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Diagnosis Of Focal Formations Of The Thyroid Gland With The Use Of Complex Of Methods

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ABSTRACT

The research paper presents the results of diagnosis and treatment of 82 patients with focal thyroid masses. Based on a complex study of patients, main specific diagnostic criteria were determined, the use of which allows to detect thyroid cancer in their early stages. It was educed, that multiself-reactance ultrasonic research, including B-mode, EDC, DDC, spectral Doppler and elastography assist upgrading of research in the early exposure of chasse of thyroid.

KEYWORDS

Thyroid tumors, complex ultrasound diagnostics, elastography

INTRODUCTION

Among modern medical and social problems, one of the most important diseases of the thyroid gland (thyroid gland), which is currently leading among the rest of the endocrine pathology. In this case, the proportion of thyroid cancer (TC) in relation to benign nodules and focal formations, according to the literature, ranges from 2 30% [1,5,10,19]. The prognosis of the disease in thyroid cancer largely depends on early diagnosis. The main difficulties in the timely diagnosis of thyroid cancer are associated with its long-term existence or on other thyroid diseases. Despite the achievements of high radiation diagnostics, none of the methods of medical care can accurately distinguish benign pathology of the thyroid gland from malignant [11,19,24]. The introduction of the TI-RADS classification system in the work of an ultrasound doctor reduced the total number of TAPBs by 31.8%. The TI-RADS classification, based on ultrasound data, reflects the differentiation of the thyroid nodule depending on the oncological risk. TI-RADS allows you to standardize ultrasound examination of the thyroid gland, to minimize the subjective factor in the interpretation of the ultrasound picture of the thyroid nodule; to develop a unified codified approach to the nodes of the formation of the thyroid gland on the part of ultrasound diagnostics doctors and clinicians. The use of TI-RADS helps to determine the indications for TAPP thyroid nodules and surgical treatment, and, consequently, to reduce the number of non-necessary minimally invasive and surgical interventions on the thyroid gland [3]. Currently, the study in B-mode, color and power Doppler mapping is of great importance in ultrasound diagnostics of thyroid diseases. Differential diagnosis of thyroid diseases is based on an assessment of the size of the gland, its echogenicity, echostructure, and information about regional lymph nodes. Nodular formations in the gland are differentiated by localization, size, shape, borders, contours, echogenicity, internal echostructure, state of the capsule and vascularization of the gland [7, 11, 25].

According to numerous domestic and foreign publications, the sensitivity and specificity of the gray scale technique in the differential diagnosis of qualitative and benign processes ranges from 55–70% [19,23]. The use of pulse-wave Doppler sonography, which allows assessing blood flow in the nodes and the thyroid gland, increases the sensitivity of the method slightly to 65–75% [7]. Modern complex ultrasound diagnostics, consisting of echography and Doppler sonography, has been supplemented by a third technology - elastography. Shear wave elastography is a method that allows for a quantitative assessment of tissue elasticity, which excludes the possibility of subjective interpretation of the data [2,12,18]. Physically, a shear wave is an elastic transverse wave (ultrasonic wave - longitudinal), the displacement of the particles of the medium in this direction perpendicular to the wave. The principle of operation of the technique is based on the generation of a shear wave in the tissues caused by an ultrasonic pulse and an assessment of the speed of its advance. In this case, the shear wave propagation is also visualized by the ultrasonic sensor itself. Numerical values of the elasticity index are given in m / s or kPa, depending on the type of shear wave elastography, the method is called quantitative ultrasound elastography or elastometry. The literature reports that two methods are used for “shear wave” elastography: point and two-dimensional shear wave elastography [12,18,21,23,27]. Point "shear wave" elastography as a method of obtaining shear waves allows one to obtain quantitative information about the elasticity of tissues, but only at a given depth in the focal zone. To obtain shear waves at a different depth, it is necessary to shift the focus area closer or further from the sensor and create the necessary pressure in it with a new powerful ultrasonic pulse to obtain shear waves and measure their characteristics.

The stiffness of tissues is depicted in color: blue - for softer ones, and red - for harder ones. Following the study of color elastograms, elastometry is performed using one or more test volumes, freely movable and resizable. Numerical data can be presented as either shear wave velocity (in m / s) or elasticity (kPa). Thus, this technology makes it possible to quantitatively reflect the elasticity of the thyroid gland. A significant difference of this technology from the previous one (shear wave point elastography) is that color mapping greatly facilitates elastometry, allowing the doctor to choose only high-quality, artifact-free elastograms [4,17,18].

RESEARCH OBJECTIVE

Improving the differential and clarifying diagnosis of thyroid nodules by using sonoelastography.

MATERIALS AND METHODS

120 patients were under observation, referred for ultrasound to clarify the nature of the nodules in the thyroid gland. The age of the patients ranged from 18 to 81 years. Among the examined patients, men and women accounted for 26 (21.7%) and 94 (78.3%), respectively. Ultrasound was performed on modern ultrasound machines MINDRAY DS-80 (China), Logiq S8 XD clear GE Healthcare (USA), HI VISION Preirus (Hitachi Medical Corporation, Japan) and Samsung-Medison WS80 AC ELITE (South Korea) with a frequency range linear sensor 5-13MHz.

Ultrasound was performed according to the standard technique with gray-scale study, color and power Doppler mapping (CDC, EDC, spectral Doppler), and also sonoelastography mode (compression and shear waves) was used, which was used to assess the rigidity of the focal formations of the thyroid gland.

RESEARCH RESULTS AND THEIR DISCUSSION

In 62 (51.7%) subjects, single thyroid nodules were detected, in 58 (48.3%) patients, multiple nodules were detected.

The defeat of the thyroid gland was mainly observed in 34 women of reproductive age (36.1%). The largest group, of the examined (n = 49) 40.1%, consisted of various variants of diffuse-nodular goiter.

Out of 120 patients, 85 (70.1%) had a change in size towards an enlargement of the gland, irregularity of the contours was observed in 56 (46.7%) patients, uneven echogenicity - in 79 (65.8%), halo rim - in 62 (51.6%), an increase in the volume of the thyroid gland in 89 (74.2%), calcifications in 32 (26.7%), hypervascularization in 98 (81.6%) patients. Thyroid tissue elasticity indices were higher than 48.9 kPa (norm 6.7-19.8 kPa) in 106 (88.3%) patients.

During elastography, the normative range was 18.4 ± 7.8 kPa. In benign lesions, the arithmetic mean stiffness was 47.5 ± 10 kPa, which is significantly higher than the norm: ($p < 0.05$). Hypoechoic focal formations 5-10 mm in size were characterized by uniform staining in blue during elastography.

When identifying nodules of mixed echogenicity with sizes exceeding 10 mm, as well as isoechoic formations with a hypoechoic rim along the periphery, cytological and histological findings were follicular adenomas without proliferation. The formations had a mosaic pattern of staining with a predominance of blue areas and several harder green areas. Elastograms showed a mixed type of mapping with a predominance of rigid, rigid blue areas. The arithmetic mean stiffness in malignant tumors was 156.2 ± 34.3 kPa, which is significantly higher than the norm, and significantly higher than the stiffness indicators (p <0.01). (Figure 1.2.3.4).

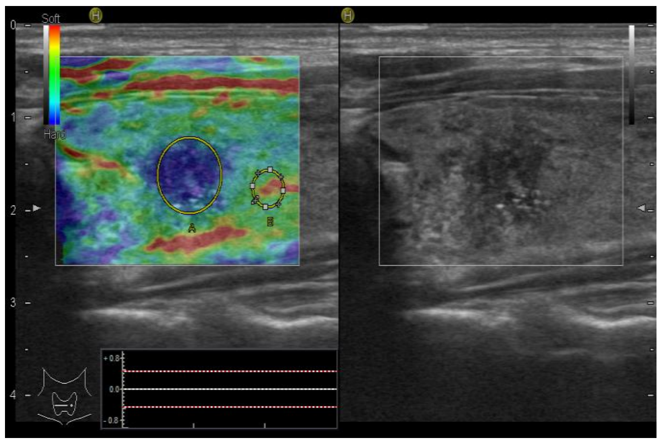

Fig. 1 Thyroid cancer. With compression elastography

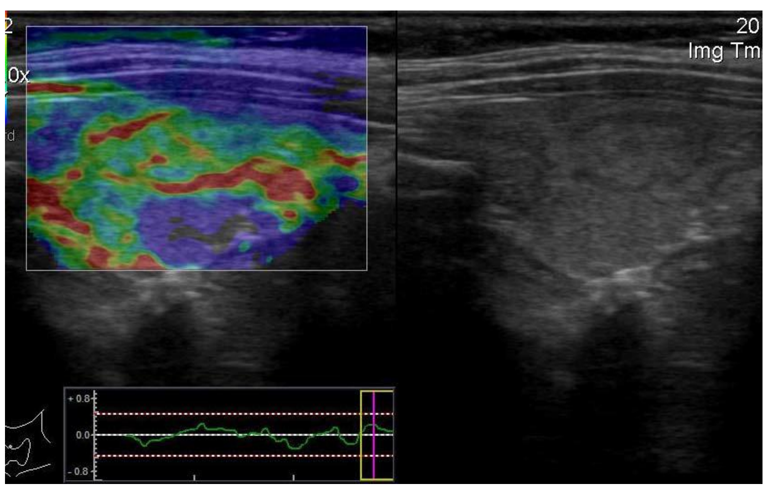

Fig. 2 Nodular formations of the thyroid gland.

With compression elastography

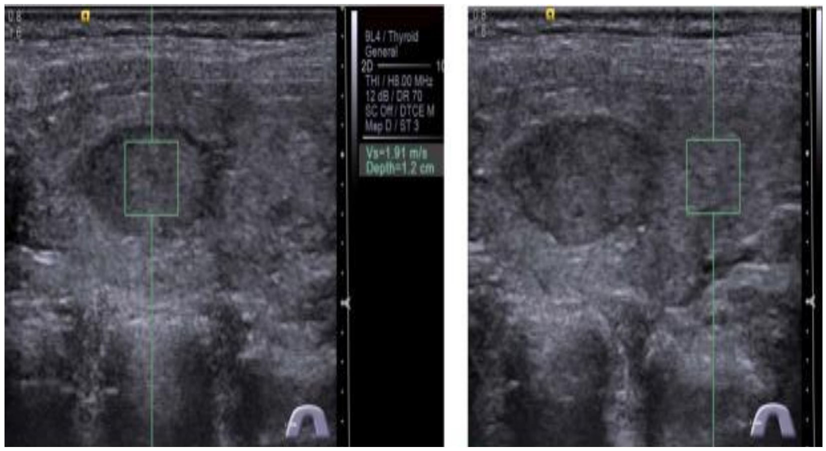

Fig. 3. Shear wave elastography. Nodular goiter in men 39 years old.

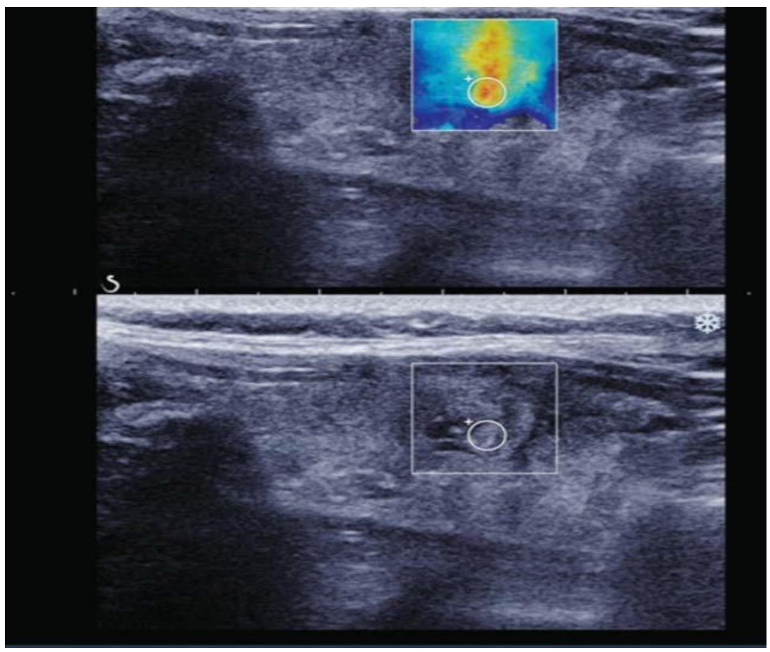

Fig. 4. Nodular formation of the thyroid gland.
2D shear wave elastography

CONCLUSIONS

Thus, the inclusion of quantitative and qualitative indicators of sonoelastograms in the modern complex ultrasound examination of the thyroid gland significantly increases the specificity and accuracy of traditional ultrasound examination in the diagnosis of non-palpable thyroid nodules. The diagnostic accuracy of the ultrasound method is increased to clarify the staging of thyroid cancer, which makes it possible to detect malignant tumors in the early stages. The use of sonoelastography for thyroid nodules is easily integrated into standard diagnostic procedures for thyroid pathology. This procedure is completely painless for the patient and requires only a few extra minutes, without prior preparation of the patient.

Sonoelastography has the potential to distinguish benign tumors from malignant thyroid nodules. The main role of sonoelastography in ultrasound diagnostics is to clarify the nature of the nodules that can be observed without TAPB or surgical intervention. This can be especially informative in patients with undiagnosed or uncertain histological findings. In addition, the diagnostic value of the sonoelastography technique lies in the possibility of dynamic observation of various methods of treating thyroid nodules.

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