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KIDNEY DISEASE AND CHANGES IN CENTRAL HEMODYNAMICS

Vafoeva Nigora Abrorovna
Khaydarova Zarrina Erkinovna
Yarmukhamedova Saodat Khabibovna
Samarkand State Medical Institute
Department of Internal Medicine

Abstract

There has been an increase in the number of patients with chronic kidney disease worldwide. This condition is caused by an increase in the primary incidence of chronic kidney disease (CKD), the incidence of diabetes mellitus (DM) and an increase in the number of patients with kidney damage of vascular nature. Addressing cardiorenal relationships is one of the most important issues in

Cardiology and nephrology Achievements in one of these sections are noticed to be useful for the other (Mukhin N A, 2003).

Large-scale population studies conducted in various countries in recent decades have revealed a high prevalence of chronic progressive kidney disease in the general population, an inevitable consequence of which is a continuous increase in the number of patients with chronic kidney failure (CKD), stated by various international registers (RDO Registry, EDTA)

Chronic glomerulonephritis dominates in the structure of the causes of terminal CKD requiring renal replacement therapy (HRT - hemodialysis, peritoneal dialysis, kidney transplantation) (Bikbov B T, Tomilina N A, 2012), while in the USA and Latin America - diabetic and hypertensive nephropathy.

However, survival and quality of life of patients on MST ultimately, it is not only the costly dialysis and transplantation technologies, but also on the condition of the cardiovascular system (CVS) (BROWN at1, 2014). Epidemiological studies indicate a high incidence of cardiovascular lesions in patients with CKD (Volgina G V, 2010). Thus, the prevalence of arterial hypertension (AH), as the most important risk factor for coronary heart disease (CHD) and left ventricular hypertrophy (LVH), in chronic kidney disease (CKD) is 87-90%, while in general population, the representation of AH is less than 40% At least 35% of patients with renal disease at the time of their visit to a nephrologist have History of CHD (myocardial infarction or The prevalence of HLH increases with decreasing renal function, reaching 75% by the time of renal function, reaching 75% by the time of dialysis (Levin A, 2013).

In the majority of the studies carried out, cardiovascular disease in nephrological patients was investigated at the pre-dialysis and dialysis stages of renal failure

(Volgina G V, 2000). However mechanisms of development of cardiovascular pathology in preserved renal function or in case of moderate renal dysfunction remain unclear. The problem at which value of glomerular filtration rate (GFR) sharply increases the incidence of cardiovascular pathology is also extensively debated (Volgina G.V., 2010, Kutyrina I.M., 2015).

Purpose of the study

To study clinical aspects in patients with chronic kidney disease without marked impairment of kidney function in order to optimize timely diagnosis and targeted prevention of cardiovascular pathology in them.

Materials and methods

Sixty eight patients (33 male and 35 female) aged 18-55 years (mean age 40.1±0.96 years) of II therapeutic department of Samarkand Medical Institute clinic were examined. Patients with chronic kidney disease in stages 1-3 (according to NKF K/DOQI classification, 2002) were included in the study Criteria of inclusion in the study were the presence of chronic nephropathy of nondiabetic etiology, confirmed by clinical, laboratory and instrumental examination with preserved renal function or with decreased glomerular filtration rate, but not lower than 30 ml/min/1.73m2. The exclusion criteria for the study were age under 18 and over 55 years, GFR <29 ml/min/1.73m2, presence of diabetes mellitus type I or II, presence of cardiovascular pathology that fused before renal pathology, presence of cerebral or endocrine pathology accompanied by secondary arterial hypertension, renovascular hypertension, presence of severe somatic and mental diseases, pregnancy occurring with renal pathology,

Our 18 (31%) patients who participated in the study had chronic glomerulonephritis (CGN), 30 (51.7%) patients had chronic pyelonephritis (CPN), 10 (17.2%) had chronic tubulo-interstitial nephropathy (CTIN). All patients were divided into 3 groups according to the level of prescribed GFRIO Group 1 consisted of 30 patients with a GFR>90 ml/min/1.73m2 . (17m/23zh, mean age - 38.6±1.8 years, mean FFR - 95.7±1.6 mL/min/1.73m2, CKD stage 1), in the second group - 17 patients with FEF of 60-89 A.F.P. 60-89 ml/min/1.73 m2 (19 women/27 men, mean age - 39.9±1.7 years, mean GFR - 72.9±1.1 ml/min/1.73 m2), and another 11 patients with a blood transfusion of 72.9±1.1 ml/min/1.73 m2, CHD 2), and in the 3-rd group - 8 patients with FEF between 24-59 ml/min/1.73 m2 (17 women/25zh, mean age 41.3±1.4 years, mean GFR - 45.4±1.4 ml/min/1.73 m2). - (17/25zh, mean age 41.3±1.4 years, mean FFR - 45.4±1.4 ml/min/1.73 m2, CKD stage 3). Conventional general clinical urine

and blood tests, biochemical blood analysis, determination of daily uric acid excretion (UEF) and daily proteinuria, as well as special instrumental methods of investigation were used. The study included daily ECG monitoring, determination of NUP in blood. Biochemical blood analysis included the determination of total protein (TSP), albumin (A), creatinine (Cr), uric acid (CA), total cholesterol (TC), low-density lipoproteins (LDL), high-density lipoproteins (HDL), triglycerides (TG), glucose, total calcium (Ca) and inorganic phosphorus (P). The glomerular filtration rate was calculated using the MIC formula1) taking into account age and blood creatinine level. The stage of chronic kidney disease (CKD) was determined by the level of GFR in accordance with the recommendations of the US National Kidney Foundation. Office BP was measured in the traditional way twice on both arms, in the sitting position, after a 5-10 minute rest. If the difference was more than 5 mmHg, an additional measurement was performed. The average value of the last two measurements was calculated. The patient was warned about the necessity of withdrawal of hypotensive drugs 24 hours before the visit to the doctor.

Echocardiography (M- and B-mode) and Doppler echocardiography were performed. We determined cardiac linear dimensions, ejection fraction (EF), diastolic function of left ventricle, left ventricular volumes in systole (ESR), diastole (DE), left ventricular stroke volume (SWV) Left ventricular myocardial mass (LVMMV). IMLV index (IMLV) was obtained as the ratio of IMLV to body surface area (IMLV/MPT). Relative left ventricular wall thickness (RWT) was calculated according to the formula RWT = (TLC+TML)/CDP.

Left ventricular hypertrophy (LVH) was diagnosed in

Left ventricular hypertrophy (LVH) was diagnosed in men with a BMI greater than 125 g/m2 and in women with a BMI greater than 110 g/m2. Depending on BMLD and VLA, the following types of left ventricular geometry were distinguished Normal Geometry (NG) with VLA < 0.45 and normal BMLD, Concentric Remodeling (CR) at AIS >0.45 and normal BMI, concentric HLV (CG) at OLS > 0.45 and increased IMML and eccentric HLV (EG) at OLS<0.45 and increased IMML

Functional class (FC) of CHF was assessed according to NUNA classification.

In order to assimilate renal blood flow, ultrasound Doppler study of renal vessels with spectral analysis (USDG) was performed. The main trunk of the right and left renal arteries (PA) in the area of the estuary as well as intrarenal arteries' - segmental (SA), interlobar (MA), arch (DA) were visualized during scanning To assess the state of renal hemodynamics the following values were determined: maximal systolic arterial flow rate (V diastolic velocity (Ub), to characterize renal vascular resistance index (K1) and pulsatility index (P1)

Results of the study and their discussion

The results of the examination showed that in the study group as a whole, arterial hypertension occurred in 42 (72.4%) patients of the

of patients of working age with chronic kidney disease in stage 1-3 of CKD there were 42 (72,4%) patients with arterial hypertension, with 28,57% (12 patients) having AH of the 1st degree and 54,76% (23 patients) having AH of the 2nd stage. 16.67% (7 patients) had stage III AH.

Left ventricular hypertrophy was detected in 43 (74.1%) patients. Coronary heart disease was diagnosed in 31 patients (53,4%). In 12 of them (27,9%) the tension angina of the 1st functional class was revealed, in 29 (67,44%) - IIFC, and in the remaining 2 (4,65%) - IIIFC. Heart failure was diagnosed in 19 (32,76%) patients. And CHF I class (NUNA) was in 3 (15.79%), and II class (NUNA) in 14 (73.68%) patients. Cardiovascular pathology was most frequently diagnosed in patients with CCN and CPN.

EchoCG in the groups of patients randomized according to the stages of CKD did not differ significantly. BMML was statistically significantly higher in stage 3 of CKD compared to stage 1 (1 stage of CKD - BMML - 98.0 (86.3, 115.6) g/m2, 2 stage of CKD - BMML - 101.7 (90.8, 118, Diastolic LV dysfunction was more frequently diagnosed in patients with CKD (23.3%). As renal function decreases, a significant decrease in maximal systolic and minimal diastolic blood flow velocities as well as an increase in renal vascular resistance indices at the level of segmental and interstitial arteries is observed. With preserved renal function higher renal vascular resistance indices were noted in chronic pyelonephritis (K1 of segmental arteries -0.65) in comparison with chronic glomerulonephritis (I1 of segmental arteries - 0.61) and tubulointerstitial nephropathies.

As renal function decreases, there is a statistically significant increase in the frequency of diagnosed AH, CHD, IHD and CHF with the most significant (1.5-2 times) increase in the frequency of AH and CHD at a FFR level of 40-49 mL/min/1.73 m2 , and CHD - at 30-39 mL/min/1.73 m2.

At a GFR > 90 ml/min/1.73 m2, only LV EG is observed, and at a GFR of ACF of 60-89 ml/min/1.73 m2 - LV EG (61%), concentric LV hypertrophy and concentric LV myocardial remodeling (31% and 8% respectively), and at a GFR of 30-59 ml/min/1.73 m2, concentric type of LV myocardial remodeling prevails (LV CC - 45%, LV CR -15% and LV EG - 40%) More severe clinical course of nephropathy leads to concentric left ventricular hypertrophy.

When performing ultrasonography of renal vessels in the groups of patients randomized according to the etiology of chronic nephropathy, the highest values of

renal vascular resistance were obtained in patients with chronic pyelonephritis at the level of the main and segmental renal arteries.

When performing ultrasonography of the renal vessels in the groups randomized by the level of FFR, there was a gradual decrease as well as increase in renal vascular resistance indices as renal dysfunction progressed. These phenomena were statistically significant at the level of segmental and interlobular arteries ($p<0.01$) and had tendency ($p>0.05$) at the level of arc arteries.

Conclusions

In individuals of working age with preserved nitrogen excretion and filtration functions of the kidneys, arterial hypertension, CHD, left ventricular hypertrophy, and chronic heart failure are significantly more frequent in chronic glomerulonephritis. The main type of LV remodeling in patients with chronic nephropathy in stages 1-3 of CKD is eccentric left ventricular hypertrophy.

The parameters of intrarenal hemodynamics in nephrological patients with associated cardiovascular pathology are characterized by higher resistance indices and pulsatile indices of intrarenal arteries compared with patients without cardiovascular pathology.

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