(RESEARCH ARTICLE)

Study of thyroid lesions for Sudanese patients

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Abstract

This was a deceptive cross sectional study aimed to differentiate between benign and malignant tumor using ultrasonography, done in Khartoum area hospital during the period from January 2022 to January 2023. 200 patients with thyroid nodules (20%) 40 males and 160 (80%) females. The study found that most patients had well define margin nodules were 145 (73%) and ill define margin nodules were 54 (27%), most patients had taller-than-wider capsule were 192 (96%) and wider-than-taller capsule were 8(4%), most patients had internal vascularity were 150 (75%) and peripheral were 50 (25%), most patients had No calcification170 (85%) and had calcification 30(15%), most patients had hyper echogenicity were 156 (78%), hypo echogenicity were 30(15%) and iso echogenicity were 14 (7%), most patients had multi lesion were 118(59%) and solitary lesion had 82 (41%), most patients had benign lesion were 150 (75%) and malignant lesion were 50(25%), study confirmed that there was statistically significant correlation between age and margins (p-value = 0.00), vascularity (p-value = 0.003) and there was statistically insignificant correlation between age and capsule, number of lesions, between gender and margins, capsule, vascularity, number of lesions and between weight and margins, capsule, vascularity, number of lesions (p-value > 0.05). there was statistically insignificant correlation between age, gender and echogenicity (p-value > 0.05), there was statistically significant correlation between calcification and type of lesion (p-value =0.001), there was statistically significant difference in margins (sig=0.001), in vascularity (sig=0.00) .The study concluded that the most patients had benign lesion, there was statistically significant correlation between age and margins, vascularity, between calcification and type of lesion, there was statistically significant difference in margins, in vascularity, and in calcification between benign and malignant lesion and there was statistically insignificant difference in capsule and echogenicity between benign and malignant lesion.

Keywords: Thyroid; Nodules; Benign; Malignant; US

1. Introduction

A thyroid is a discrete lesion within the normal thyroid also known as abnormal growth of the thyroid cells that forms a lump with in the thyroid gland. Most nodules are benign, but between 3 and 7% of the cases are found to be malignant [1]. Ultrasound has become an important diagnostic tool in the assessment of the thyroid nodules. It's highly sensitive for detecting nodules, and the sonography features of the nodules can be used to determine the need for further investigation [2]. The normal thyroid gland is homogeneous and it mildly hyper echogenic compared to surrounding mucles . Each lobe of the thyroid has a globular shape with a smooth outline. Individual lobes of the thyroid gland and any suspicious structure must be examined in both the axial and longitudinal views. The isthmus is located at the anterior aspects between the lobes and anterior to the trachea [2,3,4,5] .

Two important features make the trachea readily identifiable, the trachea has no ultrasound signal as it filled with air; which does not transmit ultrasound, and the cartilaginous rings at the anterior aspects of the trachea produce curvilinear hyper echogenic. The carotid arteries are round and hyper echogenic tubular structures located laterally to each of the thyroid. Further lateral to the carotid arteries is the paired internal jugular vein , which is often collapsed but can be distended with the valsalva manoeuvre to aid in identification . Apart from these two large vessels, there are often echo free thinner vessels traveling within and around the periphery of the thyroid gland. All vascular structures should be closely gated with colour or power Doppler imaging . Firstly, this is a useful technique for separating blood vessels from cystic structures. Secondly the vascular pattern at and around a thyroid nodules is a useful feature in differentiating between being and malignant lesions [6] .

Now a day there was increasing of incidence of thyroid nodule and patients send to fine needle aspirations to determine benign and malignant tumor which can cause trauma to the patients and therefore use ultrasound Can clarify the type of that nodule, therefore the sonogram feature findings can use to determine whether patient need further investigation or not [7.8.9]. Whilst single US features remain of limited accuracy, patterns of findings enable thyroid nodules to be accurately stratified on a 'risk-of-malignancy' basis and form the establishment of several guidelines. Imaging features that convene a high positive predictive value for malignancy are valuable as they enable suspicious lesions to be identified and targeted for pathological analysis[10, 11].

Thyroid cancer is a common malignancy; however, the vast majority have excellent long term survival. According to the National Cancer Institute, there are about 56,000 new cases of thyroid cancer in the US each year, and the majority of those diagnoses are papillary thyroid cancer—the most common type of thyroid cancer. Females are more likely to have thyroid cancer at a ratio of 3:1. Thyroid cancer can occur in any age group, although it is most common after age 30, and its aggressiveness increases significantly in older patients. Thyroid cancer does not always cause symptoms; often, the first sign of thyroid cancer is a thyroid nodule. [9] Thyroid cancer types and incidences: There are 4 main types of thyroid cancer, and some are more common than others; Papillary and/or mixed papillary/follicular thyroid cancer: ∼ 80%, Follicular and/or Hurthle cell thyroid cancer: ∼ 15%, Medullary thyroid cancer: ∼ 3% and Anaplastic thyroid cancer: 2%[9] Most thyroid cancers are very curable. In fact, the most common types of thyroid cancer (papillary and follicular thyroid cancer) are the most curable. In younger patients, both papillary and follicular cancers have a more than 97% cure rate if treated appropriately [9].

When providing a US report after the examination of the thyroid nodule, the practitioner should aim to address several factors regarding the nodule. The report should include a detailed description of the nodule with regard to its size, location, composition and echogenicity in relation to surrounding structures. The nodular margins should be closely examined to indicate the contour and presence of rim calcification or halo, and any additional features such as colloid calcification and vascular pattern. The lymph nodes should also be screened and commented on if there are any suspicious features. Based on the collection of sonographic findings, the practitioner should provide a US classification of the thyroid nodule from U1 to U5. When there are multiple nodules, the most suspicious nodule should be used for scoring [8].

2. Material and methods

This study was Deceptive cross sectional study implemented in Khartoum area hospital during the period from January 2022 to January 2023. Study population were 200 Sudanese population with different age, gender with thyroid nodules. Sampling and sample size: 200 patients with thyroid nodules. Machine: The equipment used was high resolution high frequency (7.5 - 12 MHZ) linear array transducer. Data were collected practically by using ultrasound machine, and a data sheet and were analysis by software program (statistics package for social sciences and Microsoft excel).

2.1. Technique

The thyroid was examined with a real time linear array transducer having a short focal zone (1 to 4 cm). Most patients can be adequately imaged with 7.5 to 10 MHz frequencies. The theoretic axial resolution of these systems is 1 mm. The patient should be examined in the supine position with the neck extended. Scanning should be done in sagittal, transverse, and oblique planes to optimally visualize the common carotid artery, internal jugular vein, both lobes of the thyroid as well as the isthmus. A coupling agent is necessary to ensure good acoustic contact between the transducer and skin and allow total transsimation of the sound beam.

3. Results

Table 1 Frequency distribution of gender

Gender	Frequency	Percent
Male	40	20%
Female	160	80%
Total	100	100%

Table 2 Frequency distribution of age group

Age group	Frequency	Percent
(<20)	6	3%
(21-35)	62	31%
(36-50)	54	27%
(51-65)	64	32%
(>65)	14	7%
Total	200	100%

Table 3 Frequency distribution of margin

Margin	Frequency	Percent
well define	145	73%
ill define	54	27%
Total	200	100%

Table 4 Frequency distribution of capsule

Capsule	Frequency	Percent
Taller-than-wider	192	96%
Wider-than-taller	8	4%
Total	200	100%

Table 5 Frequency distribution of vascularity

Vascularity	Frequency	Percent
internal	150	75%
peripheral	50	25%
Total	200	100%

Table 6 Frequency distribution of calcification

Calcification	Frequency	Percent
No	170	85%
Yes	30	15%
Total	200	100%

Table 7 Frequency distribution of echogenicity

Echogenicity	Frequency	Percent
hypo	30	15%
hyper	156	78%
iso	14	7%

Table 8 Frequency distribution of number of lesion

Number lesion	Frequency	Percent
solitary	82	41%
multi	118	59%
Total	200	100%

Table 9 Frequency distribution of type of lesion

Type of lesion	Frequency	Percent
Benign	150	75%
Malignant	50	25%
Total	200	100%

Table 10 Correlations for margins, capsule, vascularity, number of lesions with patient age, gender and weight

		Age	Gender	Weight
Margin	Pearson Correlation	0.614	0.135	0.092
	Sig. (2-tailed)	0.000	0.180	0.365
	N	200	200	200
		Age	Gender	Weight
Capsule	Pearson Correlation	-0.119	-0.026	-0.108
	Sig. (2-tailed)	0.238	0.801	0.283
	N	200	200	200
		Age	Gender	Weight

Vascularity	Pearson Correlation	0.291	0.058	0.112
	Sig. (2-tailed)	0.003	0.568	0.268
	N	200	200	200
		Age	Gender	Weight
Number of lesion	Pearson Correlation	0.094	0.091	0.133
	Sig. (2-tailed)	0.351	0.365	0.188
	N	200	200	200

4. Discussion

US is the modality of choice for imaging thyroid nodules. US findings of thyroid nodules are diagnostically important and play a major role in determining appropriate clinical management [12]. Study population were 200 patients with thyroid nodules, among them (20%) were males and (80%) of them were females Table (1). Table, (2) shown that most patients in age group (51-65) were (32%), group (21-35) were (31%), group (36-50) were (27%), group (>65) were (7%) and group (<20) were (3%), this result reflect that most aged incident to thyroid nodule were the elderly however people over 65 years were of less incident in this study . As shown in Table (3) the study found that most patients had well define margin nodules, 145 (73%), however the ill define margin nodules were 54 (27%), also most patients had taller-than-wider capsule were 192 (96%) and wider-than-taller capsule were 8(4%) as in Table (4), most patients had internal vascularity 150 (75%) while whom with peripheral were 50 (25%) Table (5), most patients nodules had No calcification170 (85%) while nodules that with calcification were 30(15%) Table (6), furthermore most patients in recent study 156 (78%) had hyper echogenicity, while those which had hypo echogenicity were 30(15%) and iso echogenicity were 14 (7%), Table (7) , patients with multi lesion were 118(59%) whereas solitary lesion was found in 82 (41%) Table (8), most patients in this study had benign lesions which were calculated 150 (75%) although malignant lesion were found in 50 (25%) patient as in Table (9),. Table (10) shown that in this study, there was statistically significant correlation between age and margins (p-value = 0.00), vascularity (p-value = 0.003) whereas there was statistically insignificant correlation between age and capsule, number of lesions, or between gender and margins, capsule, vascularity, number of lesions and between weight and margins, capsule, vascularity, number of lesions (p-value > 0.05), also there was statistically insignificant correlation between age, gender and echogenicity (p-value > 0.05). on the other hand the study found that there was statistically significant correlation between calcification and type of lesion (p-value =0.001), and there was statistically significant difference in margins (sig=0.001), in vascularity (sig=0.00). An abnormal thyroid nodule margin is a recognised feature of thyroid malignancy. Assessment of the nodule edge has previously been binary. A poorly defined/irregular nodule margin conferred 87 % specificity for malignancy in a study population of 1,108 thyroid nodules but with a very low sensitivity of 39 % [13].

US report of the thyroid nodule examination, should to be address several factors concerning the nodule. The report should include a detailed description of the nodule with regard to its size, location, composition and echogenicity in relation to surrounding structures. The nodular margins should be closely examined to indicate the contour and presence of rim calcification or halo, and any additional features such as colloid calcification and vascular pattern. The lymph nodes should also be screened and commented on if there are any suspicious features. Based on the collection of sonographic findings, the specialist should provide a US classification of the thyroid nodule and when there are multiple nodules, the most suspicious nodule should be used for scoring [14].

The high prevalence of thyroid nodules requires evidence-based intelligible strategies for their differential diagnosis, risk factors , treatment, and follow-up. As the majority of nodules are non-malignant, the accurate discernment of a benign from malignant lesion is an important and challenging feature of thyroid US.

5. Conclusion

The study concluded that the most patients had benign lesion, there was statistically significant correlation between age and margins, vascularity, between calcification and type of lesion, there was statistically significant difference in margins, in vascularity, and in calcification between benign and malignant lesion and there was statistically insignificant difference in capsule and echogenicity between benign and malignant lesion.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

Statement of ethical approval

Statement of ethical approval was obtained from the ethical committee of the hospital.

Statement of informed consent

Statement of informed consent was obtained agree from all Patients that was included in the study that there was no any information's concern patient name identifications will publish.

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