 UDC 616.833-06:616.441-008.64

FEATURES OF CEREBRAL HEMODYNAMIC AND NEUROLOGICAL DISORDERS IN PATIENTS WITH PRIMARY HYPOTHYROIDISM

I.I. Bilous

Higher State Educational Establishment of Ukraine "Bukovinian State Medical University", Chernivtsi

Key words: *autoimmune thyroiditis, subclinical hypothyroidism.*

Clinical and experimental pathology. Vol.17, №2 (64). P.09-12.

DOI:10.24061/1727-4338.XVII.2.64.2018.96

E-mail: Iryna.bilous 2017@gmail.com

Objective. *The purpose of the work is to identify the clinical features of the peripheral nervous system in patients with subclinical and clinically expressed hypothyroidism against the background of autoimmune thyroiditis and postoperative hypothyroidism.*

Materials and methods*. The study involved 56 patients with hypothyroidism as a result of AIT (autoimmune thyroiditis) and 20 patients with postoperative hypothyroidism. 18 patients had subclinical hypothyroidism. We used clinical-neurological and electrophysiological examination of patients.*

Results*. The affection of the peripheral nervous system manifested itself by sensitive polyneuropathy (86,8%) in combination with tunnel neuropathies (62,5%), and supplemented by myotonic phenomenon (21,1%) and myopathic syndrome (18,4%). In patients with autoimmune thyroiditis with thyroid hypofunction, polyneuropathy and tunnel neuropathies were prevalent. In patients with postoperative hypothyroidism, myopathic changes predominated.*

Conclusion. *Sensory polyneuropathy and multiple tunnel syndromes, especially in combination with mild myopathic syndrome suggests hypothyroidism in the thyroid gland and determines the need for further endocrinological examination for justification of differentiated tactics for the management of these patients.*

Ключові слова: *автоімунний тиреоїдит, субклінічний гіпотиреоз.*

Клінічна та експериментальна патологія Т.17, №2 (64). С.09-12.

ОСОБЛИВОСТІ УРАЖЕННЯ ПЕРИФЕРИЧНОЇ НЕРВОВОЇ СИСТЕМИ У ХВОРИХ НА ПЕРВИННИЙ ГІПОТИРЕОЗ

І.І. Білоус

Мета *- виявити клінічні особливості ураження периферичної нервової системи у пацієнтів з субклінічним та клінічно вираженим гіпотиреозом на фоні автоімунного тиреоїдиту та післяопераційного гіпотиреозу.*

Матеріали на методи*. Обстежено 56 хворих на гіпотиреоз на фоні автоімунного тиреоїдиту та 20 хворих з післяопераційним гіпотиреозом, у 18 хворих був субклінічний гіпотиреоз. Проведено комплексне клініко-неврологічне та електрофізіологічне обстеження хворих.*

Результати. *Ураження периферичної нервової проявлялось чутливою полінейропатією (86,8%) в поєднанні з тунельними невропатіями (62,5%), та доповнювалось міотонічним феноменом (21,1%) та міопатичним синдромом (18,4%). У хворих аутоімунним тиреоїдитом з гіпофункцією щитовидної залози переважали полінейропатія та тунельні невропатії. У хворих з післяопераційним гіпотиреозом переважали міопатичні зміни.*

Висновки. *Наявність сенсорної поліневропатії та множинних тунельних синдромів, особливо у поєднанні з легким міопатичним синдромом дозволяє запідозрити гіпофункцію щитовидної залози та визначає необхідність подальшого ендокринологічного обстеження для обгрунтування диференційованої тактики ведення цих пацієнтів.*

Ключевые слова: *аутоиммунный тиреоидит, субклинический гипотиреоз.*

Клиническая и экспериментальная патология Т.17, №2 (64). С.09-12.

ОСОБЕННОСТИ ПОРАЖЕНИЯ ПЕРИФЕРИЧЕСКОЙ НЕРВНОЙ СИСТЕМЫ У БОЛЬНЫХ ПЕРВИЧНЫЙ ГИПОТИРЕОЗ

И.И. Билоус

Цель исследования. *Выявить клинические особенности поражения периферической нервной системы у пациентов с субклиническим и клинически выраженным гипотиреозом на фоне аутоиммунного тиреоидита и послеоперационного гипотиреоза.*

Материалы на методы. *Обследовано 56 больных гипотиреозом на фоне аутоиммунного тиреоидита и 20 больных с послеоперационным гипотиреозом, у 18 больных был субклинический гипотиреоз. Проведено комплексное клинико-неврологическое и электрофизиологическое обследование больных.*

Результаты. *У больный с первичным гипотиреозом наблюдалось поражение периферической нервной системы в виде чувствительной полинейропатии (86,8%) в*

сочетании с туннельными невропатиями (62,5%), миотоническим феноменом (21,1%) и миопатическим синдромом (18,4%). У больных аутоиммунным тиреоидитом с гипофункцией щитовидной железы преобладали полинейропатия и туннельные невропатии. У больных с послеоперационным гипотиреозом преобладали миопатические изменения.

Выводы. *Наличие сенсорной полиневропатии и множественных туннельных синдромов, особенно в сочетании с легким миопатическим синдромом позволяет заподозрить наличие гипофункции щитовидной железы и определяет необходимость дальнейшего эндокринологического обследования для обоснования дифференцированной тактики ведения этих пациентов.*

Introduction

Among the pathological conditions of the nervous system that develop due to the imbalance and diseases of the endocrine glands, neurological disorders with hypothyroid conditions of different genesis occupy a special place. This is due both to the severity and to the incidence of these disorders. Half of a century ago, the damage to the nervous system associated with hypothyroidism was considered to be very rare, and in the scientific literature there were only descriptions of the Hercules syndrome, hypothyroid myopathy and other disorders [1]. Nowadays the situation has changed. Scores of patients come to see a neurologist every day, their neurological manifestations are due to latent or undiagnosed hypothyroidism, mostly to autoimmune thyroiditis, while the number of cases of congenital hypothyroidism has not decreased. Hypothyroid neurological manifestations, which used to be rare, became common pathologies, and eventually go to one of the first places, and improving their diagnosis and treatment has become one of the more urgent problems of neurology.

On the other hand, even with the same severity of hormonal disorders and the duration of hypothyroidism, the clinical picture will, as a rule, be individualized. It is noted that patients with more severe hormonal deficiency may have less severe pathology than patients with less thyroid function [2]. However, the question of the causes of the polymorphism of the clinical picture in hypothyroidism has not been studied. This provision is fully applicable to the affection of the nervous system with hypothyroidism.

The question of the polymorphism of the clinical picture, including the damage to the nervous system, according to the literature of both domestic and foreign authors, has practically not been studied [3,4]. And although in modern conditions in the diagnosis of hypothyroidism, laboratory studies are coming to the fore, and clinical data is of secondary importance [5,6], a clinician has to rely largely on the findings of the examination in their work.

The aim of the study

To identify the clinical features of the peripheral nervous system in patients with subclinical and clinically expressed hypothyroidism against the background of autoimmune thyroiditis and postoperative hypothyroidism.

Materials and methods

The study involved 56 patients with hypothyroidism as a result of AIT (autoimmune thyroiditis) and 20 patients with postoperative hypothyroidism. The control group consisted of 20 practically healthy persons. 58 (76,3%) of patients were on substitution therapy using synthetic derivatives of L-thyroxin, and 18 (23,7%) patients had subclinical hypothyroidism. We used clinical-neurological and electrophysiological examination of patients. To confirm the diagnosis of polyneuropathy and tunneling syndromes, we used stimulation electroneuromyography. To detect the myopathic component, we used the needle electroneuromyography on the apparatus Neuro-refraction-4 (Neurosoft, Russia).

Research results discussion

The most common syndrome of the peripheral nervous system affection in patients with primary hypothyroidism is polyneuropathy. It was found in 66 (86,8%) patients under examination. Polyneuropathy was mild in 32 (48,5%) cases, moderate in 34 (51,5%); no severe polyneuropathy was found, which is consistent with the literature data [57]. The clinical picture included complaints of non-intense and moderate intensity of pain and paresthesia in the distal parts of the extremities, hypesthesia by the type of "gloves and socks". Motor disorders are represented by a decrease in tendon and periosteal reflexes, and only in 7 (10,6%) individuals the hand strength decreased to 4 points. There were no expressed paresis and paralysis or muscular hypotrophy. Vegetative disorders were also slightly expressed and manifested themselves mainly by dry skin and feet, non-coarse acrohyperhidrosis and acrocyanosis. All of these symptoms were more pronounced in the upper limbs. It should be noted that there is no correlation between the severity of the disorder and the age of the patient.

In the group of patients with hypothyroidism secondary to AIT, polyneuropathy was practically obligate syndrome and occurred in 52 (92,8%) cases. In patients with postoperative hypothyroidism, polyneuropathy was observed less frequently - 15 (75%) cases. In addition, polyneuropathy against the background of AIT was more pronounced. The nature of polyneuropathy did not depend on the severity of the thyroid gland function. In patients with subclinical hypothyroidism, polyneuropathy was diagnosed in 16 (88,9%) cases, in those with clinical hypothyroidism - in 53 (91,4%) cases.

Therefore, the feature of the clinical picture of polyneuropathy in patients with primary hypothyroidism

was mainly its sensitiveness, mild and moderate manifestations, more pronounced in the arms. The onset of this syndrome was influenced by the actual cause of hypothyroidism of the thyroid gland: in patients with hypothyroidism secondary to AIT polyneuropathy occurred more frequently and was more pronounced. In patients with varying severity of hypothyroidism, the incidence and severity of polyneuropathy were almost the same.

Another type of affection of the peripheral nervous system with primary hypothyroidism is tunnel neuropathies. Tunnel neuropathies can be a mask of hypothyroidism [7]. They develop as a result of pinching the peripheral nerves in the osteoarticular channels and under the muscle tendons against the background of soft tissue edema [2,3,5]. Mucopolysaccharides accumulate in the synovial membranes of the muscles and tendons, as well as in the shells of the peripheral nerve itself, which leads to the formation of a tunnel syndrome [6,7].

The syndromes of the carpal canal, the Guyon's canal, the cubital and tarsal canals are most frequently diagnosed. The clinical picture of this pathology included complaints of patients about morning and night paresthesia, as well as positive tests on tunnel neuropathy. In some cases, a decreased sensitivity in the area of the affected nerve was identified. There were no motor disorders associated with tunnel neuropathy. One of the features of tunnel neuropathies in primary hypothyroidism was their multiple nature. Among the patients with primary hypothyroidism clinical signs of tunnel neuropathy were diagnosed in 49 (64,5%) patients.

Among patients with hypothyroidism secondary to AIT tunnel neuropathies were diagnosed in 35 (62,5%) of cases. In patients with postoperative one the signs of this pathology were less common and accounted for 11 (55%). Like in case of polyneuropathy, the severity of tunnel neuropathy was reliably higher in patients with AIT. Patients with primary hypothyroidism were more frequently diagnosed with carpal tunnel syndrome. Its clinical manifestations were noted in 40 (52,63%) of cases. The Guyon's canal syndrome is the second most common one. In all patients who were examined this syndrome occured in 36 (47,3%) of cases. The cubital canal syndrome occupied the third place among tunnel neuropathies in patients with primary hypothyroidism. This syndrome was observed in 33 (43,4%) of patients. The syndrome of the tarsal channel was the least common 17 (22,4%).

The syndromes of the carpal canal and the Guyon's canal were more common and were more pronounced in patients with hypothyroidism against the background of AIT. Tunnel neuropathies were found in 10 (55,6%) of patients with subclinical hypothyroidism and in 40 (68,9%) of patients with clinical hypothyroidism.

Therefore, tunnel neuropathies were a frequent syndrome of peripheral nervous system damage in primary hypothyroidism. They were multiple and mainly involved the nerves of the upper extremities in the pathological process. Sensitive disorders prevailed in the clinical picture. The severity and incidence of tunnel syndromes depended on the cause of primary hypothyroidism and prevailed in patients with hypothyroidism against the background of AIT and did not depend on its severity.

Neuromuscular disorders are caused by oppression of all types of metabolism. Reducing the utilization of oxygen by tissues, increasing the protein degradation products in skeletal muscles, and excessive deposition of glycosaminoglycans change the structure of tissues, increasing their hydrophilicity, making it difficult for lymphatic drainage [7,8]. The microscopic examination of cross-striated muscles in patients with hypothyroidism finds changes in normal striation in combination with degenerative foci and basophilic infiltrates [5,6,7]. Disurbing mitochondrial oxidation processes leads to greater acidification of the intercellular space in the process of muscular contraction compared to the muscle that works properly [3,5,7], in addition, the hypothyroid rhabdomyopathy is characterized by the transformation of type 2 fast twitch muscle fibers into type 1slow twitch muscle fibers [2,4,6].

According to the literature, clear clinical manifestations of myopathy syndrome are rare, but its obliterated and mild forms are observed in 4.4-80% cases. In our study, the manifestations of hypothyroid myopathy were mostly mild and obliterated, and occurred mainly in the muscles of the legs. Almost all patients did not complain of weakness in the proximal parts of the limbs on their own. Only being actively questioned, the patients noted that they felt weakness in the muscles of the thighs when walking upstairs or when walking up, which they did not experience before. The examination found a decrease in strength by 1-2 points in the proximal parts of the limbs (mostly in the legs), while there were not atrophies or muscle hypertrophies. Only one patient with clinical hypothyroidism secondary to AIT noted a pronounced decrease in strength in the proximal parts of the limbs, which changed the pace and made her movement hard.

Signs of hypothyroid myopathy were found in 14 (18,4%) of patients with primary hypothyroidism. In patients with hypothyroidism against the background of AIT, hypothyroid myopathy was observed in 8 (14,3%) of cases, and in patients with postoperative hypothyroidism - 6 (30%).

Signs of hypothyroid myopathy in patients with clinical hypothyroidism were observed in 11 (18,9%) of cases, and in patients with subclinical hypothyroidism in 1 (5,5%) the clinical picture of myopathy was more pronounced. Thus, the myopathic syndrome in patients with primary hypothyroidism was mild. Features of hypothyroid myopathy were associated both with the cause of primary hypothyroidism, and with its severity.

Like in the case of hypothyroid myopathy, there were no expressed myotonic phenomena in the examined patients. None of the patients had such symptoms as propblems with breathing while staring to move or a significant increase in mechanical excitability of the muscles - " cushion " with percussion, described in the literature [2,5]. There only was a visible extension of the time of the tendon reflexes (Achilles and / or carporadial ones). This phenomenon was observed in 16 (21,4%) of patients with primary hypothyroidism. The combination of delayed

reflexes with myopathy was noted in 3 (18,75%) of patients with myotonic phenomenon. In patients with hypothyroidism secondary to AIT, this syndrome was noted in 13 (23,2%) of the subjects. In patients with clinical hypothyroidism, delayed reflex abnormalities were noted in 11 (18,9%) of cases, and in patients with subclinical hypothyroidism - 4 (22,2%). The cause of the myotonic phenomenon is a disorder of muscle relaxation. This is due to impaired SERCA in the sarcoplasmic reticulum, which is provided by Ca2+ ATPase [5,6]. Decreasing activity of this enzyme in the muscles is due to the presence of a T3-sensitive element [3,5]. EMG examination does not detect any characteristic myotonic phenomena [7,8].

The severity of the peripheral nervous system affection also primarily depended on the immune status of the patients and did not depend on their age and the severity of hypothyroidism. Polyneuropathy and tunnel syndromes were prevalent in patients with AIT with elevated levels of anti-thyroid antibodies.

The findings are indicative of a great role of autoimmune mechanisms in affecting the nervous system in patients with primary hypothyroidism.

Therefore, the affection of the nervous system in the primary hypothyroidism was almost obligatory. The main clinical feature of neurological syndromes in primary hypothyroidism was their "mild" course, which most often did not lead to gross social maladaptation and disability of patients.

The conducted research showed the features of the nervous system affection in hypothyroidism under current conditions and allowed to outline a number of possible causes of this variable clinical picture in patients with seemingly identical pathology.

Conclusions

1.The affection of the peripheral nervous system manifested itself by sensitive polyneuropathy (86,8%) in combination with tunnel neuropathies (62,5%), and supplemented by myotonic phenomenon (21,1%) and myopathic syndrome (18,4%).

2.In patients with autoimmune thyroiditis with thyroid hypofunction, polyneuropathy and tunnel neuropathies were prevalent. In patients with postoperative hypothyroidism, myopathic changes predominated.

3.Sensory polyneuropathy and multiple tunnel syndromes, especially in combination with mild myopathic syndrome suggests hypothyroidism in the thyroid gland and determines the need for further endocrinological examination with mandatory determination of the level of antibodies to peroxidase tyrocytes and antibodies to thyroglobulin for justification of differentiated tactics for the management of these patients.

Список літератури

1.Lee KW, Kim SH, Kim KJ, Kim SH, Kim HY, Kim BJ, et al. A Rare Manifestation of Hypothyroid Myopathy: Hoffmann's Syndrome. Endocrinol Metab (Seoul). 2015;30(4):626-30. doi: 10.3803/EnM.2015.30.4.626

2.Chung J, Ahn KS, Kang CH, Hong SJ, Kim BH. Hoffmann's disease: MR imaging of hypothyroid myopathy. Skeletal Radiol. 2015;44(11):1701-4. doi: 10.1007/s00256-015-2226-1

3.Samy DM, Ismail CA, Nassra RA. Circulating irisin concentrations in rat models of thyroid dysfunction - effect of exercise. Metabolism. 2015;64(7):804-13. doi: 10.1016/j.metabol.2015.01.001

4.Jbara Y, Bricker D. Rhabdomyolysis in the setting of induced hypothyroidism and statin therapy: a case report. Eur Thyroid J. 2015;4(1):62-4. doi: 10.1159/000371548

5.Villar J, Finol HJ, Torres SH, Roschman-González A. Myopathy in patients with Hashimoto's disease. Invest Clin. 2015;56(1):33-46.

6.Mangaraj S, Sethy G. Hoffman's syndrome - A rare facet of hypothyroid myopathy. J Neurosci Rural Pract. 2014;5(4):447-8. doi: 10.4103/0976-3147.140025

7. Sharma V, Borah P, Basumatary LJ, Das M, Goswami M, Kayal AK. Myopathies of endocrine disorders: A prospective clinical and biochemical study. Ann Indian Acad Neurol. 2014;17(3):298-302. doi: 10.4103/0972-2327.138505

8.Nalini A, Govindaraju C, Kalra P, Kadukar P. Hoffmann's syndrome with unusually long duration: Report on clinical, laboratory and muscle imaging findings in two cases. Ann Indian Acad Neurol. 2014;17(2):217-21. doi: 10.4103/0972-2327.132643

References

1.Lee KW, Kim SH, Kim KJ, Kim SH, Kim HY, Kim BJ, et al. A Rare Manifestation of Hypothyroid Myopathy: Hoffmann's Syndrome. Endocrinol Metab (Seoul). 2015;30(4):626-30. doi: 10.3803/EnM.2015.30.4.626

2.Chung J, Ahn KS, Kang CH, Hong SJ, Kim BH. Hoffmann's disease: MR imaging of hypothyroid myopathy. Skeletal Radiol. 2015;44(11):1701-4. doi: 10.1007/s00256-015-2226-1

3.Samy DM, Ismail CA, Nassra RA. Circulating irisin concentrations in rat models of thyroid dysfunction - effect of exercise. Metabolism. 2015;64(7):804-13. doi: 10.1016/j.metabol.2015.01.001

4.Jbara Y, Bricker D. Rhabdomyolysis in the setting of induced hypothyroidism and statin therapy: a case report. Eur Thyroid J. 2015;4(1):62-4. doi: 10.1159/000371548

5.Villar J, Finol HJ, Torres SH, Roschman-González A. Myopathy in patients with Hashimoto's disease. Invest Clin. 2015;56(1):33-46.

6.Mangaraj S, Sethy G. Hoffman's syndrome - A rare facet of hypothyroid myopathy. J Neurosci Rural Pract. 2014;5(4):447-8. doi: 10.4103/0976-3147.140025

7. Sharma V, Borah P, Basumatary LJ, Das M, Goswami M, Kayal AK. Myopathies of endocrine disorders: A prospective clinical and biochemical study. Ann Indian Acad Neurol. 2014;17(3):298-302. doi: 10.4103/0972-2327.138505

8.Nalini A, Govindaraju C, Kalra P, Kadukar P. Hoffmann's syndrome with unusually long duration: Report on clinical, laboratory and muscle imaging findings in two cases. Ann Indian Acad Neurol. 2014;17(2):217-21. doi: 10.4103/0972-2327.132643

Відомості про авторів:
Білоус Ірина Іванівна, доцент кафедри нервових хвороб, психіатрії та медичної психології ім. С.М. Савенка Вищого державного навчального закладу України "Буковинський державний медичний університет", Чернівці
Ведомости про авторов:
Билоус Ирина Ивановна, доцент кафедры нервных болезней, психиатрии и медицинской психологии им. С.М. Савенко Высшего государственного учебного заведения Украины "Буковинский государственный медицинский университет"
Information about authors:
Bilous I.I. MD,PhD; Higher State Educational Establishment of Ukraine "Bukovinian State Medical University", Chernivtsi

Стаття надійшла до редакції 10.04.2018
Рецензент – доц. О.В. Оленович