

A PROSPECTIVE STUDY OF CORRELATION OF ULTRASONOGRAM (USG), FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) WITH POSTOPERATIVE HISTOPATHOLOGY IN DIAGNOSIS OF THYROID LESIONS IN RURAL SOUTH INDIA

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Abstract

Background: Among all endocrine disorders, thyroid diseases are among the most common in the world. Thyroid lesions with obvious symptoms occur in approximately 4-5% of the population. Ultrasonogram (USG) and FNAC are the non-invasive and invasive diagnostic investigations of choice in the work up of these lesions. The goals of this research were to (1) evaluate the agreement between USG and FNAC in the diagnosis of thyroid nodules and (2) investigate the relationship between USG, FNAC, and histopathology in this context. **Materials and Methods:** The study comprised 71 people who had been diagnosed with nodular thyroid tumors. Following a comprehensive evaluation of each patient's medical history and thyroid function (TFT), ultrasonogram of Neck (USG) and fine-needle aspiration cytology (FNAC) were performed. Patients had final surgery, and results from the biopsies were compared to those from the FNAC. **Result:** Out of 71 patients 11% of the patients were male and 89% were female patients. Out of 71, FNAC revealed Follicular Hyperplasia in 21 patients (30%), Follicular Neoplasia in 33 patients (46%), Papillary Carcinoma in 11 patients (15%) and Thyroiditis in 6 patients (8%). Ten of the 11 malignant FNAC interpretations were confirmed by HPE as Papillary carcinoma, with the remaining case coming back as a hypertrophic nodule. FNAC has a higher sensitivity (98%) and specificity (71.4%) than USG (85%) and is thus highly preferable. **Conclusion:** USG and FNAC are effective tools in evaluating and diagnosing suspect swellings or nodules in thyroid gland. It has been shown that using many diagnostic methods together is superior than using just one since it allows clinicians to rule out malignancy in a larger percentage of patients without doing unnecessary operations.

INTRODUCTION

The thyroid gland, as the largest endocrine gland and the first to grow during embryonic life, is truly amazing. Due to the prevalence of developmental, inflammatory, hyperplastic, and neoplastic disorders affecting the thyroid gland in clinical practice, research into the thyroid continues to be vigorous even after 100 years.^[1] "Thyroid nodules, which are lumps inside the thyroid caused by the aberrant development of thyroid cells, are the most frequent thyroid abnormality seen in a clinical setting. Thyroid nodules that are visible with the naked eye occur in the general population at a rate of 4-5%.^[2] In

addition, ultrasound reveals numerous nodules in 20%-48% of persons with a single palpable thyroid nodule.^[3] Thyroid nodule growth is, thus, pandemic. Compressive symptoms, aesthetic deformity, functional nodules, bleeding, and a 5-percent malignancy rate are all consequences of thyroid nodules.^[4,5] In 1967, Fujimoto was the first to utilize USG to identify thyroid nodules.^[6] Nodules as small as 2 mm in diameter may be seen with the naked eye using today's high resolution USG techniques, which allows for real-time detection of structures. Cystic and vascular structures may be distinguished with the use of Doppler methods.^[7] More closely reflects the

prevalence of thyroid nodules seen in autopsy studies,^[8] and is more accurate than palpation in differentiating solitary or dominating nodules within a multinodular goitre. There are many benefits of USG include its low cost, rapid examination, collection of dynamic images, possibility to apply guided biopsies, easy accessibility, and non-ionizing nature of the imaging. High-frequency transducers are an alternative for achieving maximal resolution in the thyroid due to the high echogenicity of thyroid tissue and the superficial placement of the gland.

Thyroid nodule's diagnosis using fine-needle aspiration cytology (FNAC) is a rapid, noninvasive, and inexpensive procedure. Many a times, the lack of aspirate is a major cause of the FNAC's failure.

The goals of this research are to (1) evaluate the reliability of thyroid nodule diagnosis using ultrasonography (USG) and fine needle aspiration cytology (FNAC), and (2) investigate the connection between USG, FNAC, and histopathology.

MATERIALS AND METHODS

The Division of General Surgery at Dr.SMCSI rural medical college in Karakonam, India, included 71 patients with thyroid nodules between April 2020 and May 2022 for this prospective study.

Inclusion Criteria:

- Patients with clinically palpable thyroid nodule.
- All patients between 15-75 age groups of both sexes.

Exclusion Criteria

- Swellings of thyroid which are not nodular.
- Patients unfit for surgery
- Number of cases for study: - 71 patients.
- Follow up till postoperative discharge of the patient.
- Duration of study-For a period of around 2 years from April 2020 to May 2022
- Sensitivity, specificity and descriptive statistical tools like Correlation will be used to analyse the data.

Methodology

Following the collection of each patient's medical history and TFT outcomes, we performed a comprehensive further evaluation, which included ultrasound guidance and fine-needle aspiration cytology (FNAC) of the thyroid nodule. USG makes use of high-resolution 7.3 MHz probes. To evaluate if the nodules were benign or malignant, sonologists analysed their size, position, echotexture, boundaries, presence of halo, calcification, vascularity, accessory nodules, linked cervical nodes, and nodule consistency (solid, cystic, or mixed).

The FNAC was performed using a 23-gauge needle on a Franken's handle, with or without aspiration from a disposable 20-milliliter syringe. Cystic nodules were analyzed cytologically by aspirating the

cyst contents, vortexing the sediment, and making slides from the sediment.^[9]

Thyroid specimens, either from a partial (Hemi) or entire (Total) thyroidectomy, were sent for HPE in 10% formalin after patients had undergone all necessary diagnostic testing and evaluation. Sensitivity, specificity and descriptive statistical tools like Correlation will be used to analyse the data. In this study 6 patients showed thyroiditis by FNAC. They underwent Hemithyroidectomy due to High suspicion of malignancy, mass with incomplete regression on suppressive therapy or progression of goitre even with treatment and cosmetic reasons. All these thyroiditis patients were having low TSH values and they are on thyroxin treatment, there were no hyperthyroidism patients in this study. The FNAC data were compared to the final histological diagnosis obtained from pre-operative USG. The incidence of thyroid cancer was calculated, and sensitivity, specificity, diagnostic accuracy, PPV, and NPV were calculated using ultrasound and good ambition cytology (USG and FNAC), respectively.

Statistical Analysis

SPSS, a statistical application developed for social science research, was used to analyse the data. Frequency and percentage presentations of categorical data. The significance of the connection was determined using the chi-square test. If the probability is less than 0.05, the result is considered significant.

RESULTS

[Figure 1] shows that of the 71 patients, 16 were in the 20-30 age range, 38 were in the 30-50 age range, and 17 were in the 50-70 age range. Out of 71 patients 11% of the patients were male and 89% were female patients.

As per [Table 2] On Histopathological diagnosis Follicular Adenoma confirmed in 14 patients (20%), Follicular Carcinoma confirmed in 2 patients (3%), Papillary Carcinoma confirmed in 14 patients (20%), Nodular Goitre confirmed in 32 patients (45%) and Thyroiditis confirmed in 9 patients (13%).

As per [Table 3] on ultrasonographical examination, 36 (51%) of the 71 patients showed Nodular Goiter, 18 (25%) showed Nodular Goitre? Malignant, 7 patients (10%) showed Cystic Nodules and 10 (14%) showed Thyroiditis.

[Table 4] shows that 10 of the eleven malignant FNAC interpretations in this study were confirmed by HPE to be Papillary carcinoma, while the remaining FNAC interpretation was a hypertrophic nodule.

[Table 5] shows that ten of the eighteen USG malignancies that were verified by HPE were indeed papillary cancerous. When both FNAC & USG combined, 12 malignant interpretations were confirmed by HPE out of 14 papillary carcinomas. USG showed 64 solid nodules and 7 cystic nodules

in 71 patients. Out of 7 cystic nodules 3 (29%) confirmed as malignant by HPE.

As per [Table 6] it clearly suggests that sensitivity and specificity of FNAC (98%, 71.4%) is better than USG (85%, 62.5%).

Table 1: Different FNAC presentation.

S.No.	FNAC presentation	No. of patients	%
1	Follicular Hyperplasia	21	30
2	Follicular Neoplasia	33	46
3	Papillary carcinoma	11	15
4	Thyroiditis	6	8
5	Medullary carcinoma	0	0
6	Anaplastic carcinoma	0	0

Table 2: Different Histopathological Pattern.

S.No.	Histopathological Presentation	No. of patient	%
1	Follicular adenoma	14	20
2	Follicular carcinoma	2	3
3	Papillary carcinoma	14	20
4	Medullary carcinoma	0	0
5	Nodular goiter	32	45
6	Thyroiditis	9	13
7	Anaplastic carcinoma	0	0

Table 3: Different Ultrasonography Pattern

S.No.	USG	No. of patients	%
1	Nodular goiter	36	51%
2	Nodular goiter ? Malignancy	18	25%
3	Cystic nodules	7	10%
4	Thyroiditis	10	14%

Table 4: Correlation of Fine Needle Aspiration Cytology (FNAC) With Histopathology

S.No.		FNAC	%	Histopathology	%	% of patients correlated
1	Papillary carcinoma	11	15.4	14	20	71.4%
2	Thyroiditis	6	8	9	13	67%
3	Follicular/neoplasia hyperplasia/Colloid	54	76	48	68	84%

Table 5: Correlation of USG with Histopathological diagnosis in thyroid nodules

S.No.		USG	USG %	Histopathology	Histopathology %
1	Nodular goitre	44	61.9%	48	68%
2	Thyroiditis	9	13%	9	13%
3	Malignancy	18	25.3%	10 Pap Ca+2 F.Ca	20%

Table 6: Sensitivity and Specificity of FNAC and USG in diagnosing Thyroid Nodule

Technique	Sensitivity	Specificity
FNAC	98%	71.4%
USG	85%	62.5%

DISCUSSION

This study's 22.5% rate of malignancy agrees with that seen in Dorairajan and Jayashree's research.^[10] Papillary carcinoma was found to be the most prevalent kind of malignancy in this study, accounting for 87% of all cases (14 patients). According to estimates, papillary carcinoma can have a 50% to 80% prevalence.^[11] Follicular carcinoma was found in 13% of patients (2 individuals), but medullary and anaplastic carcinomas were undetected in this study.

The ages of the participants in this study ranged from 22 to 58, with a mean of 38.72. When compared to earlier research, this age range and mean incidence are rather low.^[12] Over 40% of our patients were

found to be in their thirties. That agrees with the findings of Dorairajan and Jayashree.^[10]

The gold standard diagnostic tool of thyroid nodules is fine-needle aspiration (FNAC). Its widespread adoption in recent years has reduced the overall number of surgical procedures for thyroid nodules while increasing the yield of malignant lesions in patients who have undergone surgery. It has been advocated as the preferred preoperative screening tool because of its ability to differentiate between malignant and benign tumors. The existence of a benign nodule is usually identified by the presence of colloid in the aspirate.

Our investigation found that 38% of our patients with FNAC were in fact benign. Among those FNAC samples, 11 (15% of the total) were malignant. A study from Pakistan,^[13] found numbers very similar

to ours: 39.47 percent of patients had benign FNAC, 42% had indeterminate FNAC, and 11.8% had malignant FNAC. Histopathological testing revealed 16 instances to be malignant in our research (14 papillary carcinoma and 2 Follicular carcinomas). In addition, it should be noted that, with the exception of a single instance that presented as a hypertrophic nodule, all papillary carcinomas detected by FNAC were confirmed to be papillary carcinomas on histological investigation". This is in agreement with previous research.^[13]

Sensitivity, specificity, and positive and negative predictive values were calculated using methods similar to those employed in previously published investigations.^[14] When compared to a research by Cusick et al., which found a sensitivity and accuracy of 76% and 69% for FNAC in detecting papillary neoplasm, the current study demonstrates a sensitivity of 71.4% and an accuracy of 92.9%.^[14]

Our results show that USG has a sensitivity of 62.5% and a specificity of 85% for distinguishing benign from malignant nodules. Watters et al. (1992) observed similar results, concluding that USG was 74% sensitive and 83% specific for detecting malignant tumours.^[15]

In our investigation, ten of eleven malignant FNAC interpretations were confirmed as Papillary carcinoma using HPE. Ten of the eighteen malignant USG readings were validated as Papillary carcinoma by HPE. When FNAC and USG were used together, 12 of 14 Papillary carcinomas were confirmed to be malignant by HPE. Ultrasound guided needle aspiration (USS) in conjunction with fine needle aspiration cytology (FNAC) is the gold standard for diagnosing thyroid nodules.^[16]

CONCLUSION

USG and FNAC are effective tools in evaluating and diagnosing suspect nodules or swellings in thyroid gland. Instead of relying on just one method, it's best to use a variety of diagnostic tools together to get the most accurate findings and save patients from unnecessary operations. In order to monitor minor thyroid nodules, to ascertain whether or not they are growing or shrinking, and to detect recurrent lesions in individuals with a history of thyroid malignancy, USG is indicated as part of regular investigation for all thyroid nodules. FNAC is recommended for nearly all palpable and symptomatic nodules. US Guided FNAC recommended in non-palpable nodules, deeply found, close vicinity to vessels, previous controversial nodules, when previous FNAC was not diagnostic.

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