

Evaluation of Thyroid Nodule Calcification based on Ultrasonographic Features.

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Abstract

Background: Ultrasonographic evaluations of lesions of the thyroid gland are of research importance because they directly affect the functioning of other organs of body and along with that histopathological result forms the basis of highly effective medical and surgical treatment. The prevalence and magnitude of all the thyroid disorders are associated and dependent on numerous risk factors and confounding factors

Material & Methods: The present cross-sectional, retrospective study was conducted at department of radiology of our tertiary care hospital. A sample size of 50 was calculated at 95% confidence interval at 10% acceptable margin of error by epi info software version 7.3. Institutional Human Ethics Committee clearance was obtained before start of study.

Results: In the present study, on USG evaluation most common finding was multinodular goiter among 24 patients which was followed by colloid nodule among 11 patients. Solitary thyroid nodule was found among 10 patients which were followed by malignancy among 5 patients. In the present study, on USG evaluation the size of the nodule found to be ranges from 1.2x1.2 to 7x7 cm. Macro calcifications were the commonest finding and present in 32 cases. Out of these 18 cases had multinodular goiter, 5 case had solitary thyroid nodule, 08 case had colloid nodule and 1 case had malignancy. This difference was statistically significant (P value < 0.05). Apart from this, 08 cases had micro calcification, 10 cases had macro and micro calcification together. However, we did not found any statistically significant difference in these (P value > 0.05).

Conclusion: We concluded from the present study that macro calcification is the commonest finding on USG in cases of thyroid nodule however, it is solely not a good indicator for malignancy. We found that nodules with macro calcification also had chances of micro calcification which could be a reason for positive rates for malignancy.

Keywords: Ultrasonography, Thyroid nodule, Macro calcification.

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Introduction

The thyroid hormones control the metabolism of macromolecules, oxygen consumption and the basal metabolic rate (BMR) of body cells and are essential for normal growth and maturation of the body as well as they are essential for proper development of the peripheral and central nervous system [2]. Thyroid gland is a butterfly shaped endocrine gland which is situated anatomically in the anterior aspect of root of the neck and comprises of two bulky lateral lobes which are connected by a thin isthmus [3]. Thyroid gland secretes several hormones such as triiodothyronine (T3), thyroxine (T4) and calcitonin.

The range of thyroid lesions is varied from congenital lesions to hyperplastic or metabolic goiter and inflammatory to neoplastic thyroid lesions. It is now well documented that thyroid gland lesions and disorders are the second most common endocrine disorders reported from India as well as all around the globe [4]. Ultrasonographic evaluations of lesions of the thyroid gland are of research importance because they directly affect the functioning of other organs of body and along with that histopathological result forms the basis of highly effective medical and surgical treatment [1]. The prevalence and magnitude of all the thyroid disorders are associated and dependent on numerous risk factors and confounding factors [5].

Thyroid lesions vary from non-neoplastic to neoplastic, the most common thyroid lesion is multinodular goiter which is followed by thyroid tumors [6]. Most of the thyroid tumors are benign and the malignant thyroid lesions are accounting only for 1.5% of all cancers. However, among the endocrine malignancies thyroid cancers represents approximately 92% of all endocrine cancers. Among the thyroid malignancies, the most common is papillary carcinoma which is followed by follicular carcinoma, medullary carcinoma, anaplastic carcinoma and lymphoma, while metastases are reported rarely [7].

Hence, as the incidence of thyroid carcinomas are increasing nowadays. Hence, present study was conducted to evaluate the thyroid nodule calcification based on ultrasonographic features at tertiary care center.

Materials & Methods

The present cross-sectional, retrospective study was conducted at department of radiology of our tertiary care hospital. The study duration was of one year from January 2019 to December 2019. A sample size of 50 was calculated at 95% confidence interval at 10% acceptable margin of error by epi info software version 7.3. Institutional Human Ethics Committee clearance was obtained before start of study. Strict confidentiality was maintained with patient identity and data and not revealed, at any point of time. Clinical examination history, ultrasound findings and detailed history of routine blood investigations were recorded from hospital records after institutional permission.

Nodule size, volume, location, echogenicity (isoechoic, hyperechoic or hypoechoic), texture (solid, cystic or mixed), presence and type of calcification (micro calcification, peripheral macro calcification or parenchymal macro calcification), presence of hypoechoic halo and vascularization pattern were recorded for all the patients. Calcifications which are measured less than 2 mm were labelled as microcalcification and calcifications of more than 2 mm in diameter (with an acoustic shadow) were labelled as macro calcification. Ultrasound evaluation of all patients with patient in supine with neck in extension was done using ultrasound machines superficial probe with 5.5 - 12.5 MHz transducer. Ultrasound evaluation of all patients with patient in supine with neck in extension was done using ultrasound machines superficial probe with 5.5 - 12.5 MHz transducer. Data were entered in the MS office 2010 spread sheet

and Epi Info v7. Data analysis was carried out using SPSS v22. Qualitative data was expressed as percentage (%) and Pearson's chi square test was used to find out statistical differences between the study groups and sensitivity, specificity, positive predictive value and negative predictive value were calculated. If the expected cell count was < 5 in more than 20% of the cells then Fisher's exact test was used. All tests were done at alpha (level significance) of 5%; means a significant association present if p value was less than 0.05 and highly significant if p value less than 0.01.

Results

In the present study a total of 50 study participants were enrolled. Out of them 68% patients were female and 32% patients were male and the female to male sex ratio was 2.12: 1. Age of study participants was ranged from 18- 68 years of age with the mean age of 40 ± 4.9 years. The mean BMI of study participants was 26.2 ± 2.1 . Most common presentation was swelling in front on neck however 3 patients presented with lymphadenopathy at level 2 and 3. (Table 1)

Table 1: Distribution of study participants according to study parameters.

Preoperative parameters	Number of patients
Mean age	40 ± 4.9 years.
Males	32%
Females	68%
BMI (kg/m ²)	26.2 ± 2.1
Presence of lymphadenopathy	6%

In the present study, on USG evaluation most common finding was multinodular goiter among 24 patients which was followed by colloid nodule among 11 patients. Solitary thyroid nodule was found among 10 patients which were followed by malignancy among 5 patients. In the present study, on USG evaluation the size of the nodule found to be ranges from 1.2x1.2 to 7x7 cm. Macro calcifications were the commonest finding and present in

32 cases. Out of these 18 cases had multinodular goiter, 5 case had solitary thyroid nodule, 08 case had colloid nodule and 1 case had malignancy. This difference was statistically significant (P value < 0.05). Apart from this, 08 cases had micro calcification, 10 cases had macro and micro calcification together. However, we did not found any statistically significant difference in these (P value > 0.05). (Table 2).

Table 2: Distribution of patients according to incidence of different sonographic findings.

Calcification	Total no	MNG	STN	Colloid nodule	Malignant	P value
Macro-calcification	32	18	05	08	1	< 0.05
Micro-calcification	8	2	1	2	3	>0.05
Micro+macro	10	4	4	1	1	>0.05
Total	50	24	10	11	5	>0.05

In the present study on ultrasonographic evaluation increased vascularity was found

in 22 patients. Out of these 22 patients only 5 patients were malignant on

ultrasonographic evaluation. Out of these 22 patients, 10 had multinodular goiter, 4 had solitary thyroid nodule and 3 had colloid nodule.

Discussion

According to world health organization, 7% of the global population is reported to have clinically apparent goiter. Majority of these goiter patients are living in developing countries where the etiopathogenesis is iodine deficiency [8]. Non neoplastic thyroid enlargement reported in the form of multinodular goiter and solitary or diffuse goiter. Thyroid disorders are generally more prevalent among females. Benign cancers of thyroid gland are more prevalent than neoplastic lesions of thyroid gland and the ratio was reported to be as high as 10:1 [9]. In the present study a total of 50 study participants were enrolled. Out of them 68% patients were female and 32% patients were male and the female to male sex ratio was 2.12: 1. Age of study participants was ranged from 18- 68 years of age with the mean age of 40 ± 4.9 years. The mean BMI of study participants was 26.2 ± 2.1 . Most common presentation was swelling in front on neck however 3 patients presented with lymphadenopathy at level 2 and 3.

In the present study, on USG evaluation most common finding was multinodular goiter among 24 patients which was followed by colloid nodule among 11 patients. Solitary thyroid nodule was found among 10 patients which were followed by malignancy among 5 patients. In the present study, on USG evaluation the size of the nodule found to be ranges from 1.2x1.2 to 7x7 cm. Similar results were found in a study conducted by Kiran Rao et al among patients who were presented with thyroid nodule and reported similar results to the present study [10].

Macro calcifications were the commonest finding and present in 32 cases. Out of these 18 cases had multinodular goiter, 5

case had solitary thyroid nodule, 08 case had colloid nodule and 1 case had malignancy. This difference was statistically significant (P value < 0.05). Apart from this, 08 cases had micro calcification, 10 cases had macro and micro calcification together. However, we did not found any statistically significant difference in these (P value > 0.05). Similar results were found in a study conducted by Bomeli SR et al among patients who were presented with thyroid nodule and reported similar results to the present study [11].

In the present study on ultrasonographic evaluation increased vascularity was found in 22 patients. Out of these 22 patients only 5 patients were malignant on ultrasonographic evaluation. Out of these 22 patients, 10 had multinodular goiter, 4 had solitary thyroid nodule and 3 had colloid nodule. Similar results were found in a study conducted by Naina V et al among patients who were presented with thyroid nodule and reported similar results to the present study [12,13].

Conclusion

We concluded from the present study that macro calcification is the commonest finding on USG in cases of thyroid nodule however, it is solely not a good indicator for malignancy. We found that nodules with macro calcification also had chances of micro calcification which could be a reason that nodules associated with macro calcification have positive rates for malignancy. The results of present study cannot be generalized on general population because of small sample size. Further elaborative studies needed to explore the topic.

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