

## Original Article

# Cancer incidence of larger thyroid nodules and the diagnostic value of palpation and ultrasound guided fine needle aspiration biopsy

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**Abstract.** In this prospective study, we aimed to determine the cancer incidence of thyroid nodules larger than 3cm and compare the efficacy of palpation and ultrasound guided fine needle aspiration biopsy (FNAB). The study was conducted at General Surgery Departments of Istanbul Okmeydanı and Antalya Training and Research Hospitals of Turkey from March 2008 to December 2011. In our clinics, between the years 2008 and 2011, both palpation and ultrasound guided FNAB were performed in all 55 patients having thyroid nodules larger than 3 cm. The results were determined as inadequate, benign, suspicious and malignant. Histopathological findings were compared with the results of both palpation and ultrasound guided FNAB and sensitivity, specificity and accuracy rates were calculated. The specificity (98%) and accuracy rate (92.72%) of ultrasound guided FNAB corresponded to those from the literature, except the rate of sensitivity (40%). This is explained by FNAB performed only on the dominant nodule. Ultrasound guided FNAB is an efficient and reliable diagnostic method when performed by experienced clinicians. Hematoma and pain are such rare complications. Ultrasound plays an important role in taking biopsy from the true solid thyroid nodules. We conclude that ultrasound guided FNAB is the gold standard method in the diagnosis of thyroid nodules.

**Keywords:** Thyroid, nodule, fine needle aspiration biopsy, ultrasonography

## Introduction

Thyroid nodules are one of the common clinical problems. In the light of epidemiological studies conducted abroad, with palpation the prevalence was determined as 5%, and with high-resolution ultrasound, it was reported to be from 19% to 67% [1]. Several autopsy series have identified the thyroid gland nodules in 37% to 57% of cases and detected small nodules by ultrasound in thyroids that were palpated as normal, which the importance of prevalence of nodular goiter [2]. Despite the high prevalence of thyroid nodules malignancy found only 5% of histopathological findings [2]. Despite the low ratio early diagnosis of thyroid cancer is life threatening.

To assess the thyroid nodule, there are several options including thyroid function tests, thyroid scintigraphy and thyroid ultrasonography. Cytological examination with FNAB is highly recommended for all palpable solitary or dominant nodules independent of their size. It is more helpful and cost effective in the diagnosis and discrimination of lesions if we could establish whether they are benign or malignant.

Fine needle aspiration biopsy (FNAB) in conjunction with other diagnostic methods which facilitates clear information about the pathology of the thyroid nodules has

been frequently used in recent years [3]. In addition, FNAB has a high sensitivity, specificity, and accuracy rate as related to malignant thyroid nodules and it can also prevent unnecessary thyroidectomy [4].

In this study we aimed to determine the incidence of thyroid cancer in patients which have thyroid nodule larger than 3 cm and make comparison between manual palpation and ultrasound guided FNAB.

## Materials and Methods

Patients diagnosed with thyroid nodules larger than 3 cm were included in this prospective study conducted at the General Surgery Departments of Istanbul Okmeydanı and Antalya Research and Training Hospitals of Turkey between the dates from March 2008 to December 2011 according to the ethical standards as in an appropriate version of the Declaration of Helsinki and the subsequent amendments.

We studied on 55 patients who gave informed consents prior to inclusion in the study. Of these patients, 40 (72.7%) were females and 15 (27.3%) were males. The Mean age was 47 and ranged from 23 to 72 years old.

Ultrasound and palpation guided FNAB were performed by four different surgeons without local anesthesia, by using a 21 gauge needle attached to a 10 ml-syringe after cleaning the skin with antiseptics.

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Smear preparations were evaluated after fixation with 95% ethyl alcohol and staining with Papanicolaou procedure.

Cytological diagnoses were classified into four main groups: low (enough to make a diagnosis), benign (regressive changes, nodular hyperplasia, colloid goiter, etc.), suspicious (follicular neoplasm, etc.) and malignant (papillary carcinoma, follicular carcinoma, etc.).

In all patients who underwent thyroidectomy, the histopathological findings were classified as benign or malignant. The cytological and histopathological diagnoses were compared and sensitivity, specificity, positive predictive value and accuracy rates of ultrasound and palpation guided FNAB were calculated.

### Statistical analysis

Statistical analysis of the findings of was evaluated by using the SPSS (Statistical Package for Social Sciences) program for Windows 15.0.

### Results

There were 55 FNAB cytology samples from 40 females (72.7%) and 15 males (27.3%). The mean age was  $47.11 \pm 11.78$  years (range 23-72 years). The distribution of characteristics of the cases is shown in Table 1.

Solitary nodules were found in 11 patients (20%). The other 44 patients had multinodular goitre (80%). According to the histopathological results of the specimens, the incidence of cancer was calculated to be 9.09%; 3 of these 5

TABLE I  
PATENTS' CHARACTERISTICS

Characteristics	Value
Age (years)	
Mean	47.14 $\pm$ 11.78
Range	23 - 72
Gender	
Female (%)	40 (72.7)
Male (%)	15 (27.3)

patients were men (60%) and 2 were female (40%).

The results of FNAB were classified as inadequate, benign, suspicious and malignant. The results of fifty five palpation guided FNAB reports showed malignancy for only 1 (1.81%), benign for 28 (50.9%) and insufficient material and blood cells for 26 (47.27%) biopsy samples. The results of fifty five ultrasound guided FNAB reports showed malignancy for 2 (3.63%), benign for 49 (89.09%), and suspicious for 1 (1.81%) whereas the remaining 3 (5.45%) reports stated inadequacy of biopsy samples. In the statistical classification of FNAB, insufficient material reported as benign, and suspicious results reported as malignant.

Postoperative histopathological findings, compared with the results of FNAB; a) five histopathologically malignant findings were reported as benign and one malignant histopathology result was reported as benign in 55 palpation guided FNAB results. b) three histopathologically malignant findings were reported as benign

TABLE 2  
SENSITIVITY, SPECIFICITY AND ACCURACY RATE OF FINE NEEDLE  
ASPIRATION BIOPSY

Characteristics	Palpation Guided	Ultrasound Guided
Sensitivity	0	40
Specificity	98	98
Accuracy Rate	89.09	92.72

and one malignant histopathology result was reported as benign in 55 ultrasound guided FNAB results.

The sensitivity, specificity and the accuracy rate of the ultrasound guided FNAB were 40%, 98% and 92.72%, respectively. Of the 5 samples which were confirmed as malignant on histopathological findings, initially 2 were thought to be benign and 3 were thought to have inadequate material. For this reason, sensitivity of palpation guided FNAB was not calculated but specificity and accuracy rate were calculated as 98% and 89.09%, respectively (Table 2).

### Discussion

Thyroid nodules are commonly seen and hard to diagnose clinically. The majority of the thyroid glands are normal by palpation, but detection of small nodules by ultrasound shows the importance of the prevalence of nodular goiter. However although thyroid nodules are very common, thyroid malignancies are rare and constitutes 1% of all malignant neoplasms [5]. With widespread use of ultrasound in the diagnosis of thyroid nodules, the number of asymptomatic patients is increasing [6-11].

A main problem is the distinction of detected thyroid nodules as benign or malignant and prevention of unnecessary surgical procedures. To diagnose thyroid nodules, thyroid function tests, thyroid scintigraphy and thyroid ultrasonography are used routinely. But the benign or malignant distinction cannot be done accurately with these methods. FNAB, when evaluated with other diagnostic methods, provide more accurate information about the pathology of thyroid nodules [12-14].

Preoperative diagnosis of differentiated thyroid cancer is a difficult task and a definitive diagnosis is made by histopathological examination. Because of its safety and cost effectiveness, cytologic diagnosis with FNAB has been the method of choice [1-4, 15].

In contrast, studies in the literature seem to doubt the reliability of FNAB. In a previous study on 441 patients with single nodule guided FNA and 15-year follow-up period, cancer has been identified in 6.4% of non-growing nodules and 26.3% of growing thyroid nodules [16]. However, the Mayo Clinic study followed 680 of 8000 patients who had undergone surgery and observed that FNAB gave false negative results in 15% of cancer patients [17]. In another study, the false negative FNAB results in nodules larger than 3cm seen as cystic, solid, semi-solid and in overall were 17%, 25%, 30% and 11%, respectively [18].

The aim of our study was to determine the incidence of cancer of thyroid nodules larger than 3cm and to compare

the outcomes of palpation and ultrasound guided FNAB. We detected malignancy in 5 of the 55 patients (9.09%). This rate is similar to the rates reported in the literature [19-22].

Inadequate material reported in the literature varies between 10% and 28.2%, [12, 23, 24]. Besides our rates were 47.27% in palpation guided and 5.45% in ultrasound guided FNAB. For palpation guided FNAB, it is noteworthy that the ratio was in an unexpected range values. We attribute this situation due to the experience and skills performed by different clinicians without the use of any guidance of screening methods such as ultrasound.

A randomized controlled trial of office based surgeon-performed ultrasound-guided FNAB of palpable lesions yielded a statistically significant higher diagnostic rate compared to standard palpation technique. This finding supports the utility of surgeon-performed ultrasound as a core competency in clinical practice [25].

In our study, sensitivity of palpation guided FNAB was not calculated because of the 5 samples which were confirmed as malignant on histopathological finding; initially 2 were thought to be benign and 3 were thought to have inadequate material. In the palpation guided FNAB, the accuracy rate was 89.09% and the specificity was 98%. These results were compatible with the results reported in the literature for FNAB i.e. the accuracy rates of 53-98% and specificity of 72-100% [26-28]. The precision rate for the true-positive results cannot be calculated because of the previously stated reasons. In ultrasound guided FNAB, the sensitivity was 40%, specificity is 98% and the accuracy rate was 92.72%, respectively. These results are consistent with rates reported in the literature except for the sensitivity [26-28].

Ultrasound guided FNAB has an important role in the diagnosis of thyroid malignancies. With the distinction between malignant and benign lesions by FNAB, unnecessary surgical procedures or surgical approaches can be prevented and decisions made according to the result of FNAB. Accordingly, patients undergo surgery when the cytology is reported as suspicious or malignant, and undergo followed-up for certain periods of time if cytology is reported as benign.

As shown in the present study, FNAB is still the most reliable method for the diagnosis of thyroid malignancy. In our study, the findings from palpation guided FNAB are similar to those from the literature except for the sensitivity. A high rate of insufficient material in palpation-guided FNAB result can be explained by inexperienced clinicians, inappropriate patient positioning, fault in mass immobilization, insufficient negative pressure and the ineffective movements along the long axis of the needle.

We conclude that performing FNAB under the guidance of ultrasound is highly important in the diagnosis of thyroid gland malignancies for nodules larger than 3cm.

#### Conflict of Interest

The authors declare no conflicts of interest.

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