ORIGINAL RESEARCH PAPER

Radiodiagnosis

EVALUATION OF TYPES OF THYROID NODULES BY ULTRASOUND: A PROSPECTIVE RANDOMIZED STUDY

KEY WORDS: Nodule, Thyroid, benign, malignant, ultrasound, texture, size

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ABSTRACT

Ultrasound (USG) can be one of the screening tools to identify the thyroid nodules. The present study aimed to evaluate the role of USG in the diagnosis of thyroid nodules. The study was conducted in Department of Radiology, Kannur Medical College, Kannur, Kerala. It was conducted for 6 months. A total of 45 patients were selected based on the primary evaluation. The selected patients were explained study procedure and inform consent was obtained. All the patients were subjected to USG neck for the evaluation of type of thyroid nodules. The study results showed increased nodule size in malignant compared to benign. Physical characteristics of nodules plays major role in the detection of thyroid nodules. This study results conclude that ultrasound is more useful in the detection of type of thyroid nodule.

Introduction

The first ultrasound (USG) for thyroid nodules was performed in 1967 by Fujimoto since then; many advances have developed in the ultrasonography of thyroid including real-time gray scale imaging and color Doppler study.[1] However, no USG findings are diagnostic to differentiate benign from malignant lesions.[2,3] Many findings such as illdefined margins, hypoechoic lesions, and microcalcification have shown association with malignant nodules.[4,5] The present study aimed to screen the large thyroid nodules for benign or malignant.

Materials and Methods

Study settings: The study was conducted in the Department of Radiodiagnosis, Kannur Medical College, Anjarakandy, Kannur

Inclusion criteria

- Thyroid nodules more than 1 cm
- No recent thyroid surgery

Exclusion criteria

- Thyroid medication
- Congenital thyroid disorders
- Patient not consenting for the study

Procedure

The study samples are selected who are coming to Radiology department, Kannur Medical College, Anjarakandy, Kannur. All the patients selected on the basis of inclusion and exclusion criteria. A total of 45 patients included in the study. The patients were explained detail study procedure and then subjected to USG of thyroid gland. The thyroid nodules were classified as solid when the entire nodule was solid without any cystic foci and cystic when the entire nodule was cystic without any solid areas. Predominantly solid nodules were nodules with more than 50% solid areas with scattered cystic areas, and predominantly cystic nodules were nodules that have more than 50% cystic areas with some solid areas. Similarly, echogenicity was defined as hypoechoic, isoechoic, or hyperechoic comparing the echogenicity of the thyroid nodule with the normal thyroid gland. Heterogeneous echogenicity was noted when the same nodule showed mixed echoes.[6,7] Margins were classified as ill defined when more than 50% of its border is not clearly demarcated. Microcalcification was defined as fine calcification of size 1 mm or less, single or in groups. Macrocalcifications were larger calcific foci and were classified as eggshell calcification (peripheral calcification), coarse calcification, and nodular calcification. The presence of any vascularity was defined as any color Doppler signal pickup in the nodule or periphery of the nodule.[8] Perinodular vascularity was defined as vascularity only surrounding the nodule, and intranodular vascularity was defined as vascularity within the nodule.

Statistical analysis

The data was expressed in number and percentage, mean and standard deviation. Statistical Package for Social Sciences (SPSS 16.0) version used for analysis. Chi-square test applied to find the significant between the observations. P value less than 0.05 considered statistically significant at 95% confidence interval.

Results

A total of 45 patients were participated in this study. The age of the patients ranges form 19-65 years. The mean age of patients is 35.56. Males were more (n=39) than females (n=6). The mean nodule size is more in malignant than benign. 14 had more than 30 mm in benign and 5 in malignant of nodule size (Table-1). 28 in benign showed well defined margins and 8 in malignant showed ill defined margin. 28 in benign and 8 in malignant showed solid echo texture (Table-2). In benign and malignant maximum patients showed heteroechoic echogenecity. 23 in benign and 5 in malignant showed macrocalcification in thyroid nodules. 35 in benign and 7 in malignant had no microcalcification (Table-3). 16 in benign and 5 in malignant showed increase the vascularity. Only 4 in benign showed peri and intra nodular vascularity (Table-4).

Discussion

Thyroid ultrasonographic finding is frequently misperceived as being unable to differentiate benign and malignant nodules. None of the single USG findings have been able to accurately differentiate between benign and malignant nodules. USG findings such as microcalcification, irregular illdefined margin, markedly hypoechoic echotexture, and solid internal consistency and internal vascularity are findings that are associated frequently with malignant lesions. The utility of these findings in a goiter endemic area like Nepal has been explored in this study. This study showed solid lesions to be associated with malignancy, which is consistent with most studies done previously.[9,10] Predominantly solid lesions are also considered to be associated with malignancy; however, in this study the association was not seen.[11,12] In our study also showed similar results. Hypoechoic nodules and illdefined margins were seen more frequently in malignant lesion in this

study. These factors have been established as independent predictors of malignant nodules.[13,14] However, another study has shown that echogenicity did not show any significant difference between benign and malignant nodules. In this study benign cases showed similar observations. Calcification, especially coarse and rim calcifications and microcalcification, have also been shown to be predictors of malignancy by some studies; however, other study has shown only microcalcification to be associated with malignancy, while the association of malignancy with coarse and rim calcification is debatable.[15] More calcification cases was observed in malignant than benign in this study. The present study showed similar effects in vascularity. Increased vascularity of any type was associated with malignant nodule; however, perinodular or intranodular increase in vascularity was not significantly associated with malignant lesions. Increase in vascularity of any type has been established by some other studies to be predictors of malignancy, while others consider vascularity as a nonspecific finding. The study has some limitations like small sample size and not correlated with FNAC results.

Conclusion

Ultrasound has wide application in the diagnostic field. Size, margins, texture and vascularity are important factors for discriminating benign from malignant thyroid nodule. Ultrasound has wide application in the detection of type thyroid nodule.

Table-1: Distribution of thyroid nodules based on the size

Observation	Benign (n=36)	Malignant (n=9)
Size (MEAN±SD)	25.45±12.78	36.34±14.32*
Size>30 mm	14 (38%)	5*(55%)

(*p<0.05 significant compared Benign with Malignant)

Table-2: Distribution of thyroid nodules based on morphological characteristics

Morphological characteristics	Benign (n=36)	Malignant (n=9)
Margins		
Well defined	28	1
Ill defined	8	8
Echo texture		
Solid	28	8
Cystic	8	1
Echogenicity		
Hypoechoic	5	3
Isoechoic	2	1
Hyperechoic	6	0
Heteroechoic	23	5

Table-3: Distribution of thyroid nodules based on the calcification

Calcification	Benign (n=36)	Malignant (n=9)
Macrocalcification		
Present	23	5
Coarse	4	3
Egg shell	8	1
Nodular	1	0
Microcalcification		
Present	1	2
Absent	35	7

Table-4: Distribution of thyroid nodules based on vascularity

Vascularity	Benign (n=36)	Malignant (n=9)
Increased	16	5
Perinodular	10	3
Intranodular	6	1
Perinodular+intranodular	4	0

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