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Original Research Article

To study the role of sonography in distinguishing benign from malignant thyroid lesions

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Abstract:

Background &Method: The aim of this study is to study the role of sonography in distinguishing benign from malignant thyroid lesions. Random selection of patient of all age groups was done. They presented with sign and symptoms suggestive of thyroid disorders. The commonest clinical symptom was swelling in front of neck, which moves up with deglutition. There were systemic symptoms like pain and fever in thyroiditis, weight loss and palpitation in hyperthyroidism, weight gain and hoarseness of voice in hypothyroidism and rapid increase in size with weight loss in malignancies.

Result: Thyroid disorders can either be diffuse or nodular. Thyroid disorders are predominantly nodular with ratio of diffuse to nodular being 1:3.25. In our study most of the malignant lesions are Hypoechoic with thick incomplete halo, irregular margins, microcalcification, type III & IV power Doppler pattern, resistive index >0.75 and peak velocity >50cm/s.Most of the benign lesions are Isoechoic or Hyperechoic with thin complete peripheral halo, regular margins, coarse or eggshell calcification, type I & II PD pattern, resistive index <0.75 and peak velocity <50cm/s.

Conclusion: High resolution ultrasonography is highly sensitive in diagnosing thyroid disorders. Colour Doppler acts as an important adjunct to B-mode in increasing the accuracy. Females are more commonly affected than males. Power Doppler pattern III & IV has high sensitivity and specificity in detection of malignant thyroid nodules. Non-neoplastic nodules and adenoma predominantly show type II & I power Doppler pattern.

Keywords:sonography, benign, malignant &thyroid lesions.

Study Designed: Observational Study.

1. INTRODUCTION

The Thyroid gland is located in the antero- inferior part of the neck (infrahyoid compartment) in a space outlined by muscle, trachea, oesophagus, carotid arteries and jugular veins[1]. The

thyroid gland is made up of two lobes located along either side of the trachea and connected across the midline by the isthmus, a thin structure draping over the anterior tracheal wall at the level of the junction of the middle and lower third of the thyroid gland. From 10%-40% of normal patients have a small thyroid (pyramidal) lobe arising superiorly from the isthmus and lying in front of the thyroid cartilage. It can be regularly visualized in younger patients, but it undergoes progressive atrophy in adulthood and become invisible[2].
Sonography is a precise strategy to use in ascertaining thyroid volume. In roughly 33% of cases, the sonographic estimation of volume varies from the actual size gauges formulated from assessment. Thyroid volume estimations might be helpful for goiter size assurance to survey the requirement for medical procedure, to allow computation of the portion of radioactive iodine required in the therapy of thyrotoxicosis, and to assess the reaction to concealment treatment[3]. Thyroid volume can be determined with straight boundaries or all the more exactly with numerical equations. Among the direct boundaries, the antero-back breadth is the most exact, since it is somewhat free of conceivable layered imbalance between the two lobes[4]. The most exact technique for working out the thyroid volume is a joining of equations of sequential regions got from adjoining ultrasound checks. In youngsters thyroid volume range from 0.4 to 1.4 ml expanding by roughly 1.0 to 1.3 for every 10 kg of weight up to a typical volume in grown-ups of 10.5 to 11.5 (SD ± 3.5) for every curve. Thyroid volume is for the most part bigger in patients living in districts with iodine lack and in patients who have intense hepatitis or persistent renal disappointment; more modest in patients have ongoing hepatitis or have been treated with thyroxine or radioactive iodine[5].

2. MATERIAL & METHOD

The present was conducted at Index Medical College Hospital & Research Centre, Indore, M.P. fromOct 2020 to Sep 2021. Random selection of patient of all age groups was done. They presented with sign and symptoms suggestive of thyroid disorders.The commonest clinical symptom was swelling in front of neck, which moves up with deglutition. There were systemic symptoms like pain and fever in thyroiditis, weight loss and palpitation in hyperthyroidism, weight gain and hoarseness of voice in hypothyroidism and rapid increase in size with weight loss in malignancies. In nodular goitre patients were usually euthyroid. The nodules were palpable and sometimes visible.

Technique of scanning:
Patients were scanned in supine position. Visualization was enhanced by performing the examination with the neck hyper extended and by asking the patient to swallow so as to elevate the subclavicular portion of the gland. A small pad was placed under the shoulders to provide better exposure of the neck, particularly in patients with short stocky habitus.
Scans were obtained in standard transverse & longitudinal as well as multiple oblique positions. Thyroid volume was calculated from linear parameters (length, breadth and thickness) using mathematical formulas. Alteration in echogenecity and echotexture were noted and focal nodules were localized, measured and characterized.

3. RESULTS

Table No. 1: Sex Ratio of Thyroid Disorders

SEX	NO. OF CASES	PERCENTAGE
MALE	36	18%
FEMALE	164	82%
TOTAL	200	100%

The table shows that there were 164 females and 36 males of the total 200 positive cases. The male to female ratio in our study is 1: 4.56.

Table No. 2:Pattern of Involvement of Thyroid Disorders

PATTERN OF INVOLVEMENT	NO. OF CASES	PERCENTAGE
Diffuse	47	23.5
Nodular	153	76.5
Total	200	100

Thyroid disorders can either be diffuse or nodular. Thyroid disorders are predominantly nodular with ratio of diffuse to nodular being 1:3.25.

Table No. 3: B-Mode &Colour Doppler Features In Benign &Malignant Thyroid Nodules

Ultrasound Findings	Benign		Malignant	
	No.	%	No.	%
ECHOGENECITY				
Hypoechoic	30	19.6	14	9.1
Isoechoic	58	37.9	02	1.3
Hyperechoic	47	30.7	02	1.3
HALO				
Thin & Complete	107	69.9	04	2.6
Thick & Incomplete	33	21.5	09	5.8
MARGINS				
Regular	113	73.8	03	1.9
Irregular	26	16.9	11	7.1
CALCIFICATION				
Microcalcification	94	61.4	19	12.4
Coarse Or Egg Shell	38	24.8	02	1.3
POWER DOPPLER PATTERN				
Type I & II	122	79.7	02	1.3
Type III & IV	16	10.4	13	8.4
RESISTIVE INDEX (RI)				
<0.75	133	86.9	06	3.9

>0.75	02	1.3	12	7.8
VELOCITY (Vmax)				
< 50cm/s	107	69.9	04	2.6
> 50cm/s	35	22.8	7	4.5

In our study most of the malignant lesions are Hypoechoic with thick incomplete halo, irregular margins, microcalcification, type III & IV power Doppler pattern, resistive index >0.75 and peak velocity >50cm/s.

Most of the benign lesions are Isoechoic or Hyperechoic with thin complete peripheral halo, regular margins, coarse or eggshell calcification, type I & II PD pattern, resistive index <0.75 and peak velocity <50cm/s.

4. DISCUSSION

As per Song C Rumack [1] the pinnacle time of patients with goiter is between 35-50years, which was additionally higher than our review.

Most normal reason for thyroid augmentation is iodine inadequacy or goitrous impacts. The thyroid growth might show up in youth, yet normally it tops at about adolescence or before long (Cotran et al)[6].

Knobs show up from the get-go in endemic goiter and later (20-30) in irregular goiter, albeit the patient might know nothing about the goiter until late 40s or 50s (Bailey and Love et al)[7] .

Early age occurrence in our review might be because of expanded number of patients with endemic goiter as India is an endemic zone for goiter with 54 million individuals affected[8].

The main objective of thyroid ultrasound is to characterize whether the patient has diffuse or nodular anomaly. Because of the extremely successive event of central non-neurotic elements of the thyroid organ the term knob ought not be ascribed to sores less than 6-8mm in distance across (Solbiati).

In our concentrate out of 100 patients 82 patients have nodular thyroid sickness and 18 have diffuse thyroid illness. Nodular contribution of thyroid is more normal than diffuse association, which was likewise seen in one more concentrate by Brander An et al[9].

Out of the all out 18 instances of diffuse inclusion, volume expansion was an element of all with the exception of one. Heterogenecity with coarse Echotexture and sinewy groups were seen in14/18 cases. Micronodulations was available in just 5 cases. Based on these B-mode discoveries out of 18, 6 patients of every one of Grave's, Hashimoto's Thyroiditis and straightforward goiter were analyzed.

Argalia G et al 2 found that all the carcinoma with speed more noteworthy than 50cm/s had RI >0.75 however in CA with speed <50cm/s RI was autonomous of the edge worth of 0.75.

In our concentrate out of 73 harmless thyroid knobs 53 knobs had speed < 50cm/s and 20>50cm/s. Out of 9 harmful knobs 7 had speed >50cm/s and just 2 had <50cm/s. larger part of the harmless knobs with speed >50cm/s (15/20) ended up being adenomas on FNAC. Our review shows that there is clear sure connection between's expanded speed and neoplastic inclusion of thyroid knob. The responsiveness, particularity and positive prescient worth of speed >50cm/s as a measure for threat is 77%, 72% and 26% individually. Our review associates well with that of ArgaliaG[10].

In our review the outcomes shows that with B-Mode ultrasound the finding was accurately communicated in 78 out of 100 positive cases which improved to 91/100 situations when B-Mode and Album were utilized at the same time. The general responsiveness and particularity improved from 78% to 91 %. Misleading positive and bogus negative decreased from 22% to 9% when the two modalities are consolidated.

5. CONCLUSION

High resolution ultrasonography is highly sensitive in diagnosing thyroid disorders. Colour Doppler acts as an important adjunct to B-mode in increasing the accuracy. Females are more commonly affected than males. Power Doppler pattern III & IV has high sensitivity and specificity in detection of malignant thyroid nodules. Non-neoplastic nodules and adenoma predominantly show type II & I power Doppler pattern.

6. REFERENCES

[1] Carol M. Rumack, Stephanie R. Wilson. Diagnostic Ultrasound 3rd edition;738.
[2] Chammas MC, Gerhard R, de Oliveira IR et al. Thyroid nodules: evaluation with power Doppler and duplex Doppler ultrasound. Otolaryngol Head Neck Surg. 2005 Jun; 132(6): 874-82.
[3] David AK, Waters, Ahuja AJ et al. Role of ultrasound in the management of thyroid nodule surgery. AJR 1992; 164: 654-657.
[4] De Nicola H, Szejnfeld J, Logullo AF et al. Flow pattern and vascular resistive index as predictor of malignancy risk in thyroid follicular neoplasms. J Ultrasound Med. 2005 Jul; 24(7): 897-904.
[5] Enrico Papini, RinaldoGugleilmi, Antonio Bianchini et al. Risk of malignancy in nonpalpable thyroid nodules: predictive value of ultrasound and colour Doppler features. The Journal of Clinical Endocrinology & Metabolism 2002 Vol.87, No.5 1941-1946.
[6] Caruso G, Attard M, Caronia A, Lagalla R et al. Colour Doppler measurement of blood flow in the inferior thyroid artery in patients with autoimmune thyroid diseases. Eur J Radiol. 2000 Oct; 36 (1): 5-10.
[7] Boi F, Loy M, Piga M et al. The usefulness of conventional and echo Doppler sonography in the differential diagnosis of toxic multinodulargoitres. Eur J Endocrinol.2000 Sep; 143 (3): 339-46.
[8] Rago T, Vitti P, Chiovato L et al. Role of conventional ultrasonography and colour flow-Doppler sonography in predicting malignancy in 'cold' thyroid nodules. Eur J Endocrinol.1998 Jan; 138(1): 41-6
[9] Brander A, Viikinkoski P, Nickels J et al. Thyroid gland: US screening in middle-aged women with no previous thyroid disease. Radiology 1989; 173: 507-510.
[10] Argalia G, D'Ambrosio F et al. Echo Doppler in the characterization of thyroid nodular disease. Radiol Med (Torino), 1995 May; 89(5): 651-7