Original Research Article

A Study on Evaluation on Thyroid Nodule Malignancy by Ultrasound Findings in a Tertiary Care Center

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Abstract

Background: Thyroid nodule is a common clinical problem and the incidence of thyroid nodules has increased with the recently increasing use of thyroid ultrasonography in India. **Subjects and Methods:** The study included total 186 cases among which 184 were females and 02 were males. Patients with diagnosed thyroid nodules of more than 1 cm and who underwent ultrasonography were included. **Results:** From all nodules, 22.65%) were single and 76.34% were multiple nodules; 60 nodules (32.25%) were solid and 126 (67.74%) cystic. Concerning echogenicity, 44 nodules (23.65%) were Hypo-echo and 35 nodules (18.8%) Hyper-echo. 179 nodules (96.23%) had a regular edge. 65 nodules (34.9%) had without Halo. 140 nodules (75.2%) were larger than 15mm. According to histopathology results, the benign nodules were 88.7% and malignant cases were 11.3%.**Conclusion:** Based on the result of this study, thyroid nodule size must not be considered as a criterion for malignancy and thyroid nodules of any size must be suspected as malignant. Important criteria for malignancy include irregular edges, being Solid hypoechogenicity and being a single nodule respectively.
Keywords: Thyroid nodules, Ultrasound, Fine-Needle Aspiration, Benign and Malignancy.

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INTRODUCTION

A thyroid nodule is an isolated lesion in a normal thyroid gland. Thyroid nodules are very common in the adult population, especially in women.[1] Various studies on thyroid disorders have predicted that about 42 million people in India suffer from thyroid disorders.[2] Thyroid nodules are common and their prevalence depends largely on the detection technique. Estimated prevalence ranges from 4-7% by palpation alone, to 67% by ultrasound and 50% by autopsy, with a significantly higher prevalence in iodine-deficient counties.[3-5] Thyroid nodules are defined by the American Thyroid Association. association (ATA) as "discrete thyroid lesions that are radiologically distinct from the surrounding thyroid parenchyma [6]" Thyroid nodules are clinically important for several reasons. They can cause thyroid dysfunction and rarely compression symptoms, but are primarily important because thyroid cancer must be removed, so it should be distinguishable from adjacent thyroid tissue either by palpation or radiology. Thyroid nodules are 4 times more common in women than in men, and their incidence increases with age and low iodine intake.[7] Compared to FNA, thyroid US is indeed definitive as an advantage of the thyroid nodule diagnostic method, because it is a non-invasive procedure and provides immediate information. However, the clinical importance of thyroid nodules lies in the detection of malignancy, the majority of nodules are benign, less than 5% are malignant.[8,9] With small samples, many studies are limited to analysis of the relationship between nodules. . characteristics of thyroid nodule ultrasound and thyroid cancer risk.[10-12] This confirmation bias overestimates the cancer risk associated with ultrasound accuracy. The aim

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of this study was to determine the ultrasound findings of thyroid nodules in patients and to correlate them with clinical data in order to develop a standardized diagnostic system for the interpretation of thyroid ultrasound.

MATERIAL AND METHODS

This present study was carried out in the Department of Pathology and Radiology, SIMSRH, Karnataka, India during the period from 2014 to 2015. A total of 186 cases were included in the study, of which 184 were women and 02 were men. Patients diagnosed with thyroid nodules larger than 1 cm and undergoing ultrasound were included. Ultrasonography: A detailed examination of the neck for cervical lymphadenopathy should always be performed with thyroid ultrasonography, as metastatic cervical lymph nodes are common in thyroid cancer and may affect the surgical management and prognosis of patients. In these patients, a high-frequency 7.5-10.0 MHz probe was used for thyroid nodule ultrasound. This includes diameter, echogenicity (Hyper, Hypo, Iso and An Echo), texture (cystic, solid, mixed), microcalcifications (presence and absence), edges (irregular and regular) and halo (presence and absence). Lew *et al.* guidance of the edges of ultrasound nodes, which indicates malignancy. Guidelines were adopted.13 Fine needle aspiration (FNA) biopsy of the appendix was recommended to the referring physician. [14,15]. All participants provided informed written consent to participate in it.

RESULTS & DISCUSSION

This study examined 186 patients; 184 patients (98.9%) were women and (1.07%) were men. Their mean age was 34.6±24.02 years. None of the patients had irradiated the neck in childhood. Only one patient with a benign nodule had papillary carcinoma among family members (the patient's sister). Of all nodes, 22.65% were single and 76.34% multiple nodes; 60 nodules (32.25%) were solid and 126 (67.74%) were cystic. Regarding echo, 44 nodes (23.65%) were hypoechoic and 35 nodes (18.8%) were hyperechoic. 179 nodes (96.23%) had a regular border. 65 nodes (34.9%) had no halo. 140 nodules (75.2%) were larger than 15 mm. According to the histopathological results, there were 88.7% benign nodes and 11.3% malignant nodes. Summary of FNAC and histopathology [Table 2]. Prior knowledge of the nature of the disease greatly changes treatment options. In the thyroidectomy, benign nodules require partial thyroidectomy or lobectomy, while malignant disease requires extensive surgical intervention, i.e. total thyroidectomy, neck dissection followed by radioiodine ablation, and lifelong thyroxine dependence. In thyroid disease, prior knowledge of that pathology provides the advantage of FNAC, an established technique for preoperative evaluation of thyroid nodules.[16] FNAC is a cost-effective, less traumatic, less invasive, and easily performed procedure.[17] FNAC is a useful tool for diagnosing thyroid nodules when cancer is suspected. This reduced the need for imaging and surgery and increased the number of cancer patients undergoing surgery.[18] After surgery and pathology, 21 cases (10.2%) were reported as malignant, while 19 cases (9.1%) were confirmed as malignant by FNAC. All of these nodules were papillary thyroid carcinoma. There was no significant relationship. between sex and malignancy (p=1). Most of malignant nodules were single nodules (p=0.0001) and solid (p<0.0001). Most malignancies had irregular edges (p=0.15) and calcifications (p=0.02). There was no significant relationship between malignancy and nodule size of larger than 15mm (p=0.395). Compared with surgery, FNA sensitivity and specificity were calculated as 85.7% and 99.4%, respectively.

Table 1

Individual or groupfeatures		benign (Sum=167)	malignant (Sum=19)	Odd ratios (Confidence interval of 95%)	P-value
Sex	Male	2	0		1
	Female	165	19		
Age range	<15	1	2		
	15-35	22	3		
	35-55	64	6		
	>55	80	8		
No. of nodules	Single nodule	32	12	7.23{2.63-19.83}	0.0001*
	Multi nodule	135	7		
TSH level	Normal	124	10		
	Hypothyroidism	16	5		
	Hyperthyroidism	27	4		
Nodule type	Solid	43	17	24.51{5.43-110.48}	<0.0001*

	Cystic and mixed	124	2		
Echogenicity	Hypo	36	8		
	Hyper	33	2		
	iso	98	9		
Margins	Irregular	5	2	3.81{0.686-21.16}	0.152
	Regular	162	17		
Halo	Without halo	47	18	45.95{5.96-354.06}	<0.0001*
	With halo	120	1		
Nodule size	Larger than 15 mm	126	14	0.911{0.30-2.68}	1
	Smaller than 15 mm	41	5		
Calcification	With calcification	37	9	3.16{1.19-8.35}	0.02*
	Without calcification	130	10		

Fisher's test was used for comparison. (* The difference was statistically significant.) In this study, the incidence of malignant nodules was 10.2%. Compared with surgery, the sensitivity and specificity of FNA in diagnosing nodes was 85.7% and 99.4%, respectively. An isolated nodule, solid, hypoechoic, irregular borders or calcification was suitable features to distinguish between malignant and benign nodules, while nodule size had no suitable discriminatory value. In other studies, the incidence of malignancy varied. Overall, 3.6-9.9% of all thyroid nodules are reported to be malignant.[19-22] In my study, the incidence of malignancy was about the same. Age and gender were not associated with malignancy in most studies.[23-25] In addition, sensitivity and specificity of FNA were superior to surgery in most studies; therefore, the use of FNA with sonography can be very effective even for small nodules.[23,26] In our study, FNA had high sensitivity and specificity.

Table 2: Nature of thyroid nodules in FNAC and histopathology

Thyroidnodules	FNAC	Percentage(%)	Histopathology	Percentage(%)
Benign	167	89.8	165	88.7
Malignant	19	10.2	21	11.3

Table 3: Summary of FNAC and Histopathology

FNAC Findings	Histopathology Findings	
	Malignancy Present	Malignancy Absent
MalignancyPositive	18 (10.8%) (True Positive)	1 (1.07%) (False Positive)
Malignancy Negative	3 (1.07%) (False Negative)	164 (88.7%) (True Negative)

Some studies have been done to evaluate sonographic parameters in distinguishing malignant from benign thyroid nodules; results were and remain controversial.[19,27] In an American study, sonographic features could not distinguish between benign and malignant thyroid nodules, and fine-needle aspiration was recommended in all cases.[19] In some studies, sonography failed to distinguish between malignant and benign cases, and FNA is recommended for all thyroid nodules regardless of palpation.[28,29] In one study, none of the sonographic features could differentiate between benign and malignant thyroid nodules. nodules other than calcification.[19] However, there are studies that support the usefulness of sonographic signs in distinguishing between malignant and benign nodes. In one study, a single nodule, irregular margins, and microcalcification increased the risk of malignancy by 3.6-fold, 5.4-fold, and 39-fold, respectively.[23] In the study by Taner *et al.*30, the presence of multiple nodules was associated with malignancy, while in the study by Ugurlu *et al.*[23], one nodule or two nodules increased the possibility of malignancy, and Cappelli *et al.* to[35], solid and hypoechoic were associated with malignancy. However, in another study, hypoechogenicity was not associated with malignancy.[23] Irregular borders, irregular shape, solidity and hypoechogenicity can increase the possibility of malignancy.[27,31,32] In another study, the majority of malignant nodes had irregular borders and hypoechogenicity.[29] In the study by Moon *et al.*[33],

irregular shape was not associated with malignancy, but the percentage of hypoechoicity of malignant nodules was higher. Some studies supported sonographic signs to distinguish between malignant and benign cases, but none could conclusively demonstrate malignancy.

This present study showed that the small size of a nodule does not exclude the possibility of malignancy and that all nodules of any size should be investigated further. As mentioned in other studies, there is no difference in malignancy between nodes smaller or larger than 10 mm[34] Cappelli *et al.*,[35] a study showed that considering thyroid tumors larger than 10 mm caused 19% no malignant tumors were detected . Other studies have also questioned the use of exact size to suspect malignant nodules.[19,24] One study recommended FNA for nodules up to 5 mm in size.28 In another study, nodules larger than 10 mm did not increase the chance of malignancy.[19,24] [19,24] 23] Therefore, it seems that thyroid nodule size is not a good indicator for future procedures such as FNA or surgery, and malignancy should be suspected in nodules of any size. Our study also had limitations. One of its limitations was the small sample size; therefore, logistic regression analysis could not be used. It is recommended to conduct a similar study with a larger sample to more accurately identify the characteristics of malignant tumors. Finally, because US findings were interpreted by a single investigator, interobserver variability in interpretation of spongy appearance and US characteristics was not assessed.

CONCLUSION

In summary, it can be said that based on the results of this study, the size of the thyroid nodule should not be considered as a criterion for malignancy, and any size of thyroid nodule should be suspected as malignancy. Important criteria for malignancy are irregular margins, solid hypoechogenicity, and a single nodule, respectively. However, the presence of calcifications in a nodule on US indicates a higher risk of malignancy and should prompt the physician to further evaluate the nodule with repeat FNA.

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