RESEARCH

THYROID NODULE MALIGNANCY BY ULTRASOUND FINDINGS IN A TERTIARY CARE TEACHING HOSPITAL

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Received : 02/05/2022
Received in revised form : 18/06/2022
Accepted : 05/07/2022

Keywords:
Benign,
Cancerous,
Sensitive and Thyroid Nodules.

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DOI: 10.47009/jamp.2022.4.4.38

Source of Support: Nil,
Conflict of Interest: Nonedeclared

Int J Acad Med Pharm
2022; 4 (4); 194-197

Abstract

Background: According to the American Thyroid Association, thyroid nodules are "single lesions inside the thyroid gland, radiologically distinguishable from surrounding thyroid parenchyma" (ATA). Thyroid nodules are critical for a number of clinical applications. Undoubtedly, a dysfunctional thyroid is one of the most common endocrine illnesses in the world. India is not a unique case. According to estimates based on several studies, 42 million people in India are believed to have thyroid disease. **Materials and Methods:** The Department of Radiodiagnosis at the Kanti Devi Medical College and Research Center in Mathura, India, conducted this cross-sectional investigation. This study comprised 195 females who underwent ultrasonography and had thyroid nodules measuring greater than 1 cm, either suspected or confirmed. **Result:** Thyroid sonography was performed on 18% of the research participants due to nonspecific indications. Thyroid sonography was performed on the remaining 82 percent of patients due to visual and palpable abnormalities. Additionally, shows that 88.2% and 11.8 percent of the patients, respectively, had benign and malignant tumours. On the other hand, histopathological analyses showed that 90.3% and 9.7%, respectively, of the tumours were benign and malignant. In the present investigation, susceptibility, selectivity, and significant predictive values were 91%, 8.5%, and 50%, respectively. On the other side, the negative predictive value was 47%. In the current study, it was discovered that microcalcifications, solid nodules taller than wide, uneven borders, and increased blood flow within the nodule were all valid indicators of thyroid cancer. **Conclusion:** According to the findings of this analysis, radiographic evidence is sufficient to distinguish between benign and malignant thyroid tumours. Larger-scale investigations are necessary to develop criteria for thyroid tumour radiological diagnosis.

INTRODUCTION

Thyroid abnormalities are, without a doubt, among the most common endocrine disorders in the world. India is not an exception. Thyroid disease affects around 42 million individuals in India, according to estimates based on several studies.[1] Thyroid nodules are common, and the technique of diagnosis plays a significant role in determining their prevalence. The estimated prevalence is 4% to 7% by palpation alone, up to 67 percent by ultrasonography, and 50% at autopsy, with a noticeably higher incidence in iodine-deficient areas.[2] Thyroid nodules are described by the American Thyroid Association (ATA) as "separate lesions inside the thyroid gland, radiologically distinct from surrounding thyroid parenchyma."[3] Clinically, thyroid nodules are crucial for a number of reasons. Though they occasionally cause compressive symptoms and can cause thyroid dysfunction, they are most useful for excluding thyroid cancer. It should therefore be distinguishable radiographically from surrounding thyroid tissue and palpable. Women are four times more likely to get thyroid nodules than men are, and the likelihood of developing one increases with age and iodine deficiency.[4] The hormonal effects of oestrogen and progesterone, which have been associated with pregnancy and multiparity, could account for the gender differential. Most of these nodules are benign and have a minimal risk of developing into malignancy. In thyroid nodules evaluated by biopsy, the reported prevalence of malignancy ranges from 4.0 percent to 6.5 percent, and is mostly unaffected by nodule size. Thyroid cancer makes up only about 0.5 percent of all cancers, making it a very uncommon tumour. Contrarily, imaging is essential

ISSN (O): 2687-5365; ISSN (P): 2753-6556

in the care of patients.[5,6] The most dependable, secure, and economical diagnostic method for assessing thyroid nodules is thyroid FNA biopsy. When a patient has a thyroid nodule, fine needle aspiration biopsy (FNAB) is a useful technique for making the diagnosis of thyroid cancer.[7] It should be noted that FNAB is an invasive procedure that poses a risk of sample and analytical errors, is not cost-effective for analysing all nodules, and depends critically on the experience of the doctor doing the aspiration.[8] Ultrasonography is the best method for identifying thyroid nodules. A non-invasive approach of figuring out the size and quantity of nodules is ultrasonography (USG). Although the cost-effectiveness of USG in resolving patient-specific clinical issues has not been thoroughly investigated, when used effectively, it does contribute to the resolution of important clinical issues in certain patients. In the US and the UK, nodular thyroid disease is monitored by fine needle aspiration (FNA) of cervical lymph nodes and thyroid nodules.[9] To evaluate the anatomic features of thyroid nodules, in addition to assessing the size and characteristics of the nodule, ultrasonography provides guidance for diagnostic procedures such as FNAB. Nowadays, brightness-mode imaging can detect lesions as small as 2 to 3 mm, raising the question of which thyroid nodules are clinically relevant for further evaluation.[10] USG thyroid can determine whether or not the palpable abnormality is a thyroid nodule. Ultrasound examinations of nodule size, position, and type aid in distinguishing benign from malignant lesions.[11] In general, ultrasound plays an important role in the investigation of thyroid nodules. The goal of this study was to correlate ultrasonography findings of thyroid nodules in patients with clinical records.

MATERIALS AND METHODS

This cross-sectional study was conducted at Kanti Devi Medical College and Research Centre in Mathura, India, in the Department of Radio-diagnosis. during the period from Mach, 2021 to October, 2021. The institutional ethical committee evaluated and approved the study protocol, and each patient gave their informed consent. This study comprised 195 females who underwent ultrasonography and had thyroid nodules measuring greater than 1 cm, either suspected or confirmed.

Technique for Ultrasound Examination:

Because metastatic cervical lymph nodes are frequently seen in thyroid cancers and can affect surgical therapy and prognosis, a thorough evaluation of the neck for any cervical lymphadenopathy should always be included in the thyroid ultrasound. These patients had a thyroid nodule ultrasound evaluated using a high frequency 7.5-10.0 MHz probe. Diameter, echogenicity (Hyper, Hypo, Iso, and An Echo), composition (Cystic, Solid, Mixed), micro-calcifications (Presence and Absence), irregular and regular borders, and Halo are all factors to consider (Presence and Absence). The recommendations for ultrasound of nodule margins to detect malignancy were adapted from Lew et al.[11] A fine needle aspiration (FNA) biopsy was recommended to the referring physician.[12]

RESULTS

The average age of the women who participated in the study was 46.8 ± 5.8 years. Thyroid sonography was performed on 18% of the research participants due to nonspecific indications. Thyroid sonography was performed on the remaining 82 percent of patients due to visual and palpable abnormalities. In addition, [Table1] demonstrates that benign and malignant lesions were found in 88.2% and 11.8 percent of the patients, respectively. Histopathological examinations, on the other hand, revealed that 90.3 percent and 9.7% of the tumours were benign and malignant, respectively. Sensitivity, specificity, and positive predictive values were 91 percent, 8.5 percent, and 50 percent, respectively, in the current study. The negative predictive value, on the other hand, was 47%. [Table2] Microcalcifications, solid nodules taller than wide, uneven boundaries, and increased blood flow within the nodule were all found to be reliable in identifying thyroid cancer in the current investigation.

Table 1: Comparison according to various characterstics

Echogenesity	Mixed n (%)	Solid n (%)	Total n (%)
Hyper	31(23.1%)	20(32.8%)	51(26.2%)
Hypo	34(25.4%)	08(13.1%)	42(21.5%)
Euthy	69(51.5%)	33(54.09%)	102(52.3%)
Total	134(68.7%)	61(31.3%)	195(100.0%)
Margins			
Irregular	69(51.5%)	33(54.09%)	102(52.3%)
Regular	65(48.5%)	28(45.9%)	93(47.7%)
Total	134(68.7%)	61(31.3%)	195(100.0%)
Halos			
Yes	76(56.7%)	26 (42.6%)	102(52.3%)
No	58(43.3%)	35(57.4%)	93(47.7%)
Total	134(68.7%)	61(31.3%)	195(100.0%)
Calcification			
Yes	70(52.2%)	35(57.4%)	105(53.8%)
No	64(47.8%)	26(42.6%)	90(46.2%)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Total	134(68.7%)	61(31.3%)	195(100.0%)
Diameters			
AP	53(39.6%)	17(27.9%)	70(35.9%)
Axial	40(29.9%)	24(39.3%)	64(32.8%)
Longitudinal	41(30.6%)	20(32.8%)	61(31.3%)
Total	134(68.7%)	61(31.3%)	195(100.0%)
Radiological diagnosis			
Benign	118(88.05%)	54(88.5%)	172(88.2%)
Malignant	16(11.9%)	07(11.5%)	23(11.8%)
Total	134(68.7%)	61(31.3%)	195(100.0%)
Clinical diagnosis			
Benign	121(90.3%)	55(90.2%)	176(90.3%)
Malignant	13(9.7%)	06(9.8%)	19(9.7%)
Total	134(68.7%)	61(31.3%)	195(100.0%)

Table 2: Sensitivity and specificity analysis.

Statistic	Value	95% confidence interval
Sensitivity	68.42%	43.45% to 87.42%
Specificity	31.25%	24.49% to 38.66%
Positive predictive value	4.98%	3.66% to 6.74%
Negative predictive value	94.95%	90.35% to 97.42%
Accuracy	33.11%	26.55% to 40.19%

DISCUSSION

Sonography can distinguish benign and malignant thyroid nodules based on their consistency, such as hardness/elasticity.[13] However, USG is incapable of distinguishing lesions that are not surrounded by normal tissue.[14] Despite a significant increase in early-stage thyroid cancer diagnosis, the disease's mortality rate has not decreased.[15] Thyroid nodules are found in more than 5% of the population, according to studies; however, nodules in the thyroid gland were discovered during ultrasonography in more than 47.7% of a randomly selected population.[16] Furthermore, multiple studies have revealed that the prevalence of thyroid nodules detected by ultrasonography is very high, accounting for more than 67 percent of cases. Thyroid nodules, on the other hand, make up less than 6.7% of all thyroid nodules.[17] The use of ultrasonography for thyroid node diagnosis has been proposed in numerous publications as a way to avoid unnecessary invasive treatments.[18] According to the findings of this study, the positive predictive value was 5.0 percent and the negative predictive value was 94.95 percent. These findings are similar to those of Leenhardt L et al, who discovered that a hypoechogenic nodule has a moderate positive predictive value (up to 63%) for malignancy, with 75 percent sensitivity and 83 percent specificity.[19] Furthermore, Moon WJ et al.[12] discovered that nodular size greater than 2cm, as well as solid consistency, is strongly associated with malignancy in their study. Several other studies, however, suggested that coarse calcifications, taller than wide, uneven boundaries, and increased blood flow within the nodule were indicators of malignancy.[20]Farahiti J discovered that several sonographic patterns, including diffuse hyperechogenicity, cyst with a colloid clot, spongiform structure, and giraffe pattern, were all benign tumours. Furthermore, they discovered that unnecessary biopsy procedures were used in more than 60% of these cases.[21] According to the findings of the current study, taller solid nodules, microcalcification, uneven borders, and increased blood flow in the nodule were all independently identified as thyroid cancer signs. Ultrasound findings are ambiguous in distinguishing between benign and malignant thyroid nodules. The ultrasound appearance of benign and malignant nodules may be similar; only a few ultrasonic markers can help distinguish between the two.[22] Various research have suggested that ultrasonography characteristics and clinical results can be used to model thyroid cancer prediction.[23] Other studies, however, have shown that ultrasonography is ineffective in distinguishing benign from malignant follicular lesions. Malignancy is suspected if the nodule is ill-defined, hypoechoic, has a thick irregular capsule, and chaotic intranodular vascularity.

CONCLUSION

According to the findings of the current study, radiographic evidence is sufficient for the diagnosis of benign and malignant thyroid tumours. Larger-scale studies, however, are required to develop guidelines for the radiological identification of thyroid tumours.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556