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ECHOCARDIOGRAPHIC ASSESSMENT OF CARDIAC REMODELING IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Abstract: Rheumatoid arthritis is associated with an increased risk of cardiovascular involvement, even in the absence of clinically apparent heart disease. This study aimed to evaluate echocardiographic changes in patients with rheumatoid arthritis and to determine the influence of concomitant arterial hypertension on cardiac structure and function. A total of 129 women underwent comprehensive echocardiographic examination, including assessment of left ventricular systolic and diastolic function, myocardial mass, global longitudinal strain, and valvular abnormalities. Patients with rheumatoid arthritis combined with arterial hypertension demonstrated a higher prevalence of left ventricular hypertrophy, diastolic dysfunction, impaired global longitudinal strain, and valvular lesions compared with patients without hypertension ($p < 0.05$). Modern echocardiographic techniques enable early detection of subclinical myocardial abnormalities and may improve cardiovascular risk stratification in patients with rheumatoid arthritis.

Keywords: rheumatoid arthritis, echocardiography, arterial hypertension, left ventricular hypertrophy, diastolic dysfunction, global longitudinal strain, cardiovascular risk, myocardial remodeling, valvular heart disease, left ventricular function.

ЭХОКАРДИОГРАФИЧЕСКАЯ ОЦЕНКА РЕМОДЕЛИРОВАНИЯ СЕРДЦА У ПАЦИЕНТОВ С РЕВМАТОИДНЫМ АРТРИТ

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Аннотация: Ревматоидный артрит сопровождается высоким риском поражения сердечно-сосудистой системы даже при отсутствии выраженных клинических проявлений заболевания сердца. Целью исследования явилась оценка эхокардиографических изменений у пациентов с ревматоидным артритом и определение влияния сопутствующей артериальной гипертензии на структуру и функцию сердца. В исследование были включены 129 женщин, которым выполнено комплексное эхокардиографическое обследование с оценкой систолической и диастолической функции левого желудочка, массы миокарда, глобальной продольной деформации и клапанных изменений. У пациентов с ревматоидным артритом в сочетании с артериальной гипертензией значительно чаще выявлялись гипертрофия левого желудочка, диастолическая дисфункция, снижение глобальной продольной деформации и клапанная патология по сравнению с пациентами без артериальной гипертензии ($p < 0,05$). Современные эхокардиографические технологии позволяют своевременно выявлять субклинические изменения миокарда и способствуют более точной оценке сердечно-сосудистого риска у пациентов с ревматоидным артритом.

Ключевые слова: ревматоидный артрит, эхокардиография, артериальная гипертензия, гипертрофия левого желудочка, диастолическая дисфункция, глобальная продольная деформация, сердечно-сосудистый риск, ремоделирование миокарда, клапанная патология, функция левого желудочка.

Introduction: Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease characterized by persistent synovial inflammation, progressive joint destruction, and multiple extra-articular manifestations. Cardiovascular involvement is one of the most important systemic complications of RA and represents a major cause of morbidity and premature mortality. Chronic inflammation, immune-mediated endothelial dysfunction, oxidative stress, and accelerated atherosclerosis contribute to structural and functional myocardial abnormalities even in patients without clinically evident cardiovascular disease.

Arterial hypertension frequently coexists with RA and further increases the risk of left ventricular hypertrophy, impaired myocardial relaxation, and heart failure. Conventional clinical examination may not detect early cardiac involvement; therefore, noninvasive imaging techniques have become increasingly important for identifying subclinical myocardial dysfunction. Echocardiography allows comprehensive evaluation of cardiac chambers, ventricular geometry, systolic and diastolic function, myocardial strain, and valvular abnormalities. Recent studies have demonstrated that advanced echocardiographic techniques, including global longitudinal strain assessment, can identify myocardial impairment before reductions in left ventricular ejection fraction become apparent. Early recognition of cardiovascular involvement is essential for timely therapeutic intervention and prevention of adverse cardiac events. Therefore, systematic echocardiographic assessment should be considered an integral component of cardiovascular evaluation in patients with rheumatoid arthritis, particularly in the presence of concomitant arterial hypertension.

Aim of the study: To evaluate echocardiographic characteristics of cardiac remodeling and left ventricular function in patients with rheumatoid arthritis and to determine the influence of concomitant arterial hypertension on cardiovascular involvement.

Materials and methods. A prospective comparative study was conducted involving 129 female patients with confirmed rheumatoid arthritis according to the 2010 ACR/EULAR classification criteria. The mean age of the participants was 53.5 ± 1.2 years. Patients were divided into two groups: 79 patients with rheumatoid arthritis without arterial hypertension and 50 patients with rheumatoid arthritis combined with stage 1–2 arterial hypertension. A control group consisted of 26 apparently healthy women matched for age. All participants underwent comprehensive clinical examination, laboratory investigations, electrocardiography, and transthoracic echocardiography. Standard echocardiographic measurements included left ventricular dimensions, interventricular septal thickness, posterior wall thickness, left ventricular mass

index, left atrial diameter, left ventricular ejection fraction, and transmitral Doppler parameters. Diastolic function was evaluated using the E/A ratio, while myocardial deformation was assessed by two-dimensional speckle-tracking echocardiography with measurement of global longitudinal strain. Valvular morphology and the presence of regurgitation were also assessed. Statistical analysis was performed using STATISTICA 10.0 software. Continuous variables were expressed as mean ± standard deviation, and comparisons between groups were performed using the Mann–Whitney U test. Differences were considered statistically significant at $p < 0.05$.

Results. Echocardiographic examination demonstrated significantly more pronounced cardiac remodeling in patients with rheumatoid arthritis and concomitant arterial hypertension than in patients without hypertension. Left ventricular hypertrophy was identified considerably more frequently in the hypertension group and was accompanied by a significant increase in left ventricular mass index and interventricular septal thickness. Diastolic dysfunction, characterized by impaired relaxation and a reduced E/A ratio, was also significantly more prevalent among patients with arterial hypertension. Despite preserved left ventricular ejection fraction in most participants, assessment of global longitudinal strain revealed subclinical impairment of myocardial systolic function. Patients with rheumatoid arthritis and hypertension showed significantly lower strain values, indicating early myocardial dysfunction before the appearance of overt systolic failure. Valvular abnormalities, including mitral and aortic regurgitation, were observed more frequently in the hypertension group. Enlargement of the left atrium was also detected in patients with combined rheumatoid arthritis and hypertension, reflecting chronic elevation of left ventricular filling pressure. Conventional electrocardiographic findings remained relatively unchanged in several patients despite significant echocardiographic abnormalities. These results indicate that advanced echocardiographic evaluation detects early myocardial remodeling and functional impairment that may not be recognized using routine clinical assessment alone. Comprehensive

echocardiographic examination therefore provides valuable information for cardiovascular risk assessment and optimization of patient management in rheumatoid arthritis.

Conclusions: Patients with rheumatoid arthritis, particularly those with concomitant arterial hypertension, demonstrate significant structural and functional cardiac remodeling detectable by echocardiography. Increased left ventricular mass, impaired diastolic function, reduced global longitudinal strain, and valvular abnormalities indicate early myocardial involvement despite preserved ejection fraction. Comprehensive echocardiographic evaluation allows early identification of subclinical cardiovascular abnormalities, improves cardiovascular risk stratification, and supports timely therapeutic intervention. Routine cardiac assessment should therefore be incorporated into the long-term management of patients with rheumatoid arthritis.

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