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Vasorenal hemodynamic changes in patients with chronic kidney disease in comorbidity with hypertonic disease

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Abstract. Clinical studies conducted in recent years have confirmed the predictive value of intrarenal hemodynamic disorders in the progression of arterial hypertension (AH) and chronic kidney disease (CKD). But still, there is still no clear understanding of the issues related to the features of renal hemodynamic disorders, taking into account the severity and staging of the course of CKD, including those associated with hypertension due to their insufficient knowledge. The purpose of this study was to identify the features of vasorenal hemodynamics in patients with arterial hypertension with various forms of chronic kidney disease. Materials of the study were examined 62 patients aged 38 to 64 years, who were in inpatient and outpatient treatment, of which 51 patients had a diagnosis of hypertension and CKD stages 1 - 3a. Conclusions. In 51 patients with CGP and chronic pyelonephritis associated with hypertension at the first, second and 3a stages of CKD, the velocity indices of renal blood flow (Vmax, Vmin), as well as the indices of peripheral resistance (RI, PI) at the main, segmental and interlobar levels did not differ among themselves and reflected only the severity of intrarenal blood flow disorders.

Keywords: arterial hypertension, chronic kidney disease, renal hemodynamics.

INTRODUCTION Chronic kidney disease (CKD) is an increasingly common disease worldwide and is closely related to cardiovascular disease (CVD). CKD, including end-stage renal disease (CRF), is a public health problem worldwide and is associated with high morbidity and mortality. In addition, cardiovascular disease is the leading cause of death in these patients. Both traditional and non-traditional risk factors associated with CKD can lead to remodeling of the myocardium and blood vessels, leading to cardiomyopathy, atherosclerosis, and arterial stiffness. Subsequently, this can lead to coronary artery disease, heart failure, death from cardiovascular disease, rapid renal progression and progression to end-stage kidney disease. The identification of these risk factors, allowing prophylactic and interventional strategies, is important for the management of patients with CKD [5,8]. Hypertension is both a cause and a consequence of CKD and affects the vast majority of patients with CKD. Controlling hypertension is important for patients with CKD as it slows the progression of the disease as well as decreases the risk of cardiovascular disease. [3,6,7].

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At the same time, the search for the improvement of diagnostic methods for examining patients, contributing to the detection of diseases at an early stage, remains relevant.

Since cardiac dysfunction is associated with a poor prognosis in patients with renal failure and vice versa, a growing body of research is focusing on the pathophysiological relationship between a weak heart and kidney. Cardiorenal syndrome is defined as a disease of the heart and kidneys in which dysfunction of one organ can cause dysfunction of another [3].

Rocho et al. proposed a new classification of cardiorenal syndrome with five subtypes, reflecting the primary and secondary pathophysiology, the duration of the disease and the simultaneous dysfunction of the heart and kidney, secondary to systemic disease [1,4,10]. Such early detection of renal blood flow disorders is an important task for preventing the progression of a chronic process or minimizing its severity by means of drug correction [2,9].

Purpose of the study. To reveal the factors of cardiorenal change in patients with arterial hypertension and chronic kidney disease.

MATERIALS AND RESEARCH METHODS. The work was carried out at the Department of Faculty and Hospital Therapy of the Bukhara Medical Institute, on the basis of the BOMMC.The study included 62 patients aged 38 to 64 years who were on inpatient and outpatient treatment, of which 51 patients had a diagnosis of hypertension and CKD stages 1 - 3a.

The study included patients with CKD C1-3a on the background of chronic glomerulonephritis and chronic pyelonephritis associated with grade 1 arterial hypertension.

The study of renal blood flow was carried out in 62 subjects, of which: There were 32 patients with chronic glomerulonephritis and arterial hypertension of the 1st degree (20 men and 12 women), the average age in the group was 47 ± 1.8 years; the duration of the disease is 10.6 ± 1 year; of these stage 1 CKD - 13 patients, mean systolic blood pressure (SBP) 133.89 ± 1.44 mm Hg, diastolic blood pressure (DBP) 83.67 ± 1.66 mm Hg; CKD stage 2 - 14 patients, SBP level 134.17 ± 1.40 mm Hg, DBP level 84.9 ± 1.21 mm Hg; Stage 3a - 5 patients, SBP level 137.14 ± 1.7 mm Hg, DBP level 85.1 ± 1.2 mm Hg.

There are 19 patients with chronic pyelonephritis and arterial hypertension of the 1st degree (10 men and 9 women), the average age in the group is 38.2 ± 1.8 years; the duration of the disease is 11 ± 0.8 years. CKD stage 1 had 8 patients, the SBP level was 130.8 ± 1.8 mm Hg, the DBP level was 82.7 ± 1.7 mm Hg; CKD stage 2 CKD - 9 patients, SBP level 131.8 ± 1.6 mm Hg, DBP level 84.2 ± 0.9 mm Hg; CKD stage 3a-2 patients, the SBP level in the group was 134 ± 4.8 mm Hg, the DBP level was 87 ± 3.0 mm Hg.

The control group consisted of 11 practically healthy people, the average age in the group was 39.3 ± 1.0 years.

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All patients selected for the study were tested for parameters such as CBC, hemoglobin, erythrocytes, leukocytes, ECG levels based on laboratory diagnostic tests and tests such as urine sediment microscopy based on urinalysis, as well as the Nechiporenko test for determination of daily protein loss, immunoturbidimetric analysis of C - reactive protein, determination of serum creatinine, indicators of renal filtration function, analysis of lipid spectra in blood plasma, determination of total cholesterol, triglycerides (TG), HDL, LDL.

Kidney ultrasound (ultrasound) was performed in all patients; Renal blood flow was assessed using color Doppler imaging, which included a color flow cartogram and spectral analysis (for a complete view of the major arterial structures). Measurements were performed on the large renal artery, segmental, interlobar (interlobar) arteries.

RESULTS OF THE STUDY: Comparative analysis of the state of renal blood flow against the background of chronic glomerulonephritis and chronic pyelonephritis in patients with stage 1-3a CKD associated with arterial hypertension, leading to basal renal arteries, starting from stage 2 CKD, according to the parameters of gradual velocity (Vmax and Vmin) ... a decrease was found. These changes were insignificant, as well as an increase in peripheral resistance indices (RI and PI) and a significant change in PI at 2 and 3 stages of CKD.

There were no differences in blood flow parameters in patients with chronic kidney disease associated with pyelonephritis associated with arterial hypertension and glomerulonephritis. In patients with chronic hepatitis and pyelonephritis associated with arterial hypertension, the segmental level of the renal vessels had more pronounced changes than the baseline level.

In patients with CKD1 against the background of hypertensive-associated glomerulonephritis and chronic pyelonephritis, the maximum blood flow rate in the kidney was reduced (44 ± 0.99 cm / sec), the resistance index (0.6 ± 0.01) increased. The pulsation index values significantly differ from those in the control group in both groups of patients. At the second and third stages of CKD, the blood flow velocity indicators continued to decrease and significantly differed from the control (Vmax 43 ± 1.3 cm / s, -> 41 ± 1.2 cm / s, Vmin 16.9 ± 1 cm / sec -> 14 ± 1.3 cm / sec for patients with AH and CGN; Vmax 42.9 ± 1.2 cm / sec -> 42 ± 0.9 cm / sec, Vmin 17 ± 1 cm / sec. Sec -> 15 ± 1.3 cm / sec for patients with hypertension and pyelonephritis). R1 CKD in both groups was significantly higher compared with stage 1 and administration.

At the interlobar (interlobar) level of blood flow, the changes were the most significant, which is confirmed by the opinions of various authors (N.D. Tatarkina, N.V. Koval, 2008, G.I.Sivous et al. 2003, I.O. Beloglazova et al., 2015). So, in patients with CGN and pyelonephritis associated with hypertension, with CKD stage 1. the mean values of the maximum renal blood flow reached 33.9 ± 0.9 cm / sec and 34 ± 0.7 cm / sec, respectively, as well as RI 0.67 ± 0.008; 0.67 ± 0.006, respectively, significantly differed from the values in the control group, although they did not go

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beyond the normal range. Minimal renal blood flow was reduced in both groups (13 ± 0.6 cm / sec; 12.6 ± 0.6 cm / sec), and the P1 index had significantly high values (1.31 and 1.27).

At stage 2 of CKD, the values of maximum renal blood flow and minimum renal blood flow in patients with CGN and pyelonephritis associated with hypertension also had reduced values and significantly differed from the control group (Maximum renal blood flow 25.6 ± 1 cm / sec; 25.39 ± 1.2 cm / sec, the minimum renal blood flow is 10.1 ± 0.6 cm / sec and 8.65 ± 0.4 cm / sec, respectively), indicating an increase in the disturbance of intra renal blood flow with a decrease in renal function. The PI and RI indices remained significantly high, reflecting increased peripheral resistance.

At stage 3 of CKD, the interlobar level of renal vessels was characterized by even lower values of blood flow velocities in systole and diastole, which significantly differed from the previous stages of CKD in both groups of patients, and the peripheral resistance indices exceeded the normative values.

Existing guidelines do not offer consensus on optimal blood pressure (BP) targets. Therefore, understanding the evidence used to create these guidelines is vital when considering how best to manage individual patients. Non-pharmacological interventions are useful for lowering blood pressure in CKD, but are rarely sufficient to adequately control blood pressure. Patients with CKD and hypertension often require a combination of antihypertensive drugs to achieve target blood pressure. Some pharmacological therapies provide additional renoprotective and / or cardioprotective effects independent of blood pressure, and this must be taken into account when prescribing therapy.

CONCLUSIONS: In 51 patients with chronic glomerulonephritis and chronic pyelonephritis associated with arterial hypertension in the first, second and 3a stages of CCD, the main indicators were renal blood flow velocity (Vmax, Vmin), as well as indicators of peripheral resistance (RI, PI) in segmental and no changes were found in the interlobar segments, only the severity of disorders within the renal blood flow was revealed.

With the development of CVD, the value of blood flow velocity indicators (Vmax, Vmin) decreases, and the number of peripheral resistance indices (RI and PI) increases.

In the interlobar part of the renal blood flow, the most pronounced changes were observed: an increase in the PI pulsation index above normal and a decrease in Vmin below normal in stage 1 CKD, a decrease in V max below normal and an increase in RI in stage 2 CKD was defined as above.

Importantly, a personalized and evidence-based treatment plan remains the key to achieving BP targets, reducing CVD risk and slowing the progression of CKD.

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