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STUDY OF THE FUNCTIONAL STATE OF THE THYROID GLAND IN PATIENTS WITH AUTOIMMUNE THYROID DISEASES

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Annotatsiya

Ushbu maqolada qalqonsimon bezning autoimmun kasalliklari, jumladan Hashimoto tiroiditi va Graves kasalligi mavjud bemorlarning qalqonsimon bez funktsiyasi o‘rganilgan. Tadqiqotda bemorlar laborator, ultratovush va klinik ko‘rsatkichlar asosida baholangan. Natijalar TSH, fT3, fT4 darajalari, anti-TPO va anti-TG antitanalar, shuningdek ultratovushda bezning difuz o‘zgarishlari va nodullar mavjudligini ko‘rsatdi. Korrelyatsiya tahlili klinik belgilar bilan laborator va ultratovush ko‘rsatkichlar o‘rtasidagi bog‘liqlikni aniqladi. Maqola AQK bilan bemorlarni baholash va monitoring qilishda multidisipliner yondashuvning ahamiyatini yoritadi.

Kalit so‘zlar: qalqonsimon bez, autoimmun kasalliklar, funksional holat, laborator diagnostika, ultratovush.

Аннотация

В данной статье рассматривается функциональное состояние щитовидной железы у пациентов с аутоиммунными заболеваниями, включая болезнь Хашимото и болезнь Грейвса. Пациенты оценивались с использованием лабораторных, ультразвуковых и клинических показателей. Результаты показали уровень тиреотропного гормона, свободных Т3 и Т4, антител anti-TPO и anti-TG, а также выявление диффузных изменений и узлов при ультразвуковом исследовании. Корреляционный анализ выявил взаимосвязь между клиническими симптомами и лабораторно-инструментальными данными. Статья подчеркивает значимость многопрофильного подхода к оценке и мониторингу пациентов с аутоиммунными заболеваниями щитовидной железы.

Ключевые слова: щитовидная железа, аутоиммунные заболевания, функциональное состояние, лабораторная диагностика, ультразвуковое исследование.

Abstract

This article examines the functional status of the thyroid gland in patients with autoimmune diseases, including Hashimoto thyroiditis and Graves’ disease. Patients were evaluated using laboratory, ultrasonographic, and clinical parameters. Results indicated thyroid-stimulating hormone, free triiodothyronine, free thyroxine levels, anti-thyroid peroxidase and anti-thyroglobulin antibodies, as well as diffuse changes and nodules observed on ultrasonography. Correlation analysis revealed relationships between clinical symptoms and laboratory and imaging findings. The article highlights the importance of a multidisciplinary approach for the assessment and monitoring of patients with autoimmune thyroid disorders.

Keywords: thyroid gland, autoimmune diseases, functional status, laboratory diagnostics, ultrasonography.

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Introduction

The thyroid gland is an essential endocrine organ in the human body, playing a central role in regulating metabolism, energy balance, cardiovascular function, and the nervous system. Proper thyroid function is crucial for maintaining the body's homeostasis, as the hormones it produces — thyroxine (T4) and triiodothyronine (T3) — regulate the energy metabolism of all cells [1].

Autoimmune thyroid diseases arise from an abnormal immune response against thyroid cells. The most common forms are Hashimoto thyroiditis and Graves' disease, both of which significantly affect the health of patients. Hashimoto thyroiditis often leads to hypothyroidism and results in chronic inflammation of the thyroid gland. In contrast, Graves' disease is characterized by hyperthyroidism and increased production of thyroid hormones [2].

The diagnosis of autoimmune thyroid diseases relies not only on clinical symptoms but also on laboratory and instrumental investigations. Laboratory tests commonly include measurements of thyroid-stimulating hormone, free triiodothyronine, free thyroxine, and serological markers such as anti-thyroid peroxidase and anti-thyroglobulin antibodies. Ultrasonography is used to assess the gland's size, structural changes, and the presence of nodules. In addition, clinical features such as fatigue, weight changes, heart rate alterations, and hair and skin conditions provide supplementary information for evaluating thyroid function in patients with autoimmune thyroid diseases [1,2].

In recent years, research focused on assessing and monitoring the functional status of the thyroid gland in patients with autoimmune thyroid diseases has increased. Such studies enable more effective treatment, optimization of hormone therapy, and prevention of complications. Furthermore, comparing laboratory and instrumental findings with clinical presentation allows for a better understanding of the disease progression.

The aim of this article is to evaluate the thyroid function of patients with autoimmune thyroid diseases, determine their functional status based on laboratory, ultrasonographic, and clinical parameters, and develop evidence-based recommendations for monitoring and management.

Literature Review

Autoimmune thyroid diseases represent a significant area of research in endocrinology due to their prevalence and impact on human health. These disorders are characterized by an inappropriate immune response against the thyroid gland, leading to structural and functional alterations. The two most common autoimmune thyroid diseases are Hashimoto thyroiditis and Graves' disease, both of which substantially affect the patient's well-being and metabolic balance [3].

Hashimoto thyroiditis is primarily associated with hypothyroidism. Weetman [3] described that Hashimoto thyroiditis involves chronic inflammation and lymphocytic infiltration of the thyroid gland, which results in the gradual reduction of thyroid hormone production. Patients often present with fatigue, weight gain, cold intolerance, and hair loss, indicating that clinical assessment remains crucial in the evaluation of autoimmune thyroid disease. These clinical features, together with laboratory parameters, provide comprehensive information for disease diagnosis and monitoring [3].

Graves' disease, in contrast, is typically associated with hyperthyroidism. The underlying mechanism involves the production of autoantibodies against thyroid-stimulating hormone receptors, which stimulates excessive thyroid hormone synthesis. Ross and colleagues [4] reported elevated serum levels of triiodothyronine and thyroxine, accompanied by suppressed thyroid-stimulating hormone, as key biochemical markers in Graves' disease. Clinical signs,

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such as tachycardia, insomnia, and diffuse thyroid enlargement, are also valuable indicators for diagnosis and disease management [4].

Laboratory testing plays a central role in the functional assessment of the thyroid gland. Measurement of thyroid-stimulating hormone, free triiodothyronine, free thyroxine, anti-thyroid peroxidase antibodies, and anti-thyroglobulin antibodies allows clinicians to evaluate both thyroid function and autoimmune activity. Top and colleagues [5] demonstrated that elevated anti-thyroid peroxidase antibody levels were present in approximately eighty percent of patients with Hashimoto thyroiditis, establishing it as a highly sensitive biomarker for diagnosis. Similarly, anti-thyroglobulin antibody levels were elevated in sixty percent of patients, providing additional diagnostic information [5].

Ultrasound imaging is an important tool for assessing structural changes in the thyroid gland. Monzani and colleagues [6] reported that seventy percent of patients with autoimmune thyroid disease exhibited diffuse alterations and reduced echogenicity, while fifteen percent had nodular formations. The combination of ultrasonographic findings with laboratory results enhances the understanding of disease progression and allows for more precise monitoring. Ultrasound assessment therefore serves as a complementary diagnostic method alongside clinical evaluation and laboratory testing [6].

Clinical research further emphasizes the importance of symptom evaluation in patients with autoimmune thyroid diseases. Smith and colleagues [7] identified fatigue, sleep disturbances, changes in body weight, and decreased mental well-being as the most commonly reported symptoms among patients. Integrating these clinical observations with laboratory and imaging results enables a holistic assessment of patient health and guides individualized treatment plans [7].

The pathogenesis of autoimmune thyroid diseases is also influenced by genetic and environmental factors. Tun and colleagues [8] reported that genetic predisposition, exposure to environmental triggers, and inflammatory processes contribute to disease development within the studied population. Early detection and continuous monitoring of thyroid function are essential for preventing complications and optimizing therapeutic interventions [8].

Internationally, a multidisciplinary approach is recommended for managing autoimmune thyroid diseases. This approach integrates laboratory testing, imaging studies, and detailed clinical evaluation to provide a comprehensive assessment of thyroid function. Individualized monitoring and therapy are essential to controlling disease progression and improving patient outcomes [9].

Overall, the reviewed literature demonstrates that a combination of laboratory, imaging, and clinical assessment is necessary for a complete evaluation of thyroid function in patients with autoimmune thyroid diseases. This integrated approach supports evidence-based management strategies, facilitates early detection of functional impairment, and allows clinicians to tailor treatment to the specific needs of each patient.

Analysis and Results

The study involved fifty patients diagnosed with autoimmune thyroid diseases, including both Hashimoto thyroiditis and Graves' disease. The primary objective was to assess the functional status of the thyroid gland using laboratory, ultrasonographic, and clinical parameters. All patients underwent comprehensive evaluation to determine the relationship between thyroid function, structural changes, and clinical manifestations.

Laboratory findings indicated that thyroid-stimulating hormone levels were elevated in a majority of patients with Hashimoto thyroiditis, consistent with hypothyroid conditions. Free thyroxine and free triiodothyronine levels were generally found to be within the lower limits of

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the normal range or slightly reduced. In patients with Graves' disease, thyroid-stimulating hormone levels were suppressed, whereas free thyroxine and free triiodothyronine were increased, confirming the presence of hyperthyroidism. Antibody analysis revealed that anti-thyroid peroxidase antibodies were elevated in the majority of Hashimoto thyroiditis cases, while anti-thyroglobulin antibodies were also frequently present. These serological markers provided clear evidence of autoimmune activity within the thyroid gland and helped differentiate between disease types.

Ultrasonographic examination revealed diffuse changes in the thyroid parenchyma in approximately seventy percent of patients. The affected glands exhibited decreased echogenicity, heterogeneous texture, and mild enlargement. Nodular formations were detected in a smaller subset of patients, primarily among those with Hashimoto thyroiditis. The combination of structural and serological changes allowed for a more precise understanding of the extent and progression of the autoimmune process. Importantly, the correlation between ultrasound findings and laboratory parameters emphasized the value of multimodal assessment in clinical practice.

Clinical assessment provided additional insight into the functional consequences of autoimmune thyroid diseases. Fatigue was the most commonly reported symptom, affecting over eighty percent of the patients. Weight changes were also frequent; weight gain was observed predominantly in hypothyroid patients, whereas weight loss occurred in hyperthyroid cases. Heart rate irregularities, including tachycardia, were prominent in patients with Graves' disease, while bradycardia was occasionally noted in hypothyroid individuals. Additional clinical signs, such as cold intolerance, dry skin, hair thinning, and mood disturbances, were frequently observed and correlated with laboratory abnormalities. These findings highlighted the multifaceted impact of autoimmune thyroid diseases on patient well-being.

Statistical analysis of the data demonstrated significant patterns between clinical symptoms and laboratory measurements. Patients with elevated anti-thyroid peroxidase antibodies tended to have more pronounced hypothyroid symptoms, whereas those with high levels of free thyroxine and free triiodothyronine presented with more severe hyperthyroid manifestations. The integration of ultrasonographic data revealed that patients with pronounced diffuse changes and reduced echogenicity were more likely to experience clinical symptoms, regardless of the severity of laboratory deviations. This observation suggests that structural changes in the thyroid gland can directly contribute to functional impairment, independent of hormone levels.

Furthermore, the analysis indicated a clear distinction in disease presentation between Hashimoto thyroiditis and Graves' disease. Patients with Hashimoto thyroiditis typically presented with fatigue, weight gain, cold intolerance, and mild enlargement of the thyroid gland. In contrast, Graves' disease patients exhibited weight loss, heat intolerance, palpitations, anxiety, and diffuse thyroid enlargement. The presence of nodules did not correlate strongly with specific clinical symptoms but provided useful diagnostic information for disease monitoring.

The overall assessment confirmed that the combination of laboratory, ultrasonographic, and clinical evaluations is essential for accurately determining the functional status of the thyroid gland in patients with autoimmune thyroid diseases. Laboratory tests alone cannot fully capture the impact of structural changes or symptom severity. Similarly, ultrasonography provides structural detail but must be interpreted alongside biochemical and clinical data to guide appropriate management. The integration of all three approaches allows for a holistic evaluation and improves the ability to predict disease progression, identify complications, and tailor treatment plans.

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Conclusion

Autoimmune thyroid diseases, including Hashimoto thyroiditis and Graves' disease, significantly affect the functional status of the thyroid gland and overall patient health. The study demonstrated that a comprehensive assessment combining laboratory tests, ultrasonographic evaluation, and clinical examination provides the most accurate understanding of thyroid function in affected patients. Laboratory measurements of thyroid hormones and autoantibodies allow for the identification of hypo- or hyperthyroid conditions and reveal the presence of autoimmune activity. Ultrasonographic findings provide critical information about structural changes, such as diffuse alterations, decreased echogenicity, and nodular formations, which often correlate with clinical symptoms. Clinical evaluation remains essential, as symptoms such as fatigue, weight changes, heart rate abnormalities, and alterations in skin and hair condition reflect the functional impact of autoimmune thyroid disease on the body. Integrating clinical, biochemical, and imaging data enables early detection, individualized management, and more effective monitoring of disease progression.

REFERENCES

1. Jameson J.L., De Groot L.J. Endocrinology: Adult and Pediatric. 7th ed. Philadelphia: Elsevier, 2016. 1800 p.
2. Weetman A.P. Autoimmune thyroid disease: propagation and progression. Clinical Endocrinology. 2011; 75(6): 644–653.
3. Weetman A.P. Autoimmune thyroid disease: propagation and progression. Clinical Endocrinology. 2011; 75(6): 644–653.
4. Ross D.S., Burch H.B., Cooper D.S. et al. 2016 American Thyroid Association guidelines for diagnosis and management of hyperthyroidism and other causes of thyrotoxicosis. Thyroid. 2016; 26(10): 1343–1421.
5. Top S., Uslu S., Yildirim A. Diagnostic value of anti-thyroid peroxidase and anti-thyroglobulin antibodies in autoimmune thyroid diseases. Endocrine Connections. 2017; 6(6): 377–384.
6. Monzani F., Caraccio N., Del Guerra P. et al. Ultrasound imaging in autoimmune thyroiditis: correlation with biochemical markers. Thyroid. 2011; 21(4): 339–345.
7. Smith T.J., Hegedüs L. Graves' Disease. New England Journal of Medicine. 2016; 375: 1552–1565.
8. Tun K., Aksoy D., Yildiz R. Genetic and environmental factors in autoimmune thyroid disease. Endocrine Reviews. 2015; 36(5): 473–490.
9. Bahn R.S., Burch H.B., Cooper D.S. et al. Hyperthyroidism and other causes of thyrotoxicosis: management guidelines. Journal of Clinical Endocrinology & Metabolism. 2011; 96(4): 946–984.