



RENACARDIAL SYNDROME IN DIABETIC NEPHROPATHY

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Article history:	Abstract:
<p>Received: July 28th 2021 Accepted: August 26th 2021 Published: September 30th 2021</p>	<p>This article presents data on the prevalence of different variants of heart remodeling in patients with type 2 diabetes with DN. It was revealed that the severity of structural and functional changes in the heart depends on the stage of diabetic nephropathy. New data are presented that establish a clear relationship between indicators characterizing the structural and functional state of the heart and kidneys in patients with type 2 diabetes with DN. New facts have been obtained indicating that the combined renocardial disorders in patients with type 2 diabetes are based on impaired vascular endothelial function.</p>
<p>Keywords: Diabetes mellitus, diabetic nephropathy, microalbuminuria, glomerular filtration rate, heart remodeling, endothelial dysfunction, cardiorenal syndrome</p>	

RELEVANCE:

Diabetes mellitus (DM) is a widespread disease. The number of patients with diabetes in the world is 140 million people and, according to the World Health Organization, by 2025 this population will increase to 300 million [1]. Chronic kidney disease (CKD) affects 10-16% of the adult population in Asia, the United States, Australia and Europe and is a global health problem [3,5]. It increases the risk of overall mortality and cardiovascular disease, as well as the possibility of progression to end-stage renal failure [2]. According to the recommendations of the 2002 KDOQI protocols, CKD is defined as kidney damage assessed by the loss of albumin and a decrease in the level of glomerular filtration rate (GFR), which underlies its division into stage [6].

The earliest marker of kidney damage in diabetes mellitus is microalbuminuria (MAU), the presence of which is closely associated with further progression of diabetic nephropathy. With the development of proteinuria, DN progresses to chronic renal failure. 5-10% of DN cases ends in end-stage renal failure [4,10], which in the structure of mortality in patients with type 2 diabetes is 1.5-3% [9]. All stages of DN are associated with cardiovascular pathology [7,10]. The emergence of DN leads to a 5-8-fold increase in the mortality of these patients, compared with the general population [3]. Diseases of the cardiovascular system to this day continue to be the leading cause of death in patients with type 2 diabetes, who did not survive to end-stage renal failure [8].

In recent studies, the relationship between GFR and albuminuria and clinical outcome in subjects in the general population has been described, which makes it possible to present threshold values for GFR (<60 ml/min/1.73m²) and MAU, which are risk factors

that increase mortality [1, 5]. Epidemiological data from more than 65,000 patients support the view that MAU is a "biomarker" of poor outcomes even in patients with normal renal function [7]. both the risk of development and progression of renal dysfunction.

Myocardial remodeling in CKD develops due to the influence of a number of factors: pressure and volume overload, anemia, the effect of a number of pressor hormones [6,9,10]. A number of indicators that determine the degree of renal dysfunction (GFR, creatinine) may have a role in hemodynamic impairment and the progression of heart failure. Based on the foregoing, we studied the relationship between echocardiography indicators of left ventricular (LV) remodeling, MAU level, and the degree of renal dysfunction in patients with PKC types 2 and 4. The underlying mechanisms responsible for the fact of combined damage to the heart and kidneys in type 2 diabetes are not fully understood.

Objective: To study the features of renocardial syndrome in diabetic nephropathy in patients with type 2 diabetes mellitus.

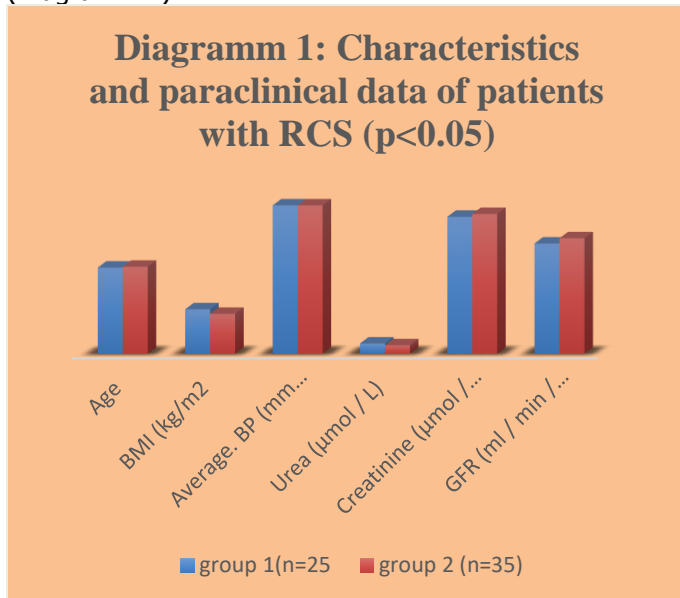
MATERIAL AND METHODS:

We examined 50 patients (27 men and 23 women) with type 2 diabetes with DN who were inpatient treatment. Patients (n=50) were divided into 2 groups based on the duration of diabetes and the level of MAU: group I (n=25) MAU was noted within 12.8 ± 4.65 mg/ml, in group II (n=35) it was 22.4±4.64 mg/ml. The studied patients underwent general clinical and biochemical analyzes, echocardiography in B-modes.

Glomerular filtration rate (GFR) was determined using the CKD-EPI formula (ml/min/1.73 m²).

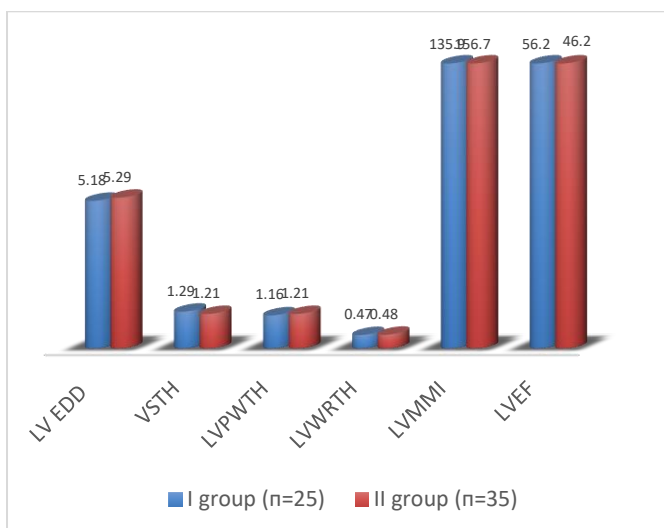
RESULTS AND DISCUSSION:

In group I patients, the level of creatinine and GFR was 75.8 ± 10.2 mmol/l and 78.2 ± 14.9 ml/min/1.73m², and in group II - 79.1 ± 10.8 mmol/l and 73.7 ± 16.8 ml/min/1.73m², respectively. Therefore, the higher the MAU level, the higher the creatinine level and the lower the GFR, i.e. the initial manifestations of renal dysfunction are noted (Diagramm 1).



In patients of group I, EDD, VSTH, LVWRTH, LVEF MI were observed within 5.18 ± 0.33 sm, 1.16 ± 0.08 sm, 0.47 ± 0.03 M, $9.5 \pm 2.9\%$, 135.9 ± 24.1 g/m², and in group II - 5.29 ± 0.48 sm, 1.21 ± 0.09 sm, 0.48 ± 0.04 , $46.2 \pm 4.2\%$, 156.7 ± 29.1 g/m², respectively (Diagramm 2).

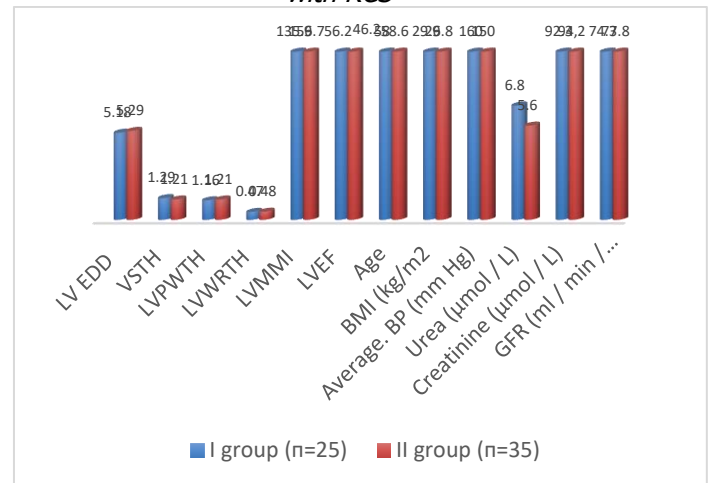
Diagramm 2: Structural and functional parameters of the myocardium in patients with RCS (* p <0.05)



Comparative characteristics of the main structural and functional parameters of the myocardium according to echocardiography in patients with chronic kidney disease reveal in the examined group II (MAU- 24.8 ± 5.03 mg/ml) a greater LVEDD (5.29 ± 0.48 sm) and a more pronounced decrease in LVEF ($52.2 \pm 4.2\%$). The degree of LVSTH is also significant (1.21 ± 0.09 cm) in patients of group II (1.16 ± 0.08 sm) than the same indicator in patients of group I (Diagramm 3). Correlation analysis revealed a direct proportional relationship between the level of MAU and LWRTH, LVEDD and LVMMI, respectively, $r=0.2$, $r=0.3$, $r=0.3$ ($p<0.05$) and the inverse relationship between LVEF and MAU ($r=(-0.44)$) moderate correlation ($p<0.05$).

A higher MAU level is accompanied by an increase in creatinine level and a decrease in GFR, is associated with an increase in LV myocardial mass, and is associated with preclinical impairment of LV systolic function.

Diagramm 3. Renal function and indicators of LV structural and functional rearrangement in patients with RCS



The interaction of increased blood pressure, increased mass of the LV myocardium, changes in its geometry and dysfunction, revealed by us, increases the role of MAU as an early and reliable marker of cardiac, preclinical, structural and functional changes in the myocardium.

Several studies indicate the levels of GFR and albuminuria used to define and stage CKD, taking into account the complications, the degree of risk and the assessment of the effectiveness of the management of these patients. Our results allow us to note the MAU level (22.4 ± 4.64 mg/ml), at which a high probability of impaired LV contractile function is determined, which will make it possible to predict and prevent the progression of CKD and, therefore, RCS earlier.



CONCLUSION:

Thus, the common ethical factors and pathogenetic mechanisms of damage to the heart and kidneys in type 2 diabetes, parallelism in the stages of damage to these target organs.

The revealed mechanisms of myocardial remodeling in chronic cattle may form the basis for early diagnosis of circulatory failure, as well as targeted and pathogenetically justified pharmacotherapy in this category of patients.

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