

The role of multiparameter ultrasound diagnosis in focal thyroid glands

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Annotation

The article presents the results of diagnosis and treatment of 120 patients with focal thyroid masses. Based on a complex study of patients, authors determine the main specific diagnostic criteria, 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.

Key words: thyroid tumors, multiparameter ultrasound diagnostics

Relevance: Thyroid disease (thyroid) is one of the most important problems of our time and now occupy a leading position among endocrinological problems. According to the summary data, the incidence of thyroid nodules has increased from 4-9% to 5-22% in the last 30 years, and in the last 10 years, the incidence of thyroid cancer has doubled, causing the death of 1% of cancer patients [8]. At the same time, among all benign and malignant tumors of the head and neck, thyroid pathology accounts for 1.5 to 3.5%. In this regard, today the issues of early and differential diagnosis of thyroid nodules are relevant.

Thus, the issues of early and differential diagnosis of all thyroid nodules remain relevant [1,3]. A special place at the present stage is the high informativity of ultrasound that allows you to apply ultrasound imaging to diagnose the disease at an early and even preclinical disease stadii [6,9,11,13,18]. Increased risk factors, a high probability of malignant modification of benign tumors, a tendency to the emergence of hidden forms of cancer, a feature in the mild and nonspecific clinical symptoms of the tumor attach particular importance to the problem. Unfortunately, even with the use of the latest ultrasound technologies in attempts to classify echographic semiotics and systematize the data with the differentiation of ultrasound signs of thyroid cancer and morphological forms of cancer, the issue is now open and the problem is relevant [1,5,8,15,19]. The introduction of innovative technologies opens up new perspectives specifying the diagnosis of nodules [2,6,9,12]. However, the role and place of high technology echography are not well understood.

Purpose of research. Improvement of differential and clarifying diagnosis of

thyroid cancer through the use of multiparameter ultrasound

Materials and methods. The study included 120 patients referred to ultrasound to clarify the nature of the nodules in the thyroid gland. The age of patients ranged from 22 to 75 years. Among the examined patients, men and women accounted for 42 (35%) and 78 (65%), respectively. Ultrasounds were performed on modern ultrasonic devices "MINDRAY DS-8" (China), Logiq S8 XD clear GE Healthcare (USA), HI VISION Preirus (Hitachi Medical Corporation, Japan) and Samsung-Medison WS 80 AC ELITE (South Korea) with a range frequencies of the linear sensor 5-13 MHz, providing visualization in real mode of the gray scale, obtaining the characteristics of Doppler studies, elastography. Ultrasound examination was performed using a standard technique with a sersoscale study, Doppler sonography (CDC, EDC, spectral Doppler), as well as an elastography mode (compression and shear wave) with which the stiffness of focal thyroid formations was evaluated.

Patients were divided into 4 groups:

Group 1 (n=30) included patients whose examination revealed focal lesions of the thyroid gland with a diameter of up to 10 mm.

Group 2 (n=30) consisted of patients whose examination revealed focal lesions of the thyroid gland with a diameter of more than 10 mm.

The 3rd group (n=30) consisted of patients who had a surgery concerning the node formations of the thyroid.

Group 4 (n=30) consisted of patients who received preoperative chemo-radiation therapy for various forms of CSF.

The results of the study and their discussion. A total of 62 (52%) of the examined patients were found to be single, in 58 (48%) multiple thyroid nodules. In 30 (25%) patients, with identified focal changes, pathomorphologically confirmed: papillary cancer in 23 (19.1%), follicular cancer in 5 (4.2%), medullary cancer in 2 (1.6%), primary a lesion with a lesion of regional lymph nodes in 1 (0.1%) patient (Figure 1, 2, 3, 4). Of the 120 patients, a change in size, in the direction of an increase in the gland, was in 82 (68.3%), irregularity of the contours was observed in 43 (35.8%) patients, uneven echogenicity - in 57 (47.5%), the "halo" rim in 81 (67.5%), an increase in thyroid gland in 94 (78.3%), calcinates in 41 (34.2%), hypervascularization in 103 (86%) patients. Thyroid tissue elasticity was higher in 104 (86.6%) patients. Among them, the range of elasticity of benign tumors ranged from 25 to 68 kPa, and malignant tumors from 70 to 169 kPa (norm 6,7-19,8 kPa). Characteristic ultrasound signs of the most common papillary carcinoma (n = 23) were: irregular shape, uneven boundaries, fuzzy contours, reduced echogenicity, heterogeneity of the echostructure of the formation; preservation of the TG capsule; hypervascular node, asymmetry, randomness, disorganization of vascular

pattern in its structure, pathological transformation of blood vessels. Follicular cancer ($n = 5$) of the thyroid gland was characterized more often than other forms by hyperechogenic and medium echogenicity nodes, the structure of which was also more often heterogeneous; calcinates were less common than in other forms, and the rim of delimitation was more common. Avascular and hypovascular forms were also more common. Medullary carcinoma ($n = 2$) of the thyroid gland, unlike other forms, was often defined as an oval-shaped hypoechoic formation; more often than in other forms, the echostructure of the nodes was homogeneous. Vascularization has always been high. When conducting elastography, the regulatory range was 18.4 ± 7.8 kPa. In benign tumors, the arithmetic mean hardness was 47.5 ± 10 kPa, which was

significantly higher than the norm: ($p < 0.05$). Hypoechoic focal formations with elastography, sizes 5–15 mm were characterized by uniform staining in blue. In identifying focal lesions of mixed echogenicity with sizes greater than 10 mm, as well as isoechoic lesions with a hypoechoic rim along the periphery, the cytological and histological findings were follicular adenomas without proliferation. Education had a mosaic-like structure staining sections with a predominance of blue and a few more tough sections of the green. In group 3, a mixed type of mapping was revealed on elastograms with a predominance of hard areas stained blue on elastograms. The stiffness has made $169,2 \pm 24.3$ kPa, significantly higher than normal, and significantly higher rigidity values than the 2nd group ($p < 0.01$).



Fig. 1. Cancer of the thyroid gland. Irregular shape, jagged knot boundaries. Two-dimensional study in gray scale.

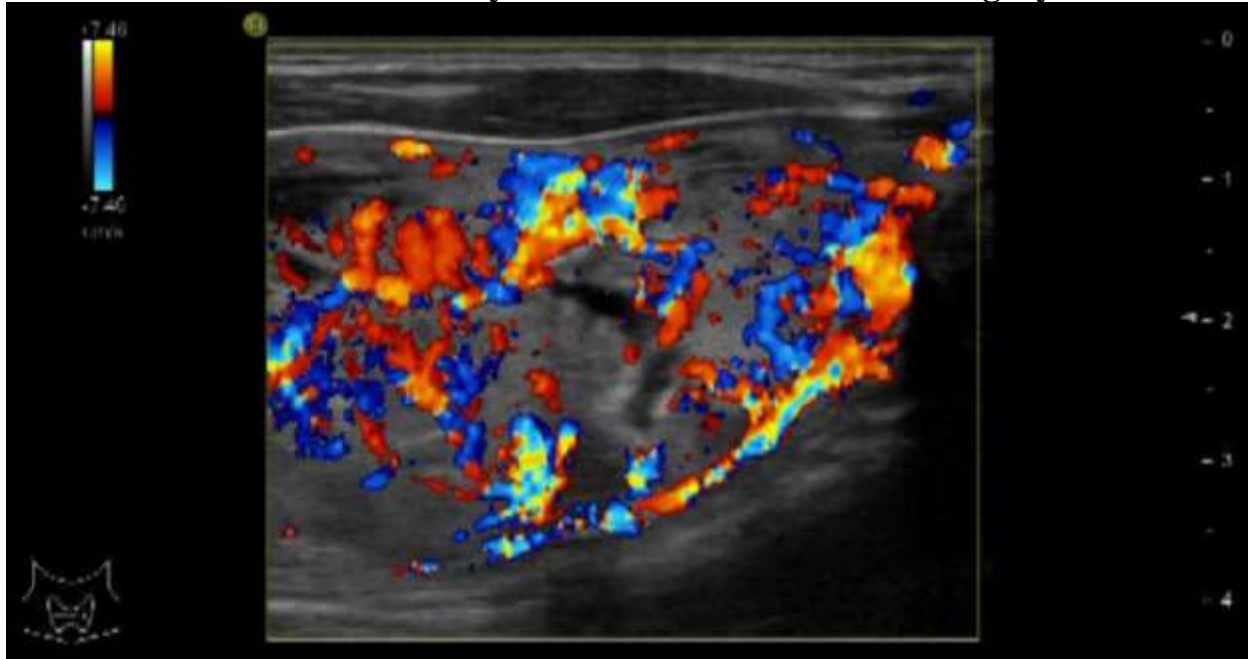


Fig. 3. Cancer of the thyroid gland. Hypervascularization of the node.

In the mode of color Doppler mapping.

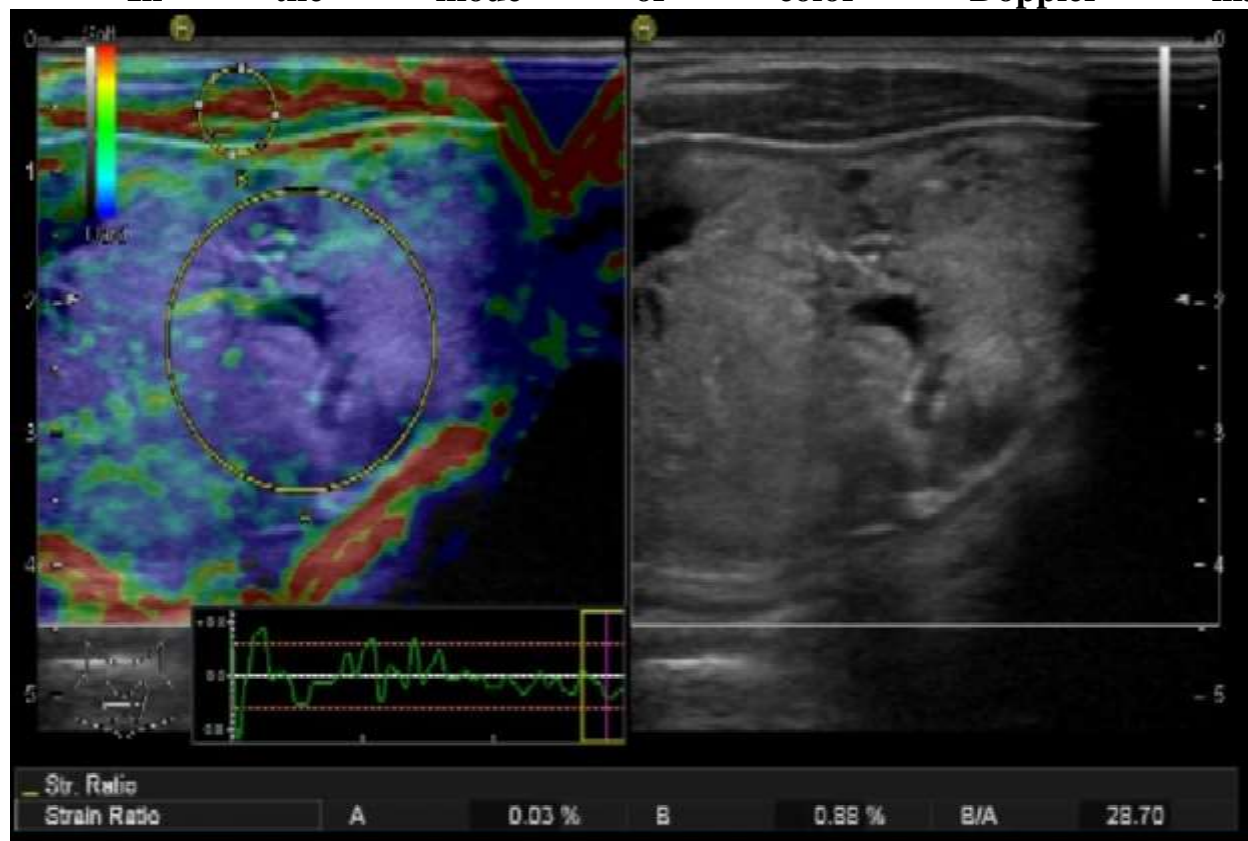


Fig. 2. Cancer of the thyroid gland. With compression elastography

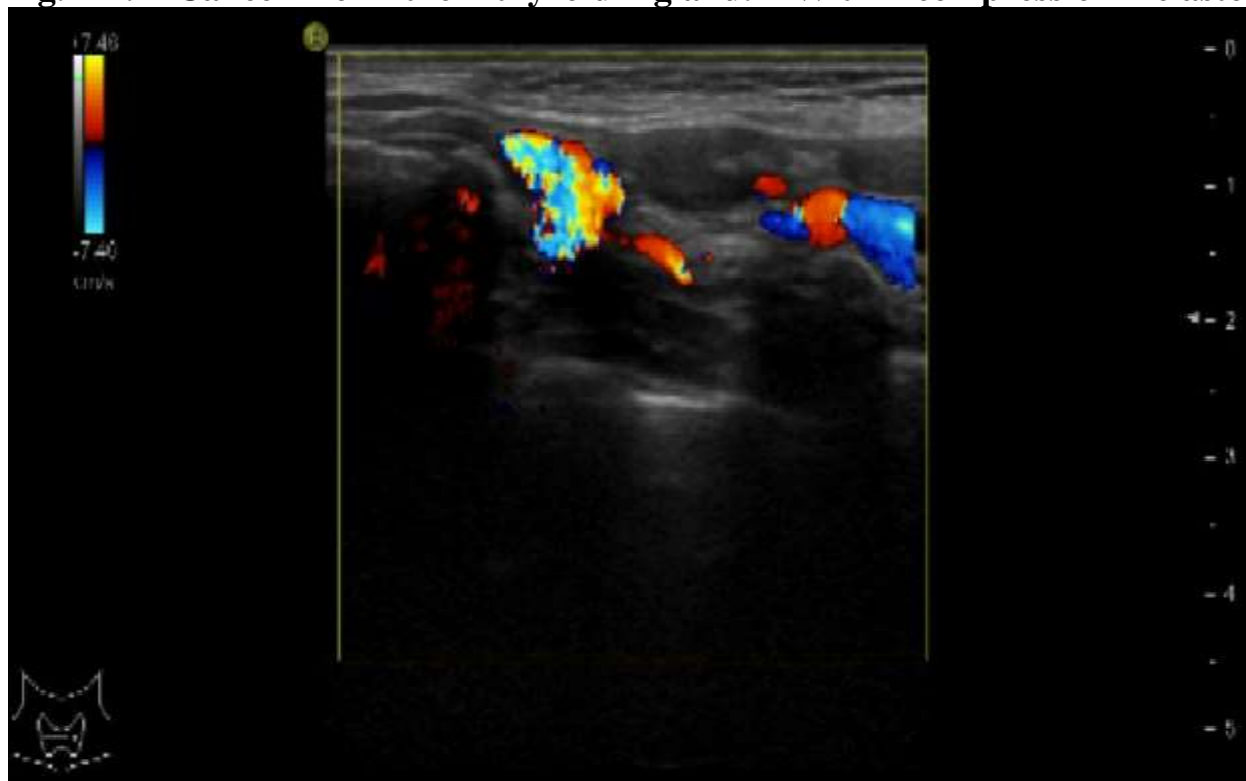


Fig. 4. Metastases to the lymph nodes of the neck. In the mode of color Doppler mapping.

Summary. In multiparameter ultrasound examination of focal thyroid diseases, the most informative ultrasound criterion was contour irregularity, volume increase, the presence of calcinates, hypervascularization and decreased elasticity of the affected tissue. Multiparameter ultrasound, including B-mode, CDC, EDC, spectral Doppler and elastography, is a highly informative method of diagnosis in the early detection of thyroid cancer. Elastography is a modern method that can significantly improve the results of ultrasound diagnosis of malignant degeneration of thyroid nodules. Multiparameter ultrasound using elastography increases the sensitivity of ultrasound in the

diagnosis of thyroid cancer to - 95 %, and the specificity to-92%.

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