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Evaluation of thyroid ultrasound findings in patients with rheumatoid arthritis combined autoimmune thyroiditis

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Abstract: The frequency of autoimmune thyroid pathology in rheumatoid arthritis is significantly higher than the population level (4-13.5 vs. 1-6%), so the main attention of patients with RA should be directed to the dynamic control of the functional state of the thyroid. Hereditary predisposition plays an important role in the development of RA and autoimmune thyroid diseases - hyperthyroidism (Graves' disease) and chronic autoimmune thyroiditis (AIT). Patients suffering from rheumatological diseases tend to develop thyroid autoimmune pathology in a high frequency, which is explained by the presence of common immunological mechanisms in the development of the above diseases. This predetermines the need for thyroid function screening in patients with rheumatological diseases.

Keywords: rheumatoid arthritis, autoimmune thyroiditis, thyroid gland, hyperthyroidism, hypothyroidism

Introduction. Rheumatoid arthritis (RA) is a systemic autoimmune rheumatic disease characterized by inflammation of the joint synovial sac, progressive destruction of cartilage and bone tissue, and the development of a wide range of extra-articular symptoms [15,4]. The social importance of RA is associated with a high level of disability. Thus, almost 50% of patients with RA become disabled within 5 years of the disease, and 10% within the first two years of the disease [8,12]. The life expectancy of patients with RA is also reduced compared to the general population: on average, this reduction reaches seven years [3]. At the same time, according to the results of an epidemiological study conducted in a population sample of Russian adults, RA is the most common rheumatic disease, its prevalence is 0.61% (610 per 100,000 population). The global prevalence of RA has a similar pattern, which is 1% (1000 per 100,000 population) [25,14]. According to modern concepts, autoimmune thyroiditis (AIT) is a group of diseases characterized by different clinical manifestations, common pathogenesis and common morphological picture, characterized by lymphocytic infiltration of thyroid tissue. Autoimmune processes play an important role in the pathogenesis of AIT [1,5]. AIT affects 2% of the working-age adult population, is more common in women than in men, and is the leader in a cluster of autoimmune diseases (RA, type 1 diabetes, and vitiligo) that often coexist with other autoimmune diseases [14,16]. According to some reports, 13-50% of patients with AIT have another systemic autoimmune disease, primarily RA, but also systemic lupus erythematosus, Sjogren's syndrome, and systemic scleroderma. However, the pathophysiology of AIT and the role of various

antithyroid antibodies in terms of the likelihood and risk of developing systemic autoimmune disease, particularly RA, are not fully understood.

Patients suffering from rheumatological diseases tend to develop thyroid autoimmune pathology in a high frequency, which is explained by the presence of common immunological mechanisms in the development of the above diseases. This predetermines the need for screening evaluation of thyroid function in patients with rheumatological diseases. Autoimmune diseases are one of the most widespread and serious human diseases, including more than 80 nosological types. The frequency of autoimmune diseases among the population is 5-8%. Autoimmune diseases (AID) are one of the most common and clinically severe human diseases, with a prevalence of up to 10% of the population and include many different forms. The pathogenesis of these diseases is based on autoimmunity, which is characterized by a violation of immune tolerance against autoantigens, which leads to the development of an immune response against one's own tissues and organs [7,16] Patients with rheumatological diseases are prone to the development of thyroid autoimmune pathology at a high frequency, and these diseases are related to the above it is explained by the presence of common immunological mechanisms in its development. This predetermines the need for screening evaluation of thyroid function in patients with rheumatological diseases. Autoimmune diseases are one of the most widespread and serious human diseases, including more than 80 nosological types. The frequency of autoimmune diseases among the population is 5-8%. The basis of autoimmune diseases is autoimmunity, which is characterized by a violation of tolerance to one's own antigens and, supposedly, they are foreign to the body - leading to the development of an immune reaction against normal tissues. The immunological specificity of produced autoantibodies is based on organo-nonspecific (systemic) and organospecific division of autoimmune diseases [25,24] The main representatives of organospecific autoimmune diseases are endocrine diseases (Hashimoto's thyroiditis, Graves' disease, etc.). Organo-nonspecific autoimmune diseases include, first of all, systemic rheumatological diseases: systemic lupus erythematosus (SLE), RA, etc. [17,19]. Endocrine diseases play an important role in the occurrence and development of rheumatological diseases. The relationship between these two groups of diseases is unquestionable and significant, and it is evident between TG pathology on the one hand and RA, systemic lupus erythematosus on the other [20,1,5]. The problem of co-occurrence of RA with thyroid pathology is still receiving a lot of attention in domestic and foreign literature, which is explained by the frequent occurrence of these pathologies, immunogenetic predisposition, common mechanisms of immunopathogenesis, and hormonal disorders in these diseases. [12,13]. Patients with RA have a higher frequency of developing autoimmune thyroid diseases. According to O.V. Paramonova, the prevalence of thyroid gland pathology among patients with RA reaches 28% [25,18,4] and according to various other authors, Hashimoto's that the frequency of autoimmune thyroid pathology in RA is significantly higher than the

population level (4-13.5 compared to 1-6%), [14,16], therefore, the main attention of patients with RA should be the dynamic status of the functional state of the thyroid should be directed to control. Hereditary predisposition plays an important role in the development of RA and autoimmune thyroid diseases - hyperthyroidism (Graves' disease) and chronic autoimmune thyroiditis (AIT).

Purpose: To evaluate the results of thyroid ultrasound examinations in patients with rheumatoid arthritis combined with autoimmune thyroiditis

Materials and methods: The study examined 189 patients with rheumatoid arthritis (RA) during 2018 and 2020 at the rheumatology department of Bukhara regional multidisciplinary medical centre (BRMMC). Based on the results of the questionnaire used in the diagnosis of thyroid pathology, clinical, instrumental, and laboratory analyzes of thyroid gland pathology were conducted in all patients treated inpatient, and 82 RA patients (42 RA and 40 RA+AIT) patients and 20 healthy control groups were prospectively selected. The diagnosis of RA was made based on the diagnostic criteria based on the American Society of Rheumatology 2010 classification. In modern medicine, there are enough methods of visualization of various organs, but the leader among them is ultrasound examination, which has painless, non-invasive and popular advantages. Ultrasound examination of the thyroid gland was carried out using a 3.5 MHz linear sensor on the "Toshiba SSA-340" (Japan) device. The degree of enlargement of the thyroid gland was evaluated according to the WHO (1994) classification.

This method allows to calculate the volume of QB (V) in ml, tissue diffuse changes and increase in volume, the number of nodes in the gland, their size and structure.

E.P. Kasatkina, D.E. Shilin, M.I. According to the classification of Pykov (1999), the thyroid parenchymatous blood flow vascularization was evaluated in the mode of color doppler mapping (CDM).

The study of blood flow in the thyroid parenchyma, found focal zones, nodes and its vessels, was carried out in the spectral doppler mode by evaluating blood flow quantities:

V max — maximum (peak) systolic velocity of blood flow (cm/sec);

V min — minimum diastolic pressure (sm/sec);

V mean — average speed of blood flow (sm/sec);

RI — resistance index (RI = (V max — V min) / V max;

PI — pulsation index (V max — V min) / V mean.

We considered nodules 1 sm or larger to be clinically significant and require treatment. The informative property of the study up to 84% and the sensitivity and specificity of the method up to 90% were found to be convincing evidence for the benefit of the widespread use of UTT in the complex diagnosis of AIT.

Results of the study: 40 patients with rheumatoid arthritis diagnosed with thyroid pathology were examined, basic studies were carried out according to generally accepted methods, "autoimmune thyroiditis" was diagnosed in 30 (75%)

and euthyroid goiter in 10 (25%). According to echographic signs, patients were divided into four main groups.

Among them RA+AIT patients:

The first group - 19 patients with diffuse hypertrophic form of autoimmune thyroiditis;

The second group - 5 patients with diffuse nodular hypertrophic form of autoimmune thyroiditis;

The third group - 4 patients with focal form of autoimmune thyroiditis; The fourth group - 2 patients with atrophic form of autoimmune thyroiditis;

Patients with rheumatoid arthritis and euthyroid goiter:

The first group - 6 patients with diffuse hypertrophic form of the goiter;

The second group - 3 patients with diffuse nodular hypertrophic form of the goiter;

The third group - 1 patients with a focal form of the goiter;

During the study, the atrophic form of the thyroid gland was not observed in patients with euthyroid goiter of rheumatoid arthritis.

According to the world standards, the values of the normal size of TG up to 18 sm^ in women and 25 sm^ in men are accepted as normal [14; pp. 5-11]. In cases where the size of the thyroid gland on the if exceeded the information values obtained, the patient was diagnosed with goiter. AIT was diagnosed in cases where so-called "big" diagnostic signs were detected. These signs include primary hypothyroidism (manifest or persistent subclinical), ultrasound signs confirming autoimmune pathology. In the absence of one of the "major" diagnostic signs, the diagnosis of AIT becomes tentative. The diagnosis of AIT allows to determine the cause of TG hypofunction, but does not reflect the treatment tactics.

Diffuse hypertrophic form of the thyroid gland using USE was the main large group and was observed in 9 (52.5%) patients with subclinical hypothyroidism, 8 (61.5%) manifest hypothyroidism and 5 (50%) patients with euthyroid goiter and was seen as the main leading pathology. The second place was taken by diffuse-nodular hypertrophic form, 5 (29.4 %), 2 (15.3 %) and 3 (30 %) were observed, respectively. Atrophy of the thyroid gland was detected only in 2 (15.3%) patients with manifest hypothyroidism. Thus, the atrophic form of the thyroid gland is mainly observed in obvious hypothyroidism of the thyroid pathology and was almost not observed in the initial stages of the disease.

Diffuse exogenous changes of the thyroid gland are in the form of many irregularly located hypoechoic zones of various shapes, and fibrous structures are also noted. During the active period of the rheumatoid process, the patients experienced pain during palpation of the TG, its size increased, the consistency of the gland thickened, and sometimes there was pain when swallowing. These clinical data, together with changes in the amount of thyroid hormones, allowed us to confirm the development of chronic autoimmune thyroiditis (AIT) in patients, and in them, in TG ultrasound examinations, typical for AIT are TG tissue inhomogeneity, "false"

nodules, uneven TG contours and asymmetry of its lobes. . The following ultrasound signs were found in 18 patients: organ enlargement (including transition zone expansion); uneven diffuse structure - from fine (in 11 patients) to coarse (2 patients); decrease of various levels of exogeneity; additional hyperechoic zones (5 patients). Vascularization depending on the functional state of the thyroid gland in the color doppler imaging (CDI) mode diffuse enhancement of parenchymatous blood circulation was detected at 3-4 points according to E.P. Kasatkina. In the spectral analysis of the thyroid arteries, it was found that the blood circulation peak speed increased by more than 30%. When the function of the thyroid gland increased, a significant increase in blood circulation (4-5 points) was observed, when the function of the thyroid gland decreased, the blood circulation increased continuously (3-4 points), in normal function - it was 2-3 points. In long-term hypothyroidism, a type of blood circulation with a venous dominance of a mixed nature is noted.

In the second group (mixed) - 14 patients (35%) - focal changes of enlarged thyroid gland parenchyma were shown in the background of sonographic diffuse hypoechoic structure. These are areas with isolated hypo-, hyperechoic nodular compounds. In 25% of cases of autoimmune thyroiditis, false nodules are detected against the background of a diffuse hypoechoic process, and it is necessary to differentiate them from true nodules of the thyroid gland. Pseudonodules are characterized by the absence of an anechoic component, a hypoechoic zone around the nodule, disruption and fusion with the thyroid tissue. The intensity of circulation in the pseudonodule is reminiscent of the circulation in the thyroid gland itself and was recorded around the false nodule.

Significant changes in doppler parameters were noted in cases of increased titer of antibodies to thyroperoxidase and thyroglobulin. The blood circulation rate in the thyroid gland and intraparenchymatous arteries increased by 30% and the level of vascularization increased in the CDI regimen (types 3, 4), insignificant changes in the indices distinguish autoimmune thyroiditis from other forms of the disease.

The color doppler mapping image depends on the functional state of the TG. In euthyroid state, TG vascularization practically does not differ from normal or may be slightly reduced. It should be noted that the method of ultrasound examination cannot differentiate AIT from hypertiroidism (diffuse reduction of echogenicity is characteristic for both diseases). Treatment of autoimmune diseases of TG is one of the most common causes of primary hypothyroidism (hormonal analysis of the blood reveals a decrease in the level of T4 in combination with an increase in the amount of TTG in the blood serum). An atrophic form of autoimmune thyroiditis was observed in a long-lasting disease, hypoechoic exostructure in which fibrotic changes prevailed, accompanied by a decrease in blood circulation and the development of hypothyroidism.

An increase in regular ultrasound dimensions of TG was noted in patients with thyroid pathology. TG had an association with structural changes. Thus, these

patients had a heterogeneous structure and increased exogenity, although the blood circulation in the gland was normal.

Conclusion: Thus, if we evaluate the results of diagnosis of the thyroid gland using USE, the main large group is the diffuse hypertrophic form, 9 (52.5%) in subclinical hypothyroidism, 8 (61.5%) in manifest hypothyroidism, and 5 (50%) in euthyroid goiter, was observed in the patient and was seen as the main leading pathology. The second place was taken by diffuse-nodular hypertrophic form, 5 (29.4 %), 2 (15.3 %) and 3 (30 %) were observed, respectively. Atrophy of the thyroid gland was detected only in 2 (15.3%) patients with manifest hypothyroidism. Also, the atrophic form of the thyroid gland is mainly observed in obvious hypothyroidism of the thyroid pathology, and was almost not observed in the initial stages of the disease. The obtained data testify to the high frequency of hypothyroidism and AT transport to TPO in RA. Small thyroid size was observed in RA patients both with and without AIT. The decrease in the size of the thyroid gland can be explained by the fact that TPO is not related to AT transport, but due to chronic ischemia of the organ - along with an increase in the index of peripheral resistance in its arteries.

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