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ASSESSMENT OF THE ULTRASONOLOGICAL FINDINGS OF GOITROGENOUS LESIONS IN EUTHYROID PATIENTS

Otorhinolaryngology

Dr Akshay Krishnamurthy MBBS, MS, Assistant Professor, Department of Otorhinolaryngology and Head and Neck surgery, J.J.M Medical college, Davangere, Karnataka, India.

Dr. Santosh U.P. MBBS, MS, Professor, Department of Otorhinolaryngology and Head and Neck surgery, J J M Medical College, Davangere, Karnataka, India.

Dr. Arfan Nasser MBBS, MS, Senior Resident, Department of Otorhinolaryngology and Head and Neck surgery, J J M Medical College, Davangere, Karnataka, India.

Dr. Monica Shre A MBBS, Junior Resident, Department of Otorhinolaryngology and Head and Neck surgery, J J M Medical College, Davangere, Karnataka, India.

ABSTRACT

Benign swellings of the thyroid gland are a common occurrence, frequently seen in surgical practice. In our practice, we have found several of these patients to be in the euthyroid state when subjected to a thyroid hormone assay. In this study, we will be analyzing the ultrasonological findings of clinically euthyroid patients and correlating them with the results of their thyroid function tests. **Aim:** Analyzing specific ultrasonological findings of goitrogenous lesions in patients in the euthyroid state and correlating them with the results of their thyroid function tests. **Materials And Methods:** Patients suffering from goitrogenous lesions, in the euthyroid state attending the Out patient department in Bapuji Hospital, teaching hospital attached to J J M Medical College, Davanagere. Patients meeting the inclusion criteria were included in the study. Detailed history taking and examination were done. Informed and written consent was taken from the patients before participating in the study. Patients suffering from goitre in the euthyroid state as noted in the thyroid function tests underwent ultrasonological analysis of the lesions. The findings were analyzed and the frequency of their appearance were assessed. Their thyroid function tests were analyzed. A total of 50 patients were selected. **Results:** Significant correlation was noted between the TIRADS score and the radiological diagnosis. The 7 patients who had their lesions reported as their TIRADS scores, had lesions predominantly in the higher scoring range. Of the 7 patients with colloidal goitre 4 patients had TIRADS 1 lesions, 7 patients with solitary nodules 4 patients had TIRADS III lesions. The 12 patients having multinodular goitre, 8 patients had TIRADS III lesions. 16 patients with thyroiditis, 10 patients had category II lesions. Significant correlation was also noted between the radiological diagnosis and echotexture of the patient's lesions**.** Of the 7 patients who had their lesions reported with same TIRADS scores, 5 patients had inhomogeneous echotexture. 7 patients of colloidal goitre all had homogeneous echotexture. 7 patients having solitary nodules, 5 patients had inhomogeneous echotexture.12 patients of multinodular goitre, 11 patients had inhomogeneous echotexture.16 patients with thyroiditis, 12 patients had inhomogeneous echotexture. **Conclusions:** In our study, we found significant correlation between the Radiological diagnosis and the TIRADS score. Significant correlation was noted between the echotexture of the lesions and the radiological diagnosis, as noted in previous studies. Hence, ultrasonography is a highly useful tool for evaluating even patients in the euthyroid state who have no significant lesion on clinical palpation.

KEYWORDS

INTRODUCTION

Goitre is divided into three grades by the WHO: In Grade 0, there is no detectable swelling; in Grade 1, there is a visible mass in the neck that can be felt when the neck is in its usual posture; in Grade 2, there is a visible swelling that can be felt clinically and is consistent with an enlarged thyroid gland. Additionally, it states that ultrasound is a safe and practical test for thyroid nodules, particularly in patients where the frequency of visible nodules is low.

This is mostly due to the fact that clinical palpation of the thyroid gland has been shown to be unreliable, particularly in patients classified as Grade 0 or Grade 1, where categorization errors have been recorded to reach 40%. Clinical palpation is thought to have limited sensitivity and specificity because to inter-observer variation.[1]

It has been demonstrated that findings pertaining to individual lobes eg. Lobular hypertrophy, isthmic thickness, echotexture and vascularity can be correlated with the patient's thyroid status. In a prospective cross sectional study by Kayastha et al, among 485 clinically euthyroid patients, the volume of isthmic thickness was measured. They found that isthmic thickness best correlated with thyroid volume and body mass index and that it could serve as a guide in the treatment of the patient.[2]

Studies have also documented that parameters like the blood flow in the inferior thyroid artery can be correlated with the patient's thyroid state as reported by Chiou et al. In a retrospective analysis of 63 patients they found that those suffering from hyperthyroidism were more likely to have increased blood flow in the inferior thyroid artery doppler compared to euthyroid patients.[3]

In our study, we aim to assess the ultrasonological features of euthyroid patients and determine their frequency of appearance and determine if any significant correlation with the euthyroid state exists.

Methodology

Sources Of Data:

Patients suffering from goitrogenous lesions, in the euthyroid state attending the Outpatient department in Bapuji Hospital, teaching hospital attached to J J M Medical College, Davanagere.

Sampling Procedure: Purposive sampling method.

Study Design: Prospective, single centre, cross sectional, descriptive study.

Study Duration: 12 months.

Sampling Criteria

Inclusion criteria:
1) Patients between 10-70 years of age.
2) Patients in the euthyroid state (biochemically proven) with goitrogenous lesions.

Exclusion Criteria:

1) Patients suffering from malignancies of the thyroid.
2) Patients suffering from hypothyroidism or hyperthyroidism.

Data Collection Method:

Patients meeting the inclusion criteria were included in the study. Detailed history taking and examination were done. Informed and written consent were taken from the patients before participating in the study. Patients suffering from goitre in the euthyroid state as noted in the thyroid function tests underwent ultrasonological analysis of the lesions. The thyroid function test reports of each patient were accessed and only those in the euthyroid state were incorporated into the study. The findings were analyzed and the frequency of their appearance were assessed. Correlations with the diagnosis and the TIRADS score of the lesions were sought.

Outcome Measures: Ultrasound reports of the included patients.

Statistical Analysis:
Categorical data was represented in the form of frequency and percentage Association between variables was assessed with Chi Square Test and Fisher's Exact test if the cell values were small.

Quantitative data was represented as Mean & Sd (standard deviation).

A P value of <0.05 was considered statistically significant.

Data was analyzed with IBM SPSS Version 28 for windows.

RESULTS:

Table 1

Ultrasonological findings		
Echotexture	**Frequency**	**Percent**
Homogeneous	16	32.0
Inhomogeneous	34	68.0
Total	50	100.0

1) A majority of the patients were noted to have inhomogeneous echotexture of the lesions on ultrasound, more than double the number of patients reported to have homogeneous echotexture.

Table 2

Ultrasonological findings		
Vascularity	**Frequency**	**Percent**
Normal	27	54.0
Hypervascular	23	46.0
Total	50	100.0

2)There was no significant predisposition towards lesions having increased vascularity. The lesions with normal and increased vascularity were roughly equal in number.

Table 3

Ultrasonological findings		
Glandular enlargement	**Frequency**	**Percent**
Diffuse glandular enlargement	11	68.8
Single lobe enlargement	3	18.8
Retrosternal extension present	2	12.5
Total	16	100.0

3)16 patients had varying degrees of glandular enlargement. 11 patients had diffuse glandular enlargement, 3 patients had enlargement of a single lobe and 2 patients had retrosternal extension. 4 patients overall, had isthmic thickening, but no correlation was noted with other forms of glandular enlargement.

Table 4

Ultrasonological findings		
Echotexture & Vascularity	**Frequency**	**Percent**
Homogeneous + hyper	2	4.0
Homogeneous + Normal	14	28.0
Inhomogeneous + hyper	21	42.0
Inhomogeneous + Normal	13	26.0
Total	50	100.0

4) In the 50 patients, the most frequent radiological combination present was inhomogeneous echotexture and increased vascularity, seen in 21 patients. The least frequent combination was the presence of homogeneous echotexture with increased vascularity.

Table 5

Radiological diagnosis	Frequency	Percent
Colloidal goitre	7	14.0
Multinodular goitre	12	24.0
Solitary nodule	7	14.0
Thyroiditis	16	32.0
Normal study	1	2.0
TIRADS lesions	7	14.0
Total	50	100.0

5) 16 patients were reported to have thyroiditis, 12 patients were reported to be multinodular goitre, 7 patients were reported to be colloidal goitre, 7 patients were reported to have solitary nodules, 7 patients had their lesions reported as their TIRADS scores, while only 1 patient had a normal study.

Table 6

TIRADS	Frequency	Percent
1	12	24.0
2	13	26.0
3	17	34.0
4	7	14.0
5	1	2.0
Total	50	100.0

6) Of the 50 patients, 17 patients had lesions in the TIRADS III category, 13 patients in TIRADS II, 12 patients in TIRADS 1, 7 patients in TIRADS IV and 1 patient in TIRADS 5.

Table 7

TIRADS	Echotexture				Chi Square Test	
	Homogeneous		Inhomogeneous			
	No	%	No	%	χ2 Value	P Value
1	5	31.25	7	20.6	3.753	0.441
2	6	37.50	7	20.6		
3	4	25.00	13	38.2		
4	1	6.25	6	17.6		
5	0	0.00	1	2.9		
Total	16	100	34	100		

7) No significant correlation was noted between the TIRADS scores of the patient's lesions and their echotexture.

Table 8

TIRADS	Vascularity				Chi Square Test	
	Normal		Hyperactive			
	No	%	No	%	χ2 Value	P Value
1	8	29.63	4	17.4	2.78	0.595
2	6	22.22	7	30.4		
3	10	37.04	7	30.4		
4	3	11.11	4	17.4		
5	0	0.00	1	4.3		
Total	27	100.00	23	100.0		

8) No significant correlation was noted between the TIRADS score of the patient's lesions and their vascularity.

Table 9

Radiological diagnosis	TIRADS					Chi Square Test	
	1	2	3	4	5	χ2 Value	P Value
Colloidal goitre	4	2	1	0	0	47.931	P<0.001
Multinodular goitre	0	0	8	4	0		
Solitary nodule	2	0	4	1	0		
Thyroiditis	5	10	1	0	0		
Normal study	1	0	0	0	0		
TIRADS lesions	0	1	3	2	1		
Total	12	13	17	7	1		

9) **Significant correlation was noted between the TIRADS score and the radiological diagnoses.** . The 7 patients who had their lesions reported as their TIRADS scores, had lesions predominantly in the higher scoring range. Of the 7 patients having colloidal goitre, 4 patients had TIRADS 1 lesions. Of the 7 patients with solitary nodules, 4 patients had TIRADS III lesions. Of the 12 patients having multinodular goitre, 8 patients had TIRADS III lesions. Of the 16 patients having thyroiditis, 10 patients had category II lesions.

Table 10

Radiological diagnosis	Echotexture				Chi Square Test	
	Homogeneous		Inhomogeneous			
	No	%	No	%	χ2 Value	P Value
Colloidal goitre	6	37.50	1	2.9	14.931	P<0.010
Multinodular goitre	1	6.25	11	32.4		
Solitary nodule	2	12.50	5	14.7		
Thyroiditis	4	25.00	12	35.3		
Normal study	1	6.25	0	0.0		
TIRADS lesions	2	12.50	5	14.7		
Total	16	100	34	100		

10) **Significant correlation was noted between the radiological diagnosis and echotexture of the lesions.** Of the 7 patients who had their lesions reported as their TIRADS scores, 5 patients had lesions with inhomogeneous echotexture. Of the 7 patients of colloidal goitre, 7 patients had lesions with homogeneous echotexture. Of the 7 patients having solitary nodules, 5 patients had lesions with inhomogeneous echotexture. Of the 12 patients of multinodular goitre, 11 patients had lesions with inhomogeneous echotexture. Of the 16 patients with thyroiditis, 12 patients had lesions with inhomogeneous echotexture.

Table 11

Radiological diagnosis	Vascularity				Chi Square Test	
	Normal		Hyperactive			
	No	%	No	%	$\chi 2$ Value	P Value
Colloidal goitre	6	22.22	1	4.3	7.059	0.216
Multinodular goitre	5	18.52	7	30.4		
Solitary nodule	5	18.52	2	8.7		
Thyroiditis	6	22.22	10	43.5		
Normal study	1	3.70	0	0.0		
TIRADS lesions	4	14.81	3	13.0		
Total	27	100.00	23	100.0		

11) No significant correlation was noted between the vascularity of the patient's lesions and the radiological diagnosis.

DISCUSSION

Ultrasonography has already been demonstrated to be a reliable investigation when it comes to superior morphological detailing of the architecture of the thyroid gland. Additionally, ultrasonography helps with the classification and follow-up of various thyroid disorders, which is surprisingly still based on the infamously inaccurate method of palpation by most clinicians. It also provides an accurate size determination and evaluation of echogenicity and vascularization.[4]

In our study, we found 16 patients to have varying degrees of glandular enlargement. However, we also noted that lack of glandular enlargement does not rule out the presence of goitre. Similar conclusions were drawn by Berghout et al, who conducted a study on 80 euthyroid patients with nontoxic goitre and 50 healthy individuals. They found in their study that 15 of the patients with goitre, thyroid volume was within normal range. Also, of these 15, 14 patients had a thyroid diameter larger than 9 patients who were healthy. They concluded that application of thyroid volume measurement by ultrasonography may minimize overestimation of goitre prevalence in epidemiological surveys, even in patients when a thyroid volume within the normal reference range does not rule out the presence of nodular goitre.[5]

Thyroid blood flow may be accurately and consistently measured using the noninvasive Duplex scanning method and that this method could be used to examine the relationship between thyroid disease and pharmacological effects.[6]

Ceylan et al compared the thyroid architecture of 40 euthyroid pre menopausal patients with Hashimoto's thyroiditis and positive anti TPO antibodies with 46 healthy patients. They found that parenchymal nodularity was more common among the case group (77.5%) compared to the control group (8.6%). Increased vascularity was discovered on power Doppler imaging in 6 out of 46 (13%) control subjects and 35 out of 40 (87.5%) patients.[7] In our study, we found significant echo textural inhomogeneity in patients suffering from thyroiditis but no significant correlation could be drawn with respect to vascularity.

CONCLUSION

In our study, we found significant correlation between the TIRADS score and the radiological diagnoses. Significant correlation was noted between the radiological diagnosis and echotexture of the lesions, as noted in previous studies. Ultrasonography is a highly useful tool for evaluating even patients in the euthyroid state who have no significant lesion on clinical palpation.

REFERENCES:

1. WHO/UNICEF/ICCIDD. Chapter 2: Selecting target groups and Chapter 5: Selecting appropriate indicators: Biochemical indicators. In: Indicators for Assessing Iodine Deficiency Disorder and their Control Through Salt Iodination. Geneva: World Health Organization; WHO/NUT/94.6, 1994.
2. Kayastha P, Paudel S, Ghimire RK. Ultrasound measurement of thyroid isthmus thickness in clinically euthyroid subjects. Nepalese Journal of Radiology 2018;8(12):26-29. https://doi.org/10.3126/njr.v8i2.22979.
3. Chiou, S.-C., Peng, Y.-S., Chen, P.-Y., Ho, C., Yeh, H.-Y., Chen, C.-P., & Lin, J.-D. (2006). Color Doppler Ultrasonography of Inferior Thyroid Artery and Its Relation with Thyroid Functional State. Journal of Medical Ultrasound, 14(3), 51–57.
4. Hegedüs L. Thyroid ultrasound. Endocrinol Metab Clin North Am. 2001 Jun;30(2):339-60, viii-ix. doi: 10.1016/s0889-8529(05)70190-0. PMID: 11444166.
5. Berghout A, Wiersinga WM, Smits NJ, Touber JL. The value of thyroid volume measured by ultrasonography in the diagnosis of goitre. Clin Endocrinol (Oxf). 1988 Apr;28(4):409-14. doi: 10.1111/j.1365-2265.1988.tb03672.x. PMID: 3056637.
6. Hodgson, K. J., Lazarus, J. H., Wheeler, M. H., Woodcock, J. P., Owen, G. M., McGregor, A. M., & Hall, R. (1988). Duplex scan-derived thyroid blood flow in euthyroid and hyperthyroid patients. World Journal of Surgery, 12(4), 470–475. doi: 10.1007/BF01655423. PMID: 3047999.
7. Ceylan I, Yener S, Bayraktar F, Secil M. Roles of ultrasound and power Doppler ultrasound for diagnosis of Hashimoto thyroiditis in anti-thyroid marker-positive euthyroid subjects. Quant Imaging Med Surg 2014;4(4):232-238. doi: 10.3978/j.issn.2223-4292.2014.07.13. PMID: 25202658; PMCID: PMC4137176.