

ADEQUACY OF TWO NEEDLE PASSES IN ULTRASOUND GUIDED FNAB OF THYROID NODULE FOR CYTOLOGICAL DIAGNOSIS

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ABSTRACT

OBJECTIVE OF STUDY: To determine if two punctures in fine needle aspiration biopsies are sufficient for cytological analysis of thyroid nodules. **MATERIALS AND METHODS:** A cross-sectional study was carried out with emphasis towards diagnosis. Sample size for the study was taken conveniently from a total of 172 patients who reported at the health care facility for ultrasound guided FNAB. The study was carried out for a period of 1 year and 8 months. For the procedure to be carried out an aspiration puncture technique was used with a gauge size of 22. Results of the biopsy were entered into SPSS version 19.0. Continuous variables were reported in the form of mean and standard deviation while categorical variables were reported in the form of frequency and percentages. **RESULTS:** The mean age of the study participants was 44 ± 13.4 years. Out of the 172 patients 65 (75.6%) were women. With the utilization of two punctures, correct analysis was obtained for 97.6% of the patients. The most commonly reported cytological finding was of nodular goiter (41.9%) followed by cystic colloid goiter (18.6%). **CONCLUSION:** The study concludes that administration of two fine needle aspiration punctures allows correct analysis and identification of thyroid nodules in 97.6% of the cases. This study thus suggests that multiple punctures are not required for safe and appropriate diagnosis of thyroid nodules.

Keywords: FNAB, thyroid nodules, ultrasound guided fine needle aspiration.

Introduction

A frequent clinical problem that is being reported nowadays is of thyroid nodules. Thyroid nodules are palpable or non-palpable focal lesions in the thyroid gland. These lesions are radiologically different from thyroid parenchyma.¹ Prevalence of palpable nodules is 4 - 7 % in general population. These statistics are obtained from different epidemiological studies.^{2,3} The frequency of nodules detection may increase up to 30% to 50% with the deployment of ultrasonography,⁴ which can also be helpful in characterization of thyroid nodules. Thyroid nodules are recognized at carotid ultrasonography, computed tomography and other imaging methods. These methods provide results that require additional evaluation.⁵ Carcinomas that are mostly smaller than 1 cm in diameter are com-

monly found through ultrasonography.⁶ This method has enhanced the prediction of malignant thyroid nodules in patients.

In 1980's thyroid nodules assessment was improved. This improvement took place with the introduction of fine-needle aspiration biopsies (FNAB). FNAB is considered as the most precise method for the assessment of thyroid nodules. It is considered as the best method because of the cost-benefit ratio and the ability of the test to differentiate between malignant and benign disease.^{1,5,7,8} FNAB is also advisable because of its low complication risk. It is also considered as the procedure of choice in the assessment of thyroid nodules. In addition FNAB has led to a considerable decline in the number of patients submitted to surgery.^{1,10}

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Patients reporting with one or more thyroid nodules have a 6-13% chance of having malignant thyroid nodules.^{9,11} By utilization of FNAB diagnostic information is given to almost 85% of the patients and the accuracy of diagnosis ranges above 95%.¹² The diagnostic results found through FNAB are divided into four categories. These categories include: benign, suspicious for malignancy, malignant or undetermined and non-diagnostic.⁶

Benign colloid nodule is the most frequently found thyroid lesion. Benign colloid nodule presence is followed by nodular goiter, a hyperplastic nodule, which is then followed by plain cysts and lymphocytic thyroiditis.⁵ The uncertain or undetermined follicular lesion is the most difficult diagnostic group. The difficulty in diagnosis is because of the presence of two clinically dissimilar categories of lesions. These categories include; (a) benign follicular lesions (that include follicular lesions, follicular adenomas, Hurthle cell adenomas and hyperplasia of non-neoplastic follicular cells) and (b) malignant follicular lesions (that include follicular carcinoma, a distinction of papillary carcinoma and Hurthle cells carcinoma).⁵

Ultrasound-guided FNAB is an uncomplicated technique which requires little apparatus and can be carried out on an outpatient basis. The procedure is usually done in supine position with hyperextension of the neck. Cleaning of the cervical region is done with alcohol. In this procedure local anesthesia is usually not required. Aspiration of thyroid nodule is done with a 22 gauge needle which is attached to a 10 ml syringe. The needle is swiftly inserted into and taken out of the nodule. This process is repeated until a small quantity of blood or fluid is visible at the bottom of the needle. A recommended procedure is to perform two to three punctures on different sites of the nodules. This procedure is dependent on the co-operation of the patient. After the selection of the aspirate it is spread on an average of 2-6 glass slides. Each slide is then covered to prepare almost 4-12 specimens.⁵

If FNAB is unable to diagnose thyroid nodules it might be linked to the provision inadequate aspiration of cytological material or hemorrhagic specimen.⁵ Regardless of the extensive use of ultrasound-guided FNAB, a small number of studies have discussed the outcome of such procedures.^{7,13} Even if the mentioned technique poses fewer threats for complications,

predominantly relating to pain, uneasiness and growth of tiny hematomas, other extra severe complications may be reported. The literature review has revealed reports of, hematomas, hemorrhage, infection, edema, laryngeal nerve palsy, and tracheal perforation, changes in nodule volume and dysphasia, tumor dissemination.¹⁴ Taking into account the fact that complications are uncommon, although they may arise, the lesser the number of punctures, the lesser is the complication risk.

The number of punctures necessary for the diagnosis of thyroid nodules is not well recognized in the literature. Sandro et.al. in a study done in Brazil identified that two punctures are necessary and enough for correct diagnosis of thyroid nodules. Studies are still carried out to identify the number of necessary punctures for a harmless diagnosis of thyroid nodules. The lesser the number of punctures advised for diagnosis the less is the risk of complications. This study aims at determining whether two punctures as stated by Sandro et.al., are enough or not for a safe cytological diagnosis of thyroid nodules.

Materials and Methods

A cross sectional study was conducted in department of Radiology, Dallah Hospital, Riyadh. Ethical approval was taken from ethical review board of Dallah Hospital. Study population included patients who were advised to get an ultrasound guided FNAB. Sample size for the study was taken conveniently from a total of 172 patients who reported at the health care facility for ultrasound guided FNAB. The study was carried out for a period of 1 year and 8 months. The procedure of ultrasound-guided FNAB was carried out by a skilled radiologist and a trained nursing assistant. For the procedure to be carried out an aspiration puncture technique was used with a gauge size of 22. The needle was being advanced into the nodule and movement of needle was done by moving it back and forth. It was made sure that no suction is being done while moving the needle. The patients were given lidocaine (Xylocaine) 1% with local anesthesia. All the patients were administered to 2 punctures and the material collected was sent for further cytological analysis in separate vials. All the specimens that

were selected were analyzed in a pathological anatomy laboratory. Results of the samples were obtained on laboratory reports.

Results of the biopsy were entered into SPSS version 19.0. Continuous variables were reported in the form of mean and standard deviation. While categorical variables that included the cytology of thyroid nodules, the lobe and pole involved, calcification and vascularity were reported in the form of frequency and percentages.

Results

Sample was calculated from a total of 172 patients. Mean age of the study participants was reported as 44 ± 13.4 years. Of the 172 participants 130 (75.6%) were females while 42 (24.4%) were males. Sample was selected from the right lobe from a total of 90 (52.3%) participants while in 82 (47.4%) participants from the left lobe. The poles considered in the sample selection are described in the pie chart given below (Fig. 1).

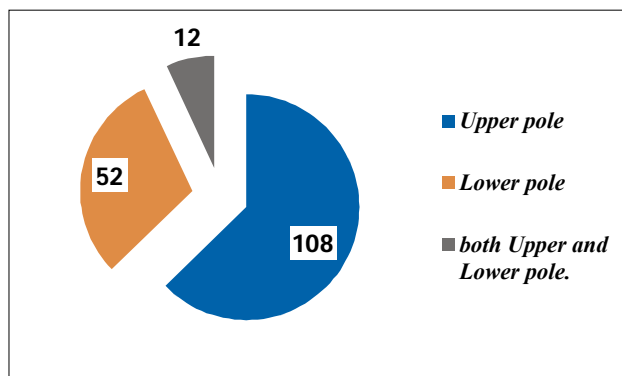


Figure 1: Site for Sample selection

Calcification was reported "Yes" by 24 (14%) samples while it was reported "No" for 148 (86%) samples. Vascularity of the nodules was reported "Yes" by 142 (82.6%) samples while it was reported "No" by 30 (17.4%) samples. The size of the nodules was also measured; largest nodule measured had a measurement of 36 X 24 mm while the smallest nodule measured had a measurement of 6 X 3 mm. Echotexture of the thyroid nodules is presented in (Fig. 2) below. The highest percentage observed was of nodular goiter i.e. 41.9%, followed by nodular colloid goiter

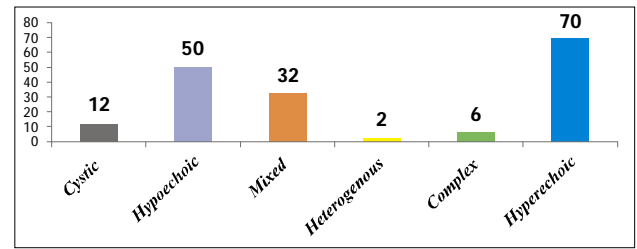


Figure 2: Texture of Nodules

(20%). Negative results were obtained from a total of only 4 samples. The lowest percentage observed was of follicular adenoma i.e. 1.2%. Results of the cytology of the thyroid nodules studied with two punctures are explained in (Tab. 1) below.

Diagnosis	n	%
Cystic nodular goiter	4	2.3
Nodular goiter	72	41.9
Cystic colloid nodule	32	18.6
Hashimoto's thyroiditis	8	4.7
Follicular adenoma	2	1.2
Adenomatous lesion	8	4.7
Lymphocytic thyroiditis	4	2.3
Nodular colloid goiter	20	11.6
Chronic lymphocytic thyroiditis	4	2.3
Colloid goiter	10	5.8
Thyroiditis	4	2.3
Negative	4	2.3

Table 1: Diagnosis of Thyroid Nodules

Discussion

Diagnosis of thyroid nodules remains a main focus area and FNAB plays a focal role in thyroid nodule diagnosis. FNAB provides a reliable interpretation of diagnosis and helps to prevent avoidable surgeries.⁸ Of thyroid nodules FNAB still remains as the main step towards diagnosis of thyroid nodules.⁸ On the other hand, in order to prevent surgery, proper cytological material should be obtained by FNAB. Specimens that are non-diagnostic increase the chance of failure. Failure increases because of the following mistakes i.e. improper puncture technique, inadequate number of cells in the sample, small nodules and a mixture of cystic and solid lesions.⁸

A frequently reported problem for non-diagnostic

samples is the insufficient aspiration of an adequate number of cells for diagnostic purposes.

This problem arises in almost 1-15% of the punctures.¹³ In the current study, a total of 4 specimens which makes up the percentage of 2.3% showed negative results for the diagnosis. Similar studies reported that the non-diagnostic specimens or specimens that showed mixed textures range from 3-11%.^{13,15,16} Our study shows a lower percentage of negative results, this might be because of the sufficient aspiration and good technique used for specimen collection.

The number of punctures in the current study was 2 punctures per patient; the number of punctures was kept constant since studies have shown that 1 to 5 punctures give good results while the highest percentage of diagnostic results is seen with 2 punctures.¹⁵ Studies have also reported that punctures ranging from 1 to 11 provide results with an average of 3.8 punctures.¹³

In the current study, the diagnostic results were obtained successfully with two punctures. Only 2.3% of the specimens produced negative results while all others gave a perfect cytological analysis. In a study done by Ceratti S et al.,¹⁵ the authors stated that a second puncture improved the chances of reaching a convincing result by 10.8%. Alternatively, the third puncture improved such possibility by only 1.1%. Hence, it is proposed that in nearly all of cases two punctures were adequate to obtain a certain diagnosis and increasing the number of punctures for better results was proposed to be inappropriate.

The findings that the present study has reported is relevant in context as the number of punctures for diagnosis of thyroid nodules to reach a conclusive result was not well established. Studies and procedures on thyroid nodules do not give recommendations on the number of punctures essential for an irrefutable diagnosis.^{1,5,7,12} It is significant to emphasize on the fact which would consequently improve the practical worth of the current study for clinical application, given that it has recognized that numerous punctures are not compulsory to get an accurate diagnosis. The cutback on the number of punctures is advantageous and favorable, as it lessens the pain, uneasiness and the probability of complications linked with punctures. It is an important fact and it needs to be reminded

that with the non-diagnostic or uncertain specimens, the danger for malignancy ranges between 4% and 20%^{8,17} and in cases like these FNAB needs to be repeated. This is a recommended protocol.¹ It is also being proposed that there are diagnostic centers that have a pathological in loco. This technique verifies the samples prior to being sent to the laboratory. Specimens are checked for appropriateness. On the other hand most of the diagnostic centers do not provide this facility. Thus the sample collected is directly sent to the laboratory and in case the specimen obtained is not enough the patient is called again for new punctures. The present study thus has a practical application.

The present study was limited in the aspects that the sample size was collected conveniently and true representation could not be obtained from the sample studied. However, it is significant to emphasize that the objective of the current study was to define the significance of the number of punctures for appropriate diagnosis of thyroid nodules which was well attained. Although none of the patient included in our study had malignant nodule, still the diagnostic accuracy of two needle passes is sufficiently high to be applicable for FNAB of all types of nodules. However, separate studies can be carried out for its efficacy in malignant thyroid nodules.

Conclusion

The study concludes that administration of two fine needle aspiration punctures allows correct analysis and identification of thyroid nodules in 97.6% of the cases. This study thus suggests that multiple punctures are not required for safe and appropriate diagnosis of thyroid nodules.

Conflict of Interest: None

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