Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value [ICV] =82.06

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

To study the ultrasonography for the diagnosis of parenchymal thyroid diseases

Priyanka Mittal

Assistant Professor, Department of Radiodiagnosis, Adesh Medical College, Bathinda, Punjab, India

ABSTRACT:

Aim: To study the ultrasonography for the diagnosis of parenchymal thyroid diseases. **Methods:** This study was conducted in the Department of Radiology. Patients were divided into five groups such as group I (normal); group II had first detected, early untreated Hashimoto disease (EH); group III comprised of chronic Hashimoto patients that are under treatment and/or follow up (H); group IV had multinodular parenchymal hyperplasia (M); and group V had nodular hyperplasia with Hashimoto (HM). They underwent spectral Doppler ultrasound and acoustic radiation force impulse using Siemens ACUSON S2000 machine. Quantitative spectral doppler parameters such as resistivity index (RI), acceleration time (AT) and quantitative elastography such as shear wave velocity (SWV) was recorded. **Results:** The distribution of patients depending on illnesses, with each group having 20 patients. The mean RI in group I was 0.56, in group II it was 0.59, in group III it was 0.44, in group IV it was 0.50, and in group V it was 0.52. The mean AT in group I was 25.8, in group II it was 24.7, in group III it was 69.4, in group IV it was 45.7, and in group V it was 44.4. The mean SWV in group I was 1.48, in group II it was 1.67, in group III it was 1. The change was statistically significant (P<0.05). **Conclusion:** The resistivity index, acceleration time and shear wave velocity combination are useful for differential diagnosis of parenchymal thyroid disorders.

Keywords: Elastography, Hashimoto disease, thyroid gland, ultrasonography

Received: 11-01- 2019 Accepted: 15-02-2019

Corresponding author: Priyanka Mittal, Assistant Professor, Department of Radiodiagnosis, Adesh Medical College, Bathinda, Punjab, India

This article may be cited as: Mittal P. To study the ultrasonography for the diagnosis of parenchymal thyroid diseases. J Adv Med Dent Scie Res 2019;7(3):226-228.

INTRODUCTION

Thyroid nodules are described as "discrete lesions inside the thyroid gland, radiologically different from surrounding thyroid parenchyma" by the American Thyroid Association (ATA).[1] Thyroid nodules are often benign, and the stated prevalence varies greatly depending on the population investigated and the technologies employed to identify the nodules. [2] Thyroid cancer is on the rise globally, with 36,000 deaths in 2010, up from 24,000 in 1990, despite good 5-year survival rates after treatment. [3-5] According to a prior research, 43,644 thyroid cancer cases were reported in the United States between 1992 and 2006. [6] Thyroid cancer is the eighth most common cancer in China, and the fast growth in thyroid cancer incidence constitutes a significant health burden. [7,8] (Ultrasound (US) is a globally recognised standard diagnostic technique for detecting thyroid nodules. [9]

Differential diagnosis of diffuse and nodular thyroid parenchymal disorders is challenging using gray-scale ultrasonography since the results are often quite similar. In addition, nodular alterations in the multinodular (M) type and the chronic autoimmune illness Hashimoto's (H) might coexist in clinical practise. [10] Actually, chronic autoimmune disease has different radiologic characteristics depending on its stage: for early-stage disease (Early Hashimoto, EH), ultrasonography is performed at the start, whereas for chronic-stage disease (Chronic Hashimoto, H), ultrasonography is performed when the patient is receiving medical treatment. With traditional ultrasonography, distinct pathologic phases of the illness are difficult to distinguish from one another (US). [11,12] Although there are many studies in the literature on radiological differential diagnosis of nodules (nodule-pseudo-nodule or benign-malignant nodule), there are few studies on differential diagnosis of parenchymal changes in heterogeneous parenchyma of H caused by diffuse or other nodular parenchymal diseases with multinodular dysplasia.

MATERIAL AND METHODS

After receiving clearance from the protocol review committee and the institutional ethics committee, this research was carried out at the Department of Radiology. All patients were informed about the procedure's approach, risks, advantages, outcomes, and related complications. This research included 100 persons of both genders ranging in age from 18 to 59 years. All patients were told about the trial and given their permission. In the case history performa, details such as name, age, and gender were noted. All patients were subjected to a complete clinical evaluation. Patients were divided into five groups: group I (normal); group II (first detected, early untreated Hashimoto disease; group III (chronic Hashimoto patients under treatment and/or follow up); group IV (multinodular parenchymal hyperplasia with Hashimoto; and group V (nodular hyperplasia with Hashimoto) (HM). The Siemens ACUSON S2000 equipment was used for spectral Doppler ultrasound and acoustic radiation force impulse. Quantitative spectral doppler characteristics such as resistivity index (RI), acceleration time (AT), and shear wave velocity (SWV) were measured. For accurate inference, the results were statistically analysed. A P value of less than 0.05 was deemed significant.

RESULTS

Out of 100 patients, 63% were male and 37% were female, with the majority of patients aged 25 to 35. 42%, followed by 31% for those aged 35-45, as seen in table1. Table 2 shows the distribution of patients depending on illnesses, with each group having 20 patients. The mean RI in group I was 0.56, in group II it was 0.59, in group III it was 0.44, in group IV it was 0.50, and in group V it was 0.52. The mean AT in group I was 25.8, in group II it was 24.7, in group III it was 69.4, in group IV it was 45.7, and in group V it was 44.4. The mean SWV in group I was 1.48, in group II it was 1.67, in group III it was 1. The change was statistically significant (P 0.05). table.3

Table 1: Age and gender distribution of patients

Gender	N=100	%
Male	63	63
Female	37	37
Age		
Below 25	6	6
25-35	42	42
35-45	30	30
Above 45	22	23

Table 2: Distribution of patients

Groups	Group I	Group II	Group III	Group IV	Group V
Diseases	Normal	Early untreated Hashimoto disease (EH)	Chronic Hashimoto (H)	Multinodular parenchymal hyperplasia (M)	Nodular hyperplasia with Hashimoto (HM)
Number	20	20	20	20	20

Table 3: Assessment of spectraldoppler parameters group

Parameters	Group I	Group II	Group III	Group IV	Group V	P value
RI	0.56	0.59	0.44	0.50	0.52	0.01
AT	25.8	24.7	69.4	45.7	44.4	0.001
SWV	1.48	1.67	1.17	1.41	1.66	0.01

DISCUSSION

The use of colour and power doppler modes to measure thyroid gland vascularity is quite beneficial. This may be used to assess disease progression, particularly in Graves' disease and thyroiditis. Furthermore, it may measure vascularity inside septations in thyroid cystic lesions that RI in distinct groups. Assessment of AT in groups and SWV in various groups distinguishes benign and malignant cysts. [13] USG is superior for post-operative monitoring as well as FNA and True cut needle biopsy guiding. However, it is still thought to be operator dependent, unable of detecting retrosternal and laryngeal extension, and lacking in sensitivity and specificity in certain circumstances. [14] Thyroid USG is used to evaluate parenchymal volume, analyse vascular characteristics of the gland, screen for nodules, and differentiate them. [15] Gray scale and Doppler exams became simpler with technological advances in transducers and high resolution displays. [16] SWV further increased the breadth of elastography and permitted quantitative assessment of nodules and thyroid parenchyma using hardware and software. Aside from thyroid nodule assessments, several studies have indicated the utility of elastography in detecting changes in thyroid parenchyma in disorders that impact thyroid parenchyma, such as HT. [17] The current research used Ultrasonography (USG) to

diagnose parenchymal thyroid disorders in adult individuals. We included 100 adult patients in this trial. Patients were divided into five groups: group I (normal); group II (first detected, early untreated Hashimoto disease (EH); group III (chronic Hashimoto patients under treatment and/or follow up (H); group IV (multinodular parenchymal hyperplasia with Hashimoto); and group V (nodular hyperplasia with Hashimoto) (HM). Yildirim et al.[18] examined the results of 227 individuals (179 females and 48 males) who underwent spectral Doppler ultrasonography and acoustic radiation force impulse in their research. The authors discovered no significant influence of gender or volume on illness pattern differentiation. The RI (0.41± 0.06) and SWV (1.19± 0.18 m/s) values were the lowest. The EH group had the highest AT values (>55 ms). The presence of H reduced RI and SWV readings while increasing AT in a distinct thyroid condition. We discovered that the mean RI in group I was 0.56, group II was 0.59, group III was 0.44, group IV was 0.50, and group V was 0.52, the mean AT in group I was 25.8, group II was 24.7, group III was 69.4, group IV was 45.7, and group V was 44.4, and the mean SWV in group I was 1.48, group II was 1.67, group III was 1.17, group IV was 1.41, and group V was 1.66. The change was statistically significant (P 0.05). Popoveniuc G et al.[19] used ultrasonography to evaluate thyroid illness in 167 participants in their research. The study groups were divided into nine categories. The authors discovered that thyroid USG plays an important role in the diagnosis and follow-up of thyroid illness.

CONCLUSION

The resistivity index, acceleration time and shear wave velocity combination are useful for differential diagnosis of parenchymal thyroid disorders.

REFERENCE

1. Cooper, D.S.; Doherty, G.M.; Haugen, B.R.; Kloos, R.T.; Lee, S.L.; Mandel, S.J.; Mazzaferri, E.L.; McIver, B.; Pacini, F.; Schlumberger, M.; et al. Revised American Thyroid Association management guidelines for patients with thyroid nodules and differentiated thyroid cancer. Thyroid 2009, 19, 1167–1214.
2. Dean DS and Gharib H: Epidemiology of thyroid nodules. Best Pract Res Clin Endocrinol Metab 22: 901-911, 2008.
3. La Vecchia C, Malvezzi M, Bosetti C, Garavello W, Bertuccio P, Levi F and Negri E: Thyroid cancer mortality and incidence: A global overview. Int J Cancer 136: 2187-2195, 2015.
4. Vigneri R, Malandrino P and Vigneri P: The changing epidemiology of thyroid cancer: Why is incidence increasing? Curr Opin Oncol 27: 1-7, 2015.
5. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, Abraham J, Adair T, Aggarwal R, Ahn SY, et al: Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010. Lancet 380: 2095-2128, 2012.
6. Aschebrook-Kilfoy B, Ward MH, Sabra MM and Devesa SS: Thyroid cancer incidence patterns in the United States by histologic type, 1992-2006. Thyroid 21: 125-134, 2011.
7. Chen W, Zheng R, Zeng H, Zhang S and He J: Annual report on status of cancer in China, 2011. Chin J Cancer Res 27: 2-12, 2015.
8. Wang Y and Wang W: Increasing incidence of thyroid cancer in Shanghai, China, 1983-2007. Asia Pac J Public Health 27: NP223-NP229, 2015.
9. Morris LF, Ragavendra N and Yeh MW: Evidence-based assessment of the role of ultrasonography in the management of benign thyroid nodules. World J Surg 32: 1253-1263, 2008
10. Liang XN, Guo RJ, Li S, Zheng ZM, Liang HD. Binary logistic regression analysis of solid thyroid nodules imaged by high-frequency ultrasonography, acoustic radiation force impulse, and contrast-enhanced ultrasonography. Eur Rev Med Pharmacol Sci. 2014;18:3601–10.
11. 2. Russ G, Leboulleux S, Leenhardt L, Hegedüs L. Thyroid incidentalomas: Epidemiology, risk stratification with ultrasound workup. Eur Thyroid J. 2014;3:154–63.
12. 3. Nam-Goong IS, Kim HY, Gong G, Lee HK, Hong SJ, Kim WB, et al. Ultrasonography-guided fine-needle aspiration of thyroid incidentaloma: Correlation with pathological findings. Clin Endocrinol. 2004;60:21–8.
13. Woliński K, Szczepanek-Parulska E, Stangierski A, Gurgul E, Rewaj-Łosyk M, Ruchała M. How to select nodules for fine needle aspiration biopsy in multinodular goitre. Role of conventional ultrasonography and shear wave elastography - A preliminary study. Endokrynol Pol. 2014;65(2):114–118.
14. Jung WS, Kim JA, Son EJ, Youk JH, Park CS. Shear wave elastography in evaluation of cervical lymph node metastasis of papillary thyroid carcinoma: Elasticity index as a prognostic implication. Ann Surg Oncol. 2015;22(1):111–116.
15. Szczepanek-Parulska E, Woliński K, Stangierski A, Gurgul E, Biczysko M, Majewski P. Comparison of Diagnostic Value of Conventional Ultrasonography and Shear Wave Elastography in the Prediction of Thyroid Lesions Malignancy. PLoS One. 2013;8(11):e81532.
16. Colakoglu B, Yildirim D, Alis D, Ucar G, Samanci C, Ustabasioglu FE, et al. Elastography in Distinguishing Benign from Malignant Thyroid Nodules. J Clin Imaging Sci. 2016;6:51–56.
17. Calvete AC, Mestre JDB, Gonzalez JMR, Martinez ES, Sala BT, Zambudio AR. Acoustic Radiation Force Impulse Imaging for Evaluation of the Thyroid Gland. J Ultrasound Med. 2014;33(6):1031–1040.
18. Yildirim D, Alis D, Bakir A, Ustabasioglu F, Samanci C, Colakoglu B. Evaluation of parenchymal thyroid diseases with multiparametric ultrasonography. Indian J Radiol Imaging. 2017;27(4):463–463.
19. Popoveniuc G, Jonklaas J. Thyroid Nodules. Med Clin North Am. 2015;96(2):329–349