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СЛУЧАЙ ПОЛНОЙ АВ-БЛОКАДЫ У ПАЦИЕНТА С КЛЕЩЕВЫМ БОРРЕЛИОЗОМ

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A Case of Complete AV Blockade in Patient with Lyme Borreliosis

Резюме

Болезнь Лайма (клещевой боррелиоз) — инфекционное трансмиссивное природно-очаговое заболевание, имеющее наклонность к хроническому и рецидивирующему течению с преимущественным поражением кожи, нервной системы, опорно-двигательного аппарата и сердца. Миокардиальное повреждение проявляется, как правило, поражением проводящей системы в виде атриовентрикулярной блокады различной степени, внутрижелудочковой блокады, дисфункции синоатриального узла. При несвоевременной диагностике и отсутствии этиотропного лечения клещевого боррелиоза может возникнуть хронизация поражения проводящей системы сердца и потребоваться имплантация электрокардиостимулятора.

Ключевые слова: *болезнь Лайма, атриовентрикулярная блокада, клинический случай*

Конфликт интересов

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов

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Abstract

Lyme disease (tick-borne borreliosis) is an infectious vector-borne natural focal disease that tends to a chronic and recurrent course with a predominant damage to the skin, nervous system, musculoskeletal system and heart. Cardiac features is manifested, as a rule, by a involvement of the conducting system as varying degrees of atrioventricular block, Bundle–branch block, dysfunction of the sinoatrial node. In case of untimely diagnosis and etiotropic treatment of tick-borne borreliosis, chronic lesions of the cardiac conduction system may occurs and implantation of a pacemaker may be required.

Key words: *Lyme disease, atrioventricular block, clinical case*

Conflict of interests

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24h ECG — 24-Hour Holter monitoring, AV block — atrioventricular block, CPK — creatine phosphokinase, ECG — electrocardiography, EDD — end diastolic diameter, ESR — erythrocyte sedimentation rate, HR — heart rate, LDH — lactate dehydrogenase, LV — left ventricle, SA block — sinoatrial block, SHI — state health institution, TSH — thyroid stimulating hormone

Introduction

Lyme disease (tick-borne borreliosis, chronic erythema migrans) is an infectious vector-borne natural focal disease caused by gram-negative spirochetes of the Borrelia genus. Tick-borne borreliosis is characterized by predominant damage to the skin, nervous, cardiovascular and musculoskeletal systems [1, 2]. Not only Russia but the whole world has recently seen an increase in the incidence of Lyme disease [1–3].

Human infection is mostly the result of a bite by an infected ixodid tick (Ixodes persulcatus and Ixodes ricinus are of major epidemiological importance in our country) in the area of the neck, chest, armpits, inguinal folds, i.e. in areas with thin skin and abundant blood supply. In most cases, attachment to the human body goes unnoticed since tick saliva contains anesthetic, vasodilator and anticoagulant substances. A person starts feeling rawness and itching at the site of the bite in at least 6–12 hours. Early removal of ticks prevents human infection if there is an infection in the tick's gastrointestinal tract [2]. The causative agent of Lyme disease can be transmitted through tick feces when they come into contact with human skin. Cases of mechanical transmission during accidental crushing of ticks when removing them from animals, as well as the alimentary route — when drinking raw milk (primarily goat milk) or dairy products without heating — cannot be excluded [2, 3].

The causative agent migrates from the place of insertion with the flow of lymph and blood to internal organs, joints, lymph nodes, with possible involvement of meninges in the inflammatory process, and causes a cascade of immunopathological reactions. The causative agent can persist in the body for a long time (more than 10 years), mostly in the lymphatic system. Immunity in case of Lyme disease is non-sterile with possible re-infection after 5–7 years [1, 2]. Processes associated with the accumulation of specific immune complexes in the synovial membrane of the joints, dermis, kidneys, myocardium are critical in the pathogenesis of tick-borne borreliosis.

Today, 0.3% to 4% of Lyme disease cases develop with cardiac involvement, and its incidence in children can be as high as 30% [3, 4]. Myocardial damage usually manifests as damage to the conducting system in the form of atrioventricular (AV) block of different grades (in 49% of cases — grade 3 AV block), intraventricular block, dysfunction of the sinoatrial node, extended QT interval and nonspecific changes in the T wave. Myocarditis and pericarditis in Lyme disease are much less common [3–6].

In actual clinical practice, delayed organ damage in case of Lyme disease requires vigilance and differential diagnosis. We present a description of a clinical case of a patient with a newly diagnosed complete AV block, which was a manifestation of myocardial damage with Lyme disease.

Description of Clinical Case

Patient Sh., male, 24, was admitted on August 05, 2019 to the Department of Cardiac Surgery and Heart Rhythm Disorders of the Ulyanovsk Regional Clinical Hospital (URCH) with complaints of weakness, dizziness and syncope attacks. According to the history, from August 01, 2019, the patient noted dyspnea and rare pulse up to 34 bpm, headache, syncope — twice, vomiting and discomfort in the epigastric region, episodes of severe dizziness. With these complaints, the patient visited the State Healthcare Institution "Cherdaklinskaya Central District Hospital", where an electrocardiographic (ECG) study revealed complete AV block, and the patient was transferred to the URCH. The epidemiological history indicates a tick bite in May 2018 in the patient's area of residence (Cherdaklinsky district), which was found by chance during self-examination. The patient did not seek medical assistance; the tick was not sent for testing for Borrelia infection; the patient did not notice the development of erythema and fever.

Upon admission of patient Sh., examination revealed pale annular erythema on the skin of the right side of the abdomen (5 cm in diameter) and on the right forearm (6 cm in diameter) (Fig. 1). Lymph nodes were not palpable. Vesicular breathing in lungs, no rales. Respiratory rate 18 per minute. Heart tones were muffled, heart rate (HR) — 40 per minute, blood pressure — 130 and 80 mm Hg on both arms. Abdomen was soft and painless during palpation. No peripheral edema.

Complete blood count on August 05, 2019: hemoglobin — 134 g/L, RBC — 4.7×10^{12}/L, WBC — 9.2×10^{9}/L (neutrophils — 60.6%, lymphocytes — 25.6%, monocytes — 12.2%, eosinophils — 1.2%, basophils — 0.4%), platelets — 185×10^{9}/L, ESR — 34 mm/h (due to the ongoing infectious process). Blood biochemical test on August 05, 2019: total protein — 65 g/L, albumin — 36 g/L, urea — 4.8 mmol/L, creatinine — 86.1 μmol/L, alanine aminotransferase — 95 IU/L (more than two upper limits of the norm (< 41 IU/L) is not diagnostically significant), total bilirubin — 13 μmol/L, glucose — 4.84 mmol/L, total cholesterol — 3.72 mmol/L, potassium — 4.4 mmol/L, sodium — 140 mmol/L, lactate dehydrogenase (LDH) — 227 U/L (130–235 U/L), creatine kinase (CPK) — 94.7 U/L (24–195 U/L), CPK-MB — 8.5 U/L (< 171 U/L), troponin — negative. Coagulogram revealed no abnormalities: prothrombin time — 10.7 seconds, activated partial thromboplastin time — 35.7 s, international normalized ratio — 0.95, fibrinogen — 1.5 g/L.

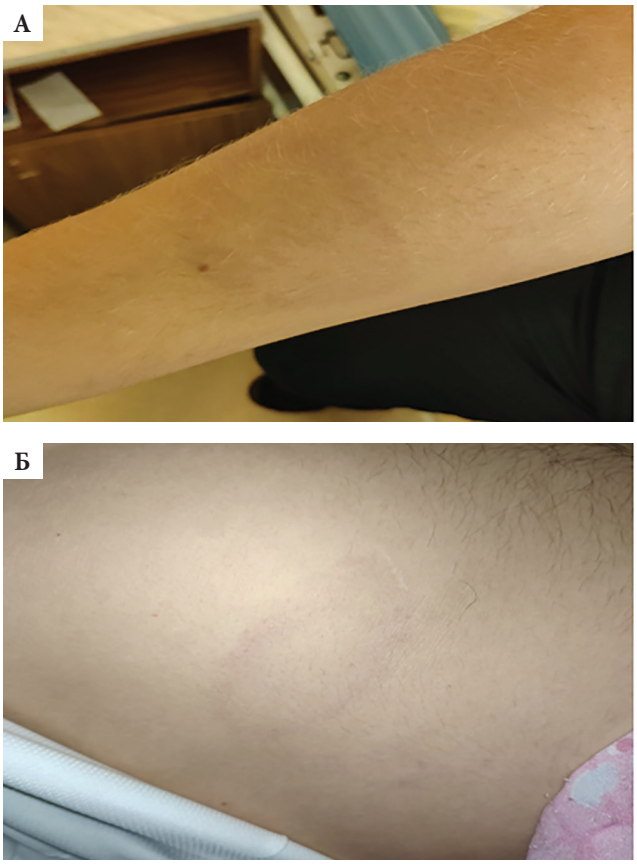

Figure 1. *Annular erythema (А — in the skin of the right forearm, Б — in the skin of the abdomen)*

Blood test for thyroid hormones on July 01, 2019 revealed no abnormalities: thyroid stimulating hormone (TSH) — 1.07 μIU/L (0.3–4.2 μIU/mL), free thyroxine (T4) — 14.93 pmol/L (10.8–22.0 pmol/L).

Test for C-reactive protein on August 05, 2019 showed an increase up to 24 mg/mL in connection with an infectious process. During treatment, C-reactive protein subsequently decreased to 5 mg/mL on August 13, 2019.

No antibodies to human immunodeficiency virus, total antibodies to hepatitis C virus (anti-HCV), hepatitis B virus surface antigen (HBs Ag) were found in the samples on August 06, 2019.

Blood serum test for antibodies to tick-borne borreliosis (Borrelia burgdorferi) on August 09, 2019 revealed positive titers of Ig G — 2.142 U/L and Ig M — 3.223 U/L (reference range of positive results — more than 1.11 U/L).

According to echocardiography results on August 05, 2019, no pathology was found: heart valves without changes, mean pulmonary arterial pressure — 15.7 mm Hg, diameter of ascending aorta — 28 mm, end diastolic diameter of the left ventricle (LV EDD) — 58 mm, LV posterior wall — 8 mm, interventricular septum — 8 mm, LV ejection fraction — 74%; pericardium without changes; local contractility is not impaired.

An ultrasound examination of abdominal organs and kidneys on August 05, 2019 revealed an enlarged liver due to the right lobe — 172 mm, left lobe — 62 mm; the structure was fine-grained, irregular echogenicity, a calcification up to 1 mm in segment 8; portal vein was not dilated. Gallbladder, pancreas, spleen, kidneys within normal.

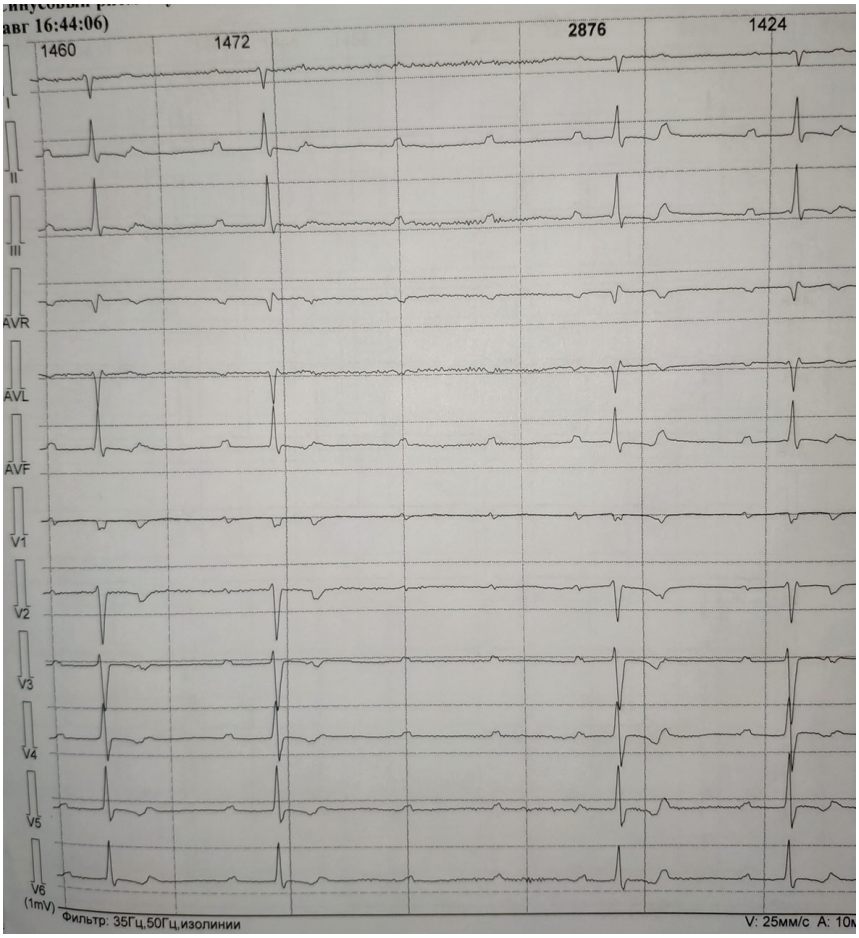

Figure 2. *Results of 24-hour ECG monitoring (08.05.2019). Sinus rhythm with complete AV block was observed with an average heart rate of 44 beats / min. (from 28 to 73 beats / min.) during the monitoring*

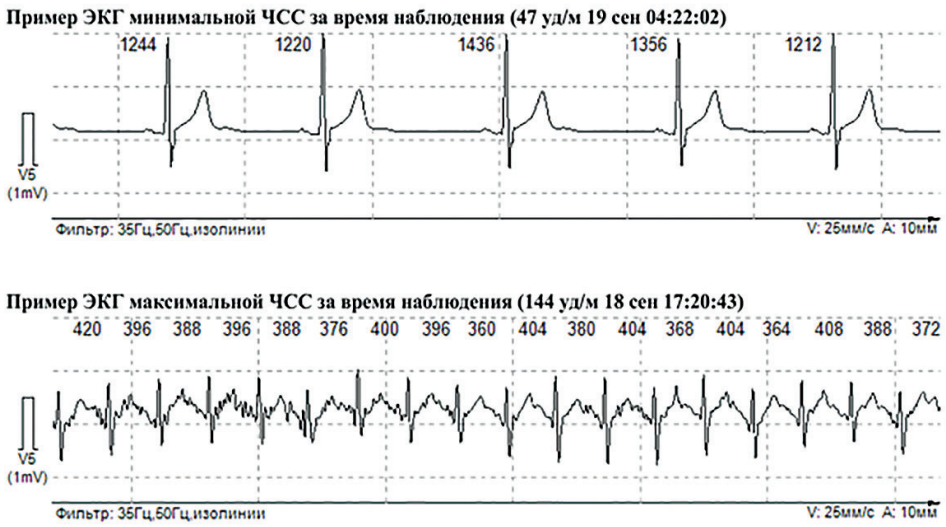

Figure 3. *Results of 24-hour ECG monitoring (19.09.2019). Sinus rhythm was observed with an average heart rate of 77 beats / min. during the day (52-144), at night 54 beats / min (47-75)*

Holter ECG monitoring (24h ECG) on August 05, 2019 showed that average HR during daytime was 44 bpm, at night — 45 bpm. Circadian index (CI) — 98%, decreased (< 120%), indicating "rigid rhythm". Minimum HR was 25 bpm while awake. During monitoring, sinus rhythm with complete AV block with average HR of 44 bpm was observed (28–73 bpm). A non-pathological number of ventricular extrasystoles was registered. There were 392 pauses with RR interval duration of up to 2.9 s. Average corrected QT interval per day was 416 ms (322–517 ms). No significantly prolonged corrected QT interval was registered (Fig. 2).

Follow-up 24h ECG on August 15, 2019 revealed sinus rhythm, average HR during daytime was 60 bpm (43–120), average HR at night was 45 bpm (39–66). 15 single ventricular extrasystoles, 26 single atrial extrasystoles, 4 paired atrial extrasystoles and 4 group atrial extrasystoles were registered. Maximum pause due to grade 2 sinoatrial (SA) block at night was 2,092 ms. During monitoring, grade 1 AV block was registered, maximum PQ interval was 232 ms during daytime and 212 ms at night.

The patient was examined by an infectious disease specialist (September 10, 2019); based on the complaints, history, examination data, laboratory tests and instrumental examinations, the clinical diagnosis of Lyme disease (tick-borne borreliosis) was established. Cardiac type, chronic recurrent course. Transient complete AV block with syncopal conditions. In accordance with the clinical guidelines [1], treatment with antibacterial agents (locally-manufactured doxycycline, 200 mg/day, 14 days) was prescribed.

During treatment, positive changes were registered: 24h ECG in a month revealed full restoration of AV conduction.

Follow-up outpatient 24h ECG on September 19, 2019 revealed sinus rhythm, average HR during daytime was 77 bpm (52–144), average HR at night was 54 bpm (47–75). There were 52 single ventricular extrasystoles, 1 paired monomorphic ventricular extrasystole, 5 single atrial extrasystoles, 4 pauses due to grade 2 SA blockade at night, maximum pause was 1,620 ms (Fig. 3).

In accordance with the clinical guidelines, the patient has been undergoing follow-up by an infectious disease specialist and general practitioner in the local clinic for three years.

Discussion

First manifestations of Lyme disease may develop several months or even years after infection when clinical signs and patterns typical for chronic infection are observed [1]. In the presented clinical case, organ damage appeared four months after the tick bite.

Diagnosis of Lyme disease can be considered justified in the presence of epidemiological data (being in an endemic region in the spring-summer period, the fact of a tick bite, duration of incubation period), migratory erythema around the tick bite, as well as features of the clinical presentation and development changes that are typical for this disease [1, 2]. Due to the significant clinical polymorphism and a significant percentage of non-erythema forms (46.4%) [7], the final diagnosis should be confirmed by immunological and/or molecular genetic tests [8]. Enzyme-linked immunosorbent assay is the method most widely used in clinical practice. It allows determining IgM and IgG antibodies to tick-borne borreliosis (in blood serum, cerebrospinal fluid, intraarticular fluid) [1, 2].

The patient in the described clinical case had an epidemiological history; on examination, annular erythema was observed; there were symptoms of myocardial damage in the form of conduction disorders. The diagnosis was also confirmed by a laboratory test — positive titers of antibodies to tick-borne borreliosis

Cardiac damage in case of Lyme disease in the form of AV block is usually reversible; the normal function of the conducting system is restored within a few days (up to a week) [9]. However, in case of late diagnosis and without etiotropic treatment, the process may become chronic, and damage to the cardiac conduction system may progress rapidly and require intensive treatment [4–6].

Etiotropic treatment for Lyme disease includes antibiotic therapy (tetracyclines, penicillins, cephalosporins) [1]. The earliest possible administration of agents is required to achieve maximum efficacy and prevent organ damage. In the chronic form of disease, repeated courses of antibiotic therapy are recommended [1, 10].

Differential diagnosis of the causes of AV block and antibiotic therapy in the presented clinical case prevented pacemaker implantation, which is often (up to 30%) required in the absence of timely etiotropic treatment for Lyme disease [4, 5, 11]. Attention should be given to the development of a scale that makes it possible to suspect "Lyme carditis" — The Suspicious Index in Lyme Carditis (SILC) score, which includes "constitutional symptoms" (fever, weakness, arthralgia, dyspnea), epidemiological history (being in an endemic region, tick bite), male gender, age under 50, presence of erythema migrans. According to the SILC, a serologic test for Lyme disease is performed at moderate to high risk, as well as empiric antibiotic therapy [4].

If there is organ damage, the follow-up of patients with confirmed tick-borne borreliosis should be carried out once every three months during the first year, once every four months during the second year and once every six months during the third year. According to clinical indications, consultations of specialist physicians or instrumental examination of patients should be performed [1]. In this case, considering Lyme disease of the cardiac type, the patient was recommended to undergo follow-up once every three months.

Conclusion

The presented clinical case demonstrates the need for the clinician's vigilance in diagnosing delayed organ damage in Lyme disease. The established diagnosis and treatment performed made it possible to avoid the implantation of a pacemaker in a young patient with Lyme disease of the cardiac type. However, considering the chronicity of this disease, follow-up is required.

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