly avoid the major complications and high costs associated with thyroidectomies [5–7]. The most significant diagnosis problem related to FNABs is the failure to extract sufficient material during the procedure; therefore, adequate training is necessary for sample making and preparation [2,7].

Some studies show that when FNABs are made by the same person, the prepared and reported thyroid FNAB's results are better than others [7,8]. The ideal situation would be that the reporting is conducted by an experienced cytopathologist for FNABs that have been prepared by trained hands [8]. In patients who have received a non-diagnostic FNAB, the FNAB should be made again with the aid of USG. Important studies conducted on this topic have reported that repeated cytological examinations are able to provide more accurate diagnoses [9,10].

The purpose of our study was to conduct a retrospective analysis of USG-guided thyroid FNAB results in both a general surgery clinic and an interventional radiology clinic and to evaluate the relationship among prognostic factors, such as non-diagnostic rates of biopsy, the experience of the person administering the FNAB, age, gender, number and size of nodes and number of lam.

2. Materials and methods

2.1. Patients and ethics

This study was conducted in the general surgery and interventional radiology clinics at Health Sciences University Adana Numune Training and Research Hospital during the period from October 2011 and July 2014. A total of 1869 nodules involving 1062 patients who had received an aspirated biopsy for thyroid nodules were eligible for the study. The data of patients and pathology reports were evaluated retrospectively, and the cytopathology results were classified according to the 2007 Bethesda System for Reporting [8].

The prognostic parameters, such as the patient's age, gender, number of nodules, number of biopsies taken, location of nodule, nodule size, number of lam, date of procedure and the clinics that performed the FNAB were evaluated in order to research the biopsy patients who had non-diagnostic (insufficient diagnosis) cytopathology results. These parameters were evaluated in both clinics. The Ethical Committee of our center approved the study protocol (ANEAH.EK2014.62).

2.2. Thyroid fine needle aspiration biopsy (FNAB)

All of the biopsies were taken by the same physician in their respective clinics. The on-site rapid assessment method was performed on the first 155 patients in the general surgery clinic, but was not performed on the other 315 nodules. At the interventional radiology clinic, the on-site rapid assessment method was not performed. All patients underwent a thyroid USG prior to being administered the FNAB by the radiology clinic (Fig. 1).

The size of the thyroid gland, number of solitary or multiple nodules, underlying disease, size of nodule, characteristics of nodule limit, the presence of halo, calcification features, sonographic characteristics of the nodule, and distinction of solid or cystic were evaluated with USG (Fig. 2).

The biopsies were taken by the Mindray DC-7 USG and with a 7.5 and 10 MHz linear probe. All interventions were made in a biopsy room, where the patient was placed in the appropriate position prior to the FNAB being administered. This position involved the placement of a pillow under the patient's shoulders and the hyperextension of the neck while they were in prone position. Betadine or alcohol was applied on the patient's neck before administering lidocaine HCl (1 ml ampule, subcutaneous) to the patient as a local anesthetic.

The FNAB was conducted using a 10 cc syringe with 22G (black points) or 21G (green tip) needles. To begin, 1–2 cc of air was taken into the syringe; then, the projection of nodules on the skin to be biopsied were detected with USG (Fig. 5). Next, the tip of the needle was entered into the nodule guided by USG. Negative pressure was created by taking up 10 cc of air into the syringe. The procedure continued with the movement of the millimeter needle back and forth in nodules to remove cells (Fig. 6). Once the material was extracted, the absence of hemorrhaging and the material of the

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