ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 09 | September - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A SONOGRAPHIC EVALUATION OF THYROID LESIONS WITH FNAC CORRELATION IN TERTIARY MEDICAL CENTRE OF BIHAR

Radio-Diagnosis

Dr Nishant Sharma* Post graduate resident III, Department of Radiodiagnosis , NMCH, Sasaram *Corresponding Author
Dr Shamim Ahmad Professor& Head, Department of Radiodiagnosis , NMCH, Sasaram
Dr Rishav Prasad Post graduate resident III, Department of Radiodiagnosis , NMCH, Sasaram
Dr Abhishek Jindal Post graduate resident III, Department of Radiodiagnosis , NMCH, Sasaram

ABSTRACT

Introduction: Ultrasound is the first line of investigation in evaluation of thyroid gland and has high sensitivity even in the detection of tiny nodules. About 4-5% of normal population have incidence of thyroid lesion of which female are more commonly affected than males. Most common thyroid nodules are benign comprising of 90% followed by malignant 10%. **Aims and objective:** To study the ultrasonographic features of various thyroid lesions in patients with thyroid disorders and assess Correlation of the sonographic findings with FNAC in the diagnosis of thyroid lesions **Methodology:** This is a Cross sectional study conducted at Radiodiagnosis outpatient department in Narayan medical college, Jamuhar , Rohtas, south Bihar during june 2021 to May 2022, Patients with thyroid lesions on sonography of age group from 10-75 years. After approval by institutional ethical committee, patients of age group between 10 to 75 years of both gender (males and females) who had thyroid disorders which were clinically symptomatic (viz dysphagia, hoarseness of voice, weight gain, altered menstrual cycles etc.) with altered levels of thyroid hormones or clinically symptomatic but with normal thyroid hormone levels or clinically suspected cases with no specific symptoms and had thyroid lesions on ultrasonography were enrolled in the study with a written informed consent. **Result:** On comparison with USG diagnosis and FNAC, the positive predictive value to detect thyoiditis by ultrasound was 92.5% in this study. In this study ultrasound is 86.2% sensitive and 90% specficity in detecting thyroiditis. And the positive predictive value for detecting medullary carcinoma was 100% and papillary carcinoma was 66%. Ultrasound has 94% positive predictive value. **Conclusions:** Ultrasound is a better modality of investigating the thyroid gland as a whole and non invasive when compared to FNAC. Ultrasound is the best imaging modality which can characterize the number of nodules, size of each nodule, margins of the nodule and contents of the nodule. Ultrasound has 80% sensitivity and 75% specificity in detecting malignant nodules.

KEYWORDS

Thyroid lesion, FNAC,USG, Hyperthyroid

INTRODUCTION

Diseases of the thyroid gland is a common clinical presentation in general population where the incidence being higher in endemic areas, which is higher in females as compared to males.(1) The prevalence of thyroid swelling ranges from 4% to 10% in general adult population and from 0.2% to 1.2% in children. The disorders of thyroid gland can be due to inflammatory and neoplastic causes. A multitude of non-invasive and invasive diagnostic tests like ultrasound, thyroid nuclear scan and Fine Needle Aspiration Cytology (FNAC) is available to the clinician for the evaluation of thyroid swellings(2). Hence there arises the need for a final diagnostic test, that is, histopathological examination (HPE).(3)

Clinical presentation is most commonly for hypothyroidism, goitres and infrequently for hyperthyroidism. Clinical surveys have shown that 5-10% of the general population have thyroid pathologies including nodular lesions in 2.5-3% of cases.(4) The prevalence of hyperthyroidism is 2% in females and 0.6 % in males, hypothyroidism 4.8 % and 0.9% and goitre 2.9% and 0.4% respectively. In both sexes the prevalence increased with age.(5)

Ultrasound is the first line of investigation in evaluation of thyroid gland and has high sensitivity even in the detection of tiny nodules. About 4-5% of normal population have incidence of thyroid lesion of which female are more commonly affected than males. Most common thyroid nodules are benign comprising of 90% followed by malignant 10%.(6)

The superficial location of the thyroid gland makes it suitable for high frequency sonography which is the imaging modality of choice. The role of FNAC in evaluating euthyroid patient with thyroid nodule cannot be overemphasized as it reduces the unnecessary thyroidectomy for patients with benign nodules. However, the combination of insufficient access to pathologists and the variable standards of pathology in sub-Saharan Africa undoubtedly mean that a significant proportion of cancer patients are receiving untimely diagnosis.(7)

Thyroid gland is primarily evaluated clinically by palpation, and determination of the levels of thyroid hormones. Surgical intervention may be indicated when there is presence of a hypofunctional, or so-called "cold" nodule, when malignant cells are detected by FNAC or when there is a large thyroid lesion that cause symptoms such as dysphagia or hoarseness of voice.(8) On USG thyroid, the nodules are evaluated.

The size of nodule, location of nodule in the thyroid gland, echotexture of the nodule, margins of the nodule, presence of halo around the nodule, calcification within the nodule, vascularity of the nodule, accessory nodules and associated cervical nodes and contents of the nodule (solid, cystic or mixed) are characterized in order to differentiate from benign and malignant nodule.(9)

With the above background we had conducted this study with the following aim and objective

Aim and objectives

To study the ultrasonographic features of various thyroid lesions in patients with thyroid disorders and assess Correlation of the sonographic findings with FNAC in the diagnosis of thyroid lesions.

Methodology

This is a Cross sectional study conducted at Radiodiagnosis outpatient department in Narayan medical college, Jamuhar , Rohtas, south Bihar during june 2021 to May 2022, Patients with thyroid lesions on sonography of age group from 10-75 years.

Sample Size Of The Study

Using the formula, $4pq/d^2$ (the Ankush Dhanadia et al(10) study, the study within India and with the lowest prevalence, from the studies used as reference, taken as the value of p), the sample size was calculated to be – 62 Sample size (n) = 4pq/d2, Where, p = prevalence, q = 1 – prevalence, d = precision is 15% Substituting in the formula, (n) = 4pq/d2 = 4 x 74 x 26 / 11.12 = 7696 / 123.2 = 62, The sample size was calculated to be 62.

Inclusion Criteria:

i. Age group10-75 years
ii. Patients with thyroid disorder with USG showing thyroid lesion
iii. Patient giving consent

Exclusion Criteria

i. Patients with bleeding disorders

ii. Patient refusal for FNAC

Study Method

After approval by institutional ethical committee, patients of age group between 10 to 75 years of both gender (males and females) who had thyroid disorders which were clinically symptomatic (viz dysphagia, hoarseness of voice, weight gain, altered menstrual cycles etc.) with altered levels of thyroid hormones or clinically symptomatic but with normal thyroid hormone levels or clinically suspected cases with no specific symptoms and had thyroid lesions on ultrasonography were enrolled in the study with a written informed consent.

Sonographic evaluation:

Convenient sampling technique is used to select 62 patients with thyroid lesions which were referred to the Department of Radio diagnosis; Narayan medical college, Jamuhar, South Bihar. All scans are done using Siemens Acuson X 300, Siemens Acuson X 600, colour Doppler equipment with a linear array high frequency (3-12 MHz) transducer. Patients who were fulfilling the inclusion criteria of age group, thyroid disorders underwent sonographic evaluation. Sonography characterizes if thyroid gland is enlarged or not, if the echogenicity of thyroid gland is homogenous or heterogenous, vascularity of the thyroid gland, if there is any nodule in the thyroid gland. If nodules are present then it should be identified as single or multiple and the size of the nodule should be measured. Nodules smaller than 5mm were not characterized. Nodules larger than 5mm were characterized based on the echogenicity, shape of the nodule, margins of the nodule, contents within the nodule, calcifications in the nodule and vascularity in the nodule. The patients who had lesions in thyroid were subjected to FNAC with informed written consent.

Fnac Of Thyroid: FNA biopsy equipment is simple and inexpensive.

Collection Of Specimen:

Patient is placed in supine position with neck extended. Skin is first cleaned with povidone iodine, and it is draped. The patient is instructed not do any voluntary act of swallowing. Then the lesion is focused with the help of ultrasound. USG gel is not used. Povidone iodine acts as coupling agent. Local anesthetic may be used if needed. A 23to 27 gauge needle is used, which is attached to a 10ml syringe. The transducer is placed over the thyroid gland and the lesion is localized and its relation to adjacent vessel is identified. The needle is inserted parallel or perpendicular to the transducer. Needle tip is monitored and when it reaches the lesion aspiration is done atleast twice and material is collected.7

RESULT

Table-1: Distribution of patients based on size of thyroid gland

Size of thyroid gland	Number	Percentage (%)
Normal	15	24.19
Enlarged	47	75.81

This shows that 24.19% of patients had normal size of thyroid gland and 75.81% of patients had enlarged thyroid gland.

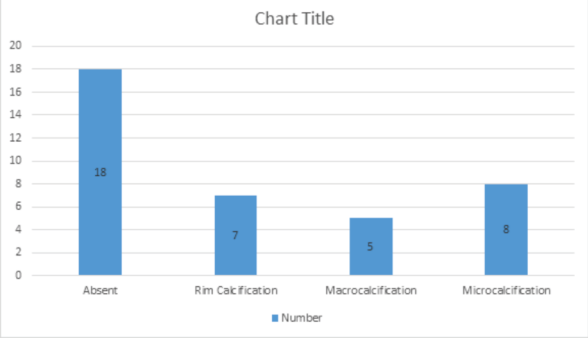

Fig -2 : Distribution of thyroid lesions based on calcification within the nodule

The calcification in the nodule which is more than 5mm is characterized. 18.42% of the nodules had rim calcification, 13.16% had macrocalcification, 21% had microcalcification and the nodules without calcification was seen in 47.37% of patients.

Table-2 : Distribution of thyroid lesions based on ultrasound diagnosis

Ultrasound diagnosis	Number	Percentage (%)
Thyroiditis	25	40.32
Colloid goiter	17	27.42
MNG	09	14.52
Medullary carcinoma	01	1.61
Papillary carcinoma	01	1.61
Adenomatous nodule	06	9.68
MNG with thyroiditis	03	4.84
Total	62	100.00

Most common lesion that was diagnosed on USG was thyroiditis, 40.3% of the patients followed by colloid goiter in 27.4% of the patients. Multinodular goiter was seen in 14.5% of the patients . the remaining lesions were papillary carcinoma (1.6%) medullary carcinoma (1.6%), adenomatous nodules (9.7%) and MNG with thyroiditis (4%)

Table-3: Distribution of thyroid lesions based on FNAC diagnosis

Ultrasound diagnosis	Number	Percentage
Thyroiditis	29	46.77
Colloid goiter	18	29.03
MNG	07	11.29
Medullary carcinoma	01	01.61
Papillary carcinoma	02	03.23
Adenomatous nodule	05	08.06
MNG with thyroiditis	00	00.00
Total	62	100.00

The main lesions seen were thyroiditis in 46.8% of the patients, colloid goiter in 29% MNG in 11.3% and adenomatous nodule 8% of the patiens. The other lesions were medullary carcinoma and papillary carcinoma(1.6% and 3.2% respectively).

Table-4 : Matching of ultrasound diagnosis with FNAC diagnosis

Type	Number	Percentage (%)
Thyroiditis	25	46.30
Colloid goiter	16	29.63
MNG	07	12.96
Medullary carcinoma	01	01.85
Papillary carcinoma	01	01.85
Adenomatous nodule	04	07.41
Total	54	100.00

Matching of ultrasound diagnosis with FNAC diagnosis was seen in 46.3% of the cases of thyroditis, 29.6% of colloid goiter cases, 12.9% of MNG cases, 7.4% adenomatous nodules and 1.8% of medillary and papillary carcinoma cases.

Table-5: Comparison of ultrasound diagnosis with FNAC diagnosis

Type	Positive predictive value	Negative predictive value	Sensitivity	Specificity
Thyroiditis	92.59	07.41	86.20	90.00
Colloid goiter	94.12	05.88	88.89	72.00
MNG	100.00	00.00	100.00	100.00
Medullary carcinoma	100.00	00.00	100.00	100.00
Papillary carcinoma	66.67	33.33	85.00	75.00
Adenomatous nodule	66.67	33.33	85.00	75.00

On comparison with USG diagnosis and FNAC, the positive predictive value to detect thyoiditis by ultrasound was 92.5% in this study. In this study ultrasound is 86.2% sensitive and 90% specficity in detecting thyroiditis. And the positive predictive value for detecting medullary carcinoma was 100% and papillary carcinoma was 66%. Ultrasound has 94% positive

DISCUSSION

The present study comprised of patients who were sent for the evaluation of thyroid disorders with USG and FNAC On comparison with USG diagnosis and FNAC, the positive predictive value to detect thyroiditis by ultrasound was 92.5% in this study. **Yeh et al(11)** showed that micronodulation on sonography is useful for diagnosing diffuse lymphocytic thyroiditis because of a high positive predictive value which was 94.7%. **Venkatachalapathy et al(12)** found that the overall

sensitivity for FNAC in their series was 81.3% for benign lesions. In this study ultrasound was 86.2% sensitive and 90% specificity in detecting thyroiditis. Features considered in this study were heterogenous thyroid parenchyma with increased vascularity and micronodulations. The positive predictive value for detecting medullary carcinoma was 100% and for papillary carcinoma it was 66%. Ultrasound has 94% positive predictive value for adenomatous nodule. Positive predictive value for colloid goiter was 94 % and that of MNG was 100%.

Vikas et al(13) has stated in his study that the overall sensitivity of thyroid ultrasound for diagnosing a malignant nodule is 83.3%. In this study it was identified that ultrasound has 80% sensitivity and 75% specificity in detecting malignant nodules based on the sonographic findings. In this study ultrasound has 100 % sensitivity in detecting Multinodular goiter. 71.8% ($P< 0.05$) of patients had nodules with well defined smooth margins which were diagnosed as benign in ultrasound and FNAC. **Moon et al(8)** stated in his study that 78.8% vs 65.4% ($P<0.001$) showed well defined margins which was characteristic of benign nodule.

In this study, it is observed that 31.25% of nodules were anechoic. All these anechoic nodules were diagnosed as benign on USG and it was confirmed by FNAC. In a study by **Schuller et al(14),** where 253 patients were randomly screened for thyroid ultrasound and 69 patients had thyroid lesions which were followed up for 5 years. All the anechoic nodules were found to be benign in USG and in FNAC even after follow up of 5 years. Some of the lesions had disappeared without any treatment.

In this study majority of the hypoechoic nodules(66. 67 %) were found to be malignant nodules, in a similar study **Pedro Weslley et al(15)** studied features of papillary carcinoma in 106 nodules which revealed hypo- echogenicity in 90.5% no calcification in 59.4% and micro calcification in 26.4%. In this study 83% of hypoechogenic nodules turned out to be malignant nodules. All the cases which were detected as malignant by ultrasound were confirmed as malignant on FNAC. Isoechoic lesions were seen in both benign and malignant lesions. Most of the benign lesions were hyperechoic.

In this study 95% of the cases were benign and only 5% of the cases were malignant. Similarly in a study conducted by **Bonovita et al(16)** the sample size was 1232 patients. Among these patients malignant cases were only about 3% to 7%, rest of the cases were benign lesions.

Out of 62 patients, 60 cases were diagnosed as benign cases, one case which was hypoechoic with comet tail artifact and well defined margins was diagnosed as benign nodule in ultrasound and this was diagnosed as papillary carcinoma on FNAC, similarly in a study done by **Ankush Danadia et al(10)** on 100 cases in Gujarat showed 66 benign cases, 8 malignant cases and 26 cases were indeterminate on USG. Out of these 66 benign cases 2 cases which were diagnosed as benign turned out to be malignant on FNAC (as papillary carcinoma). Margins of the nodules were well defined and smooth in 68% of patients and ill defined in 23.6% in a similar study done by **Ankush Danadia et al(10)**, margin was well defined in 77.7% and ill defined in 22.3% of nodules. Well defined spiculated margin of nodules are seen in malignant nodules. In this study 66.6% of malignant nodules had well defined spiculated margins.

Mary C.Frates et al(17) has conducted a study on 3200 patients over a period of eight years which showed that solitary nodule more than 1cm size has increased risk of being malignant. In this study, the lesions which were characterized by ultrasound as malignant nodules were more than 1cm in size and 66.6% of the nodules were solitary. These lesions were confirmed as malignant on FNAC also.

CONCLUSIONS

In this study of sonographic evaluation of thyroid lesions with FNAC correlation which was done in Narayan medical college, Jamuhar, South bihar for a period of 1 year had led to the following conclusions. Ultrasound has 80% sensitivity and 75% specificity in detecting malignant nodules. The nodules which were characterized as malignant in ultrasound was confirmed as malignant nodules in FNAC. Ultrasound is an excellent modality for diagnosing benign conditions such as thyroiditis, Multinodular goiter and malignant conditions such as medullary carcinoma. Certain cases such as small nodules of papillary carcinoma is difficult to differentiate from small colloid nodules. Ultrasound is a better modality of investigating the thyroid gland as a whole and non invasive when compared to FNAC. Ultrasound is the best imaging modality which can characterize the number of nodules, size of each nodule, margins of the nodule and contents of the nodule. Ultrasound has 80% sensitivity and 75% specificity in detecting malignant nodules.

Conflict of Interest: No

Funding : No

REFERENCES

1. Lal GH, Clark O. Thyroid, parathyroid and adrenal. Schwartz's principles of surgery. 10th edition. London: Brunicardi. 2015:1531.
2. das. Das S. The thyroid and parathyroids; A concise text book of surgery. 9th edition, Kolkata. S Das Publisher. 2016: 524.
3. Narayanakar RP, Saligrama D, Shetty G. A study of correlation of pre-operative fine needle aspiration cytology and ultrasonography with post-operative histopathology in thyroid swellings. 2020;7(5):1456–60.
4. V.P. Kharchenko, P.M. Kotlyarov, M.S. Mogutov, Alexandrov Y.K. Ultrasound diagnostic of thyroid diseases. Springerverlag berlin Heidelberg, 2010
5. Prasad CV. Evaluation of correlation between ultrasonography and FNAC of thyroid nodules. 2016;3(2):92–7.
6. Akhtar K, Sah D, Acharya R, Jha AK. Correlation between Ultrasonography and Fine Needle Aspiration Cytology (FNAC) Findings in Patients with Thyroid Lesions. 2021;(August):10–7.
7. Jinadu FO, Odunaiya Z. Correlation of sonographic and cytologic patterns of thyroid nodules. 2021;
8. Moon HJ, Kim E. Fine-Needle Aspiration Biopsy of Focal Thyroid Nodules. Am J Roentgenol. 2009; 345-9.
9. Mallikarjunappa B, Ashish SR. Ultrasound Evaluation of Thyroid Nodules and its Pathological Correlation. JIMSA 2014; 27: 93-5.
10. Dhanadia A, Shah H, Dave A. Ultrasonographic and FNAC correlation of thyroid lesions. Gujarat Med J 2014; 69:75-81.
11. Yeh HC, Futterweit W, Gilbert P. Micronodulation: ultrasonographic sign of Hashimoto thyroiditis. J Ultrasound Med 1996; 15:813-819
12. Sreeramulu PN, Venkatachalapathy TS, Prathima S, Kumar K. A prospective study of clinical, sonological and pathological evaluation of thyroid Nodule. J Biosci Tech 2012; 3:474-78.
13. Chaudhary V, Bano S. Thyroid ultrasound. Indian Journal of Endocrinology and Metabolism 2013;17(2):
14. Schueller-Weidekamm C, Kaserer K, Schueller G, Scheuba C, Ringl H, Weber M, et al. Can quantitative diffusion-weighted MR imaging differentiate benign and malignant cold thyroid nodules? Initial results in 25 patients. Am J Neuroradiol 2009; 30(2):417-22.
15. walsey, Fagundes Ta et al. USG features of papillary thyroid carcinoma. J Ultra Med 2004;23:572-78.
16. Bonavita JA, Mayo J, Babb J, Bennett G, Oweity T, Macari M, et al. Pattern recognition of benign nodules at ultrasound of the thyroid: which nodules can be left alone? Am J Roentgenol 2009;193(1):207-13.
17. Frates MC, Benson CB, Doubilet PM, Kunreuther E, Contreras M, Cibas ES, et al. Prevalence and distribution of carcinoma in patients with solitary and multiple thyroid nodules on sonography. J Clin Endocrinol Metab 2006;91(9):3411–7.