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Research Article

LABORATORY CHARACTERISTICS OF PATIENTS WITH DIABETES MELLITUS DEPENDING ON THE RISK OF CONTRAST INDUCED AKI

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ABSTRACT

Aim of the work: assessment of laboratory characteristics in patients with type 2 diabetes, depending on the risk of developing CI-AKI.

Materials and methods: The study included 56 patients with type 2 diabetes, the average age of the patients was 58 years, the CG consisted of 20 healthy volunteers. In most patients, the reason for which the endovascular radiopaque procedure (EVRCP) was performed was associated with atherosclerotic lesions: coronary artery disease, chronic lower limb ischemia (CLLI), atherosclerosis of the brachiocephalic arteries (BCA). EVRCP was performed on the vessels of the coronary basin, BCA, abdominal aorta and its branches, lower extremities. A retrospective analysis included a comparative analysis of two groups of patients with type 2 diabetes who underwent EVRCP: 29 patients who developed CI-AKI (CI-AKI+ group) and 27 patients in whom the post-procedure period was uneventful.

Results: The CI-AKI+ and CI-AKI- groups did not differ in nosological distribution: in both groups, half of the patients with EVRCP were performed due to the presence of coronary pathology (51.72% and 48.15%, respectively), the rest in patients it was comparable for CCI and CVD (27.59% and 20.69% in the CI-AKI+ group and 25.93% each in the CI-AKI- group).

Conclusion: Thus, based on the results of this study, it was possible to identify risk factors for the development of CI-AKI in patients with DM in the post-procedure period and to develop a scale that allows identifying DM patients

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predisposed to the development of CI-AKI as a hospital complication of endovascular interventional procedures, which is especially often observed in patients with DM.

KEYWORDS

Diabetes mellitus, contrast induced acute kidney injury, chronic kidney disease, EVRCP

INTRODUCTION

Acute kidney injury (AKI) is a widespread and potentially extremely dangerous condition that can be faced by a doctor in almost any specialty. More than 80 million doses of X-ray contrast agent (RCD) are used worldwide every year. With the introduction of high-tech methods of research and treatment into clinical practice, percutaneous coronary interventions (PCI) have become an integral stage in the treatment of patients with coronary heart disease, especially with acute coronary syndrome (ACS) [1]. Despite the obvious progress made in modern interventional cardiology and angiology, the problem of the safety of interventions remains relevant. Contrast agents used for vascular imaging are nephrotoxic, causing contrast induced acute kidney injury (CI-AKI) [2,3]. Since RCPs are almost completely excreted by glomerular filtration, their administration in large doses is accompanied by an increased burden on renal function, and with its initial decrease, the incidence of SC-AKI increases several times. Comparison of information on the frequency of occurrence of PP-AKI is a difficult task due to differences in the criteria for distinguishing this condition by different researchers. In patients without risk factors, the incidence may be less than 1%. In patients with risk factors such as diabetes mellitus, this figure rises to 9% and reaches 90% in patients with diabetic nephropathy[4]. According to the European Society of Urogenital Radiology Contrast Media Safety Committee, the following criteria for CI-AKI are proposed: an increase in serum creatinine concentration of 0.5 mg / dL (44.2 μmol / L) or more, or more than 25% of baseline, within 3- x days after intravascular injection of iodine-containing contrast, if other causes of acute kidney injury are excluded [5,6].Then the concentration of creatinine continues to increase for another 3-5 days and subsequently decreases to the initial level by 10-14 days. KDIGO (The Kidney Disease: Improving Global Outcome) criteria for CI-AKI: increase in creatinine concentration by 0.3 mg / dl or 1.5-1.9 times the baseline after the use of iodine-containing contrast for 48-72 hours [5]. Type 2 diabetes with its acute and chronic complications is a common disease that is taking on the character of a pandemic, is a pathology associated with secondary lesions of various organs and systems. Although recent studies do not consider type 2 DM to be a direct risk factor for CI-AKI, it is a predisposing factor for the development of CIN [7]. Diabetic nephropathy (DN) is a late chronic complication of DM and an independent risk factor for chronic kidney disease (CKD) and CI-AKI [6]. The incidence of CI-AKI is increased in patients with kidney injury, especially in patients with DN [9]. Data show that the incidence of CI-AKI is about 13% in patients without DM and 5.7-29.4% in diabetics [9,10].

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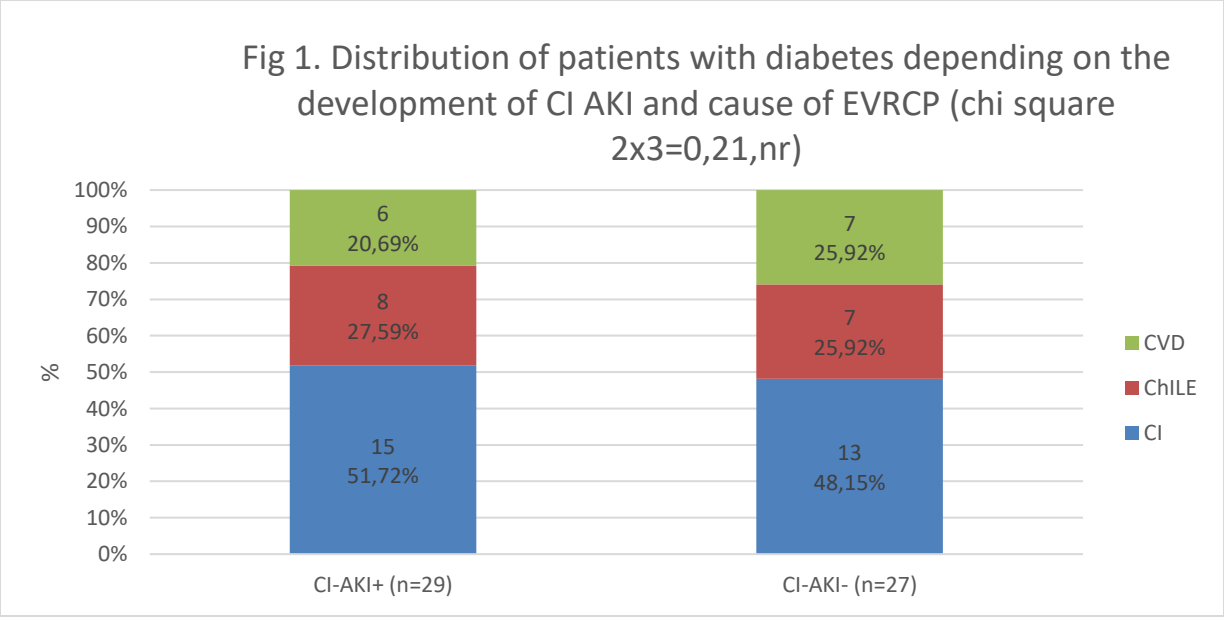
Purpose of the study: assessment of the laboratory characteristics in patients with type 2 diabetes, depending on the risk of developing CI-AKI.

MATERIALS AND METHODS OF RESEARCH

The collection of research material was carried out on the basis of the Department of Interventional Cardiology of the Republican Specialized Scientific and Practical Medical Center for Therapy and Medical Rehabilitation of the Republic of Uzbekistan. The study included 56 patients with type 2 diabetes, the average age of the patients was 58 years, the CG consisted of 20 healthy persons. In most patients, the reason for which the endovascular radiopaque procedure (EVRCP) was performed was associated with atherosclerotic lesions: coronary artery disease, chronic lower limb ischemia (CLLI), atherosclerosis of the brachiocephalic arteries (BCA). EVRCP was performed on the vessels of the coronary basin, BCA, abdominal aorta and its branches, lower extremities. A retrospective analysis included a comparative analysis of two groups of patients with type 2 diabetes who underwent (EVRCP): 29 patients who developed CI-AKI (CI-AKI+ group) and 27 patients in whom the post-procedure period was uneventful. CI-AKI was defined as an increase in venous creatinine concentration of more than 25% by the end of 48 hours after EVRCP. During this phase of the study, the patient's medical history was analyzed - their anamnestic data, glycemic status, general urinalysis, kidneys, estimated glomerular filtration rate (eGFR) initially, 2,4,6,8 and 10 days after the procedure.

RESULTS

The CI-AKI+ and CI-AKI- groups were compared in terms of clinical and anamnestic, hematological, urological data and the results of echocardiography and renal ultrasound with each other and with representatives of the CG. The CI-AKI+ and CI-AKI- groups did not differ in nosological distribution (Fig. 1): in both groups, half of the patients with EVRCP were performed due to the presence of coronary pathology (51.72% and 48.15%, respectively), the rest in patients it was comparable for CCI and CVD (27.59% and 20.69% in the CI-AKI+ group and 25.93% each in the CI-AKI- group).



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In the CI-AKI+ group, 16 people (55.17%) had had COVID-19 in the previous 6 months, which was comparable to the CI-AKI- group - 15 people (55.56%, chi square = 0.07, n.r). In the CI-AKI+ group, there were significantly more patients with lesions of several vascular territories (chi-squared 2x4=18.16, p<0.001, Fig. 2): thus, the average number of affected vascular territories was slightly higher in the CI-AKI+ group compared with the CI-AKI- group (2.72±0.16 versus 1.70±0.13, p<0.001). The duration of DM was comparable in both groups of patients: 14.93±1.05 years and 13.37±1.55 years, respectively (n.r.), although glycemia (according to the concentration of glucose and glycated hemoglobin) in the CI-AKI+ group was significantly higher, than in the CI-AKI-group (p<0.001). The fact that in both comparison groups the concentration of glucose and glycated hemoglobin significantly exceeded the CG index (p<0.001 for all 4 comparisons) was due to the condition of inclusion of patients in the study. The concentration of blood lipids was also increased in patients with DM compared with CG (p<0.001 significance of the difference in cholesterol concentration between both groups of DM and CG and triglyceride concentration between the CI-AKI+ group and CG, p<0.05 significance of the difference in triglyceride concentration between CI -AKI- and KG). At the same time, the concentration of blood cholesterol was comparable in both groups of DM, and the concentration of triglycerides in the CI-AKI+ group was significantly higher than in the group with an uncomplicated course of the post-procedural period (p<0.001 significance of the intergroup difference), which is associated with an increase in the concentration of triglycerides in conditions hypoproteinemia. In the urine of patients with DM, a significant increase in the number of leukocytes, erythrocytes and cylinders was found compared with CG (p<0.001, the significance of the difference between both groups of DM and CG for all three indicators). An increase in the number of cellular elements in the urine against the background of the absence of signs of infection is a characteristic sign of diabetic nephropathy. At the same time, the severity of disorders was significantly higher in the group of patients who subsequently developed CI-AKI (p<0.001, the significance of the intergroup difference in all three indicators), which indicates an initially more pronounced impairment of the functional state of the kidneys in this group of patients, which predisposes to development of AKI after administration of an iodine-containing contrast agent.

DISCUSSION

One of the advantages of our study is its retrospective nature. Probably, in order to obtain more accurate conclusions, it is necessary to obtain a larger array of data, as well as a more accurate classification of patients with concomitant metabolic disorders, the degree of glycemic control. In many studies, DM appears as a recognized risk factor for the development of CI-AKI [11]. One of the first studies, Cooperative Study, was conducted, demonstrating that DM is not an independent risk factor, but rather increases the risk in patients with pre-existing chronic kidney disease (CKD) on the background of DM. Until now, there is no consensus among scientists about DM as an independent risk factor for intact kidney function [12]. At the same time, as shown by G. Marenzi et al., acute hyperglycemia contributes to an increase in both the incidence of CI-AKI and in-hospital mortality [2]. Probably, it is necessary to more accurately assess renal function and the possible presence of CKD [20], which is often present in patients with diabetes.

CONCLUSION

Thus, the present study showed that in patients with DM, compared with healthy volunteers, there is a

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change in kidney function, which is more pronounced in individuals prone to the development of CI-AKI. Changes in the cellular and biochemical blood composition in patients with DM are characteristic of diabetic nephropathy and are also more pronounced in patients at risk of CI-AKI.

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