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ORIGINAL ARTICLE

Validity of Thyroid Ultrasound in Diagnosing Malignancy in Thyroid Nodule

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ABSTRACT

Aim: To determine the validity of ultrasound in the diagnosis of malignant thyroid nodule keeping histopathology as gold standard.
Methodology: This was a cross sectional study conducted in Radiology department of a Tertiary care Hospital, Islamabad for a period of one year. In this study, 55 patients who presented to indoor and outdoor department of hospital with palpable thyroid nodules underwent USG. The results of ultrasound were then compared with histopathological findings.
Result: Out of 55 patients, on the basis of ultrasound, 5 male cases with thyroid nodule were malignant and 9 were benign while 8 females were malignant and 33 benign. But on histopathology report, out of 5, only 3(21%) males had malignancy while in females, 7(17%) out of 8 found malignant**.** 9 patients were true positive for malignancy and 4 patients were false positive, 41 patients were true negative for malignancy and one was false negative. Sensitivity was 90% while specificity was 91.1%. Positive predictive value was 69.2% and negative predictive value was 97.6%.
Conclusion: Thyroid ultrasound is a valuable diagnostic tool in predicting malignancy in thyroid nodules with sensitivity of 90% and specificity of 91.1%.
Keywords: Thyroid ultrasound, Echogenicity, Calcifications, Thyroid nodule

INTRODUCTION

Endemic goiter is caused by deficiency of iodine or defective hormone synthesis. In Pakistan, Goiter belt extends from Attock to Skardu[1]. About 4% of patients attending h++++++++ospitals are with thyroid diseases[2]. Mostly thyroid nodules are benign with only about 5% being malignant[3]. Grey scale ultrasound is the most sensitive method for diagnosing thyroid nodules[4]. Thyroid B-mode scan shows typical nodular features i.e. contour, dimension, echogenicity, presence and type of peripheral halo, and number of nodules[7]. Micro-calcification is the most specific feature of thyroid malignancy with a sensitivity and specificity of 89% and 95% respectively[5]. Hypoechogenicity, absence of hypoechoic halo and blood flow to central part of nodule when greater than peripheral part are also highly suggestive of malignancy[6].

The objective of the study was to determine the validity of ultrasound in the diagnosis of malignant thyroid nodule keeping histopathology as gold standard.

METHODOLOGY

It is a cross sectional study of 55 patients. Cases with palpable thyroid nodule were enrolled. This study was held at Radiology department of a Tertiary care Hospital, Islamabad. The study was conducted for a period of one year and informed consent was taken. Permission from the hospital ethical committee was sought prior to study. All the examinations were performed using Linear-array transducer 7.5 MHz of PHILIPS with a facility of grey scale real time imaging and doppler. Grey scale imaging was done for the number of nodules and their size, however, in every patient only one nodule was taken as case which was largest. Echogenicity of nodule, its margins and contour were classified. Calcification was classified as micro calcification/ snow storm calcification, hyper echoic punctate images, ≤2mm in diameter with or without posterior shadowing and no posterior reverberation or coarse calcification is >2mm with posterior shadowing. Biopsy was taken. All the patients having palpable thyroid nodules were included in the study irrespective of age and sex and patients with history of prolonged bleeding, thyrotoxicosis were excluded. The data was analyzed on SPSS-14.

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RESULTS

Fifty five patients with palpable nodules were included in our study. 14 (25.5%) male and 41(74.5%) females with age ranging from 16-66 years were included. According to USG, 23 patients had nodule size <2cm (41.8%), 24 patients had nodule size >2cm (43.6%) and 8(14.5%) patients had nodule size 2cm. In patients with nodule size <2cm, 4(17.4%) were malignant and 19(82.6%) benign on histopathology. In patients with nodules size >2cm on histology, 2(8.3%) patients were malignant and 22(91.7%) were benign. In patients with nodule size 2cm, 4 patients were malignant and 4 were benign.

According to morphology 17(30.9%) patients had nodules with irregular margins and 38(69.1%) patients had smooth margins on ultrasound. In patients with irregular margin 11(20%) patients were benign and 6(10.9%) were malignant on histopathology. Among patients with smooth margins 4(7.3%) were malignant and 34(61.8%) benign, on histopathology. Calcification of thyroid is important diagnostic feature on ultrasound. 8(14.5%) patients had microcalcification, on histopathology malignancy rate was 50%, 3(5.5%) patients had snow storm appearance and all were malignant, while 44(80%) patients had coarse nodules, 3(5.5%) patients were malignant on histopathology.

Nine patients in our study were true positive for malignancy and 4 patients were false positive, 41 patients were true negative for malignancy and one was false negative. Sensitivity of our study was 90% while specificity was 91.1%. Positive predictive value of present study was 69.2% and negative predictive value was 97.6% according to pre mentioned criteria in data analysis.

Table 1: Calcification of nodule with histopathology

Hpx		Calcification of nodule			Total
		Microcalcification	Snowstorm	Coarse	
Benign	Count	4	0	41	45
	% within hpx	8.9%	0%	91.1%	100%
	% within calcification of nodule	50%	0%	93.2%	81.8%
	% of Total	7.3%	.0%	74.5%	81.8%
Malignant	Count	4	3	3	10
	% within hpx	40%	30%	30%	100%
	% within calcification of nodule	50%	100%	6.8%	18.2%
	% of Total	7.3%	5.5%	5.5%	18.2%
Total	Count	8	3	44	55
	% within hpx	14.5%	5.5%	80%	100%
	% of Total	14.5%	5.5%	80%	100%

DISCUSSION

In our study, 14(25.5%) male and 41(74.5%) females were according to literature and with age group ranging from 16-66years with mean age was 38.5years. Three males (30%) and 7 females (70%) have malignant disease. The literature shows that thyroid carcinoma is about three times more common in women than in men[7]. This is further authenticated by other study in which thyroid nodule was predominant in women and malignant disease of thyroid was seen in 78% of women[8].

In present study by using USG, 23 patients have nodule size <2cm (41.8%), 24 patients have nodule size >2cm(43.6%) and 8 patients have nodule size 2cm. The prevalence of malignancy was not significantly higher in nodules greater than 1cm(10 mm), and a dimensional cut-off of 10 mm seemed unhelpful. But in our study, rate of malignancy was more in nodules size <2cm and 2cm (40%), rate of malignancy was very low in nodules size >2cm (20%) comparing with histopathology. Another study showed that hypoechogenicity of the nodules was the characteristic finding for malignancy of the nodules i.e. 86% of the malignant lesions[7].

In present study, 13 patients have hyperechoic nodules, 18 hypoechoic nodules, 3 anechoic and 21 isoechoic nodules. 8 patients (80%) with the hypoechoic nodules were malignant on histopathology report (total patients with malignancy 10) which is almost equal to another study. 12 patients with hyperechoic nodules were benign and only one patient was malignant. In patients with isoechoic nodules, 20 cases were benign and one was malignant. Other study suggests that most of the malignant lesions show hypoechogenicity[9]

In present study, the comparison of the echogenicity of the thyroid nodule was made with the echogenicity of the surrounding tissue, while in the study conducted by Papini et al[9] the standard echogenicity was that of the neck muscles. Another study by Jason et al[10] has used the same method for recording echogenicity, thus in this respect these two studies are comparable. According to Jason et al, hypoechogenicity was a common sonographic feature in 47.1% of malignant nodules. This finding was not specific for malignant lesions as quite considerable benign lesions also showed hypoechogenicity of the nodules. In the same study it was observed that benign lesions showed hypoechogenicity in about 30.6% of thyroid lesions[10] and in our study it was in 22.2% of benign thyroid nodule. Papini et al[9] in their study showed that rate of malignancy in nodules with irregular margins was 85%. In our study, 60% of nodules with irregular margins were malignant. Rate of malignancy was 40 % in nodules with smooth margins. The finding of calcification was found to be very sensitive for malignancy but specificity was not as high as was expected. This sonographic finding was according to the study which had discussed the possible sonographic signs of malignancy. Jason et al showed that the specificity of calcification alone for malignancy is quite high (94.4%)[10]. This study shows that 40% of malignant nodules have microcalcification on USG. In our study, 8 patients have microcalcification and four were malignant, three patients have snow storm appearance and all were malignant, while 44 patients have coarse nodules and only 3(6.8%) were found malignant.

CONCLUSION

Thyroid ultrasound is a valuable diagnostic tool in predicting malignancy in thyroid nodules with sensitivity of 90% and specificity of 91.1%.

Conflict of interest: Nil

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