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ABSTRACT

We examined 62 people, including 51 patients with early stages of diabetic nephropathy (DN), against the background of type 2 diabetes mellitus (DM) at the age of 40 to 65 years, and 15 apparently healthy individuals. Disease duration ranged from 6 months to 3 years. The patients were divided into 3 groups: Group I - diabetics with normoalbuminuria, Group II - diabetics with microalbuminuria (MAU), Group III - with MAU and an increase in blood pressure to the upper limits of the norm (130 / 80-140 / 90 mm Hg). We studied such indicators as the glomerular filtration rate (GFR) by the radionuclide method; the size of the kidneys by ultrasound; UIA; the level of nitric oxide (NO) in daily urine; Intrarenal hemodynamic indexes - Doppler data PI, RI, Vmax. Analysis of the materials obtained in the course of the study allows us to say that with type 2 diabetes, the kidneys are actively affected already at the very beginning of the disease. The appearance of MAU or an increase in blood pressure to the upper limits of the norm in patients with diabetes mellitus 2 indicate an already advanced pathological process in the kidneys from the point of view of the possibility of its reverse development. Changes in the functional state of the kidneys take place already at the prealbuminuric stage of development of DN, and it is this stage that should be a "springboard" for an aggressive effect on hyperfiltration, renomegaly, and endothelial dysfunction that take place.

Key words: diabetes mellitus, diabetic nephropathy, microalbuminuria.

INTRODUCTION

Diabetes mellitus (DM) is a disease of civilization and accompanies humanity throughout the history of its development. However, despite the existing successes, there is no need to talk about the solution of the SD problem even at the beginning of the 21st century. Paradoxically, today, more than 100 years after the development of the first methods of treating diabetes mellitus, this disease not only

remains one of the largest global problems, but is also becoming more widespread, taking on the nature of a pandemic [1].

The greatest danger of diabetes is associated with its vascular complications, in particular, with diabetic nephropathy (DN), which develops in 30–40% of patients with diabetes and occupies a leading position among the causes of chronic renal failure (CRF) worldwide [2, 3]. Terminal CRF due to DN remains the main cause of mortality in patients with type 1 diabetes, and in patients with type 2 diabetes, it ranks second after cardiovascular pathology [2, 3]. The costs of providing renal replacement therapy for patients with end-stage CRF in the outcome of DN, as well as the treatment of its complications, are constantly growing and are a heavy burden on the health budget in different countries, including Uzbekistan. Due to the progressive nature of the course of DN and the limited possibilities of its treatment at clinically evident and already advanced stages, early detection of nephropathy at the stage of potentially reversible changes in the kidneys and the timely initiation of nephroprotection are of particular relevance. The only method currently used for early diagnosis of DN is the determination of microalbuminuria (MAU). However, as shown by morphological studies, in patients with diabetes with MAU (and even in some with normoalbuminuria), characteristic changes in the kidney tissue are already revealed [4].

According to the World Health Organization (WHO) worldwide, in 2000 there were 177 million people with diabetes. It is predicted that by 2025 this figure will be more than 350 million people (1). Diabetic nephropathy (DN) is today the most common cause of end-stage renal disease - almost 35% of uremic patients (5). The scale of renal involvement in diabetes has grown enormously in recent years, surpassing, including in terms of cost, even such a disease as glomerulonephritis (GN) (5). And if the number of cases of DN detection in DM 1 in recent years either does not change (6), or tends to decrease, then in DM 2, the detection rate of nephropathy increased by 50% (3). To date, it is indisputable that in DN caused by both DM 1 and DM 2, the so-called "preclinical" (latent) stage of development is clearly distinguished, in which there are no clinical symptoms of the disease and only functional and laboratory changes characterizing the work of the kidneys are revealed. These are, first of all, the acceleration of filtration, an increase in the size of the kidneys, an increase in intraglomerular pressure, microalbuminuria (MAU). Insufficient knowledge of the functional state of the kidneys in the early stages of DN in type 2 diabetes, the lack of informative criteria for their diagnosis, as well as the lack of development of approaches to their effective correction determine the relevance of the chosen topic for study.

The aim of the study was to study the features of the functional state of the kidneys in patients with early stages of DN caused by DM

Material and methods

A total of 66 people were examined, including 51 patients with early stages of diabetes mellitus caused by diabetes mellitus 2 at the age of 40 to 65 years and 15 practically healthy individuals. Disease duration ranged from 3 months to 3 years. The patients were divided into 3 groups: group I - patients with diabetes mellitus 2 with normoalbuminuria, group II - patients with diabetes mellitus 2 with microalbuminuria (MAU), group III - with MAU and normally elevated blood pressure (130/80-140/90 mm Hg).

Studied such indicators as the rate of glomerular filtration (GFR) by the radionuclide method; mean kidney volume (SOP) by ultrasound; microalbuminuria (MAU); the level of nitric oxide (NO) in daily urine; parameters of intrarenal hemodynamics - Doppler indices PI, RI, Vmax.

Research results and discussion.

In group I patients it was possible to establish that hyperfiltration (152, 0 (141.0-163.0), an increase in kidney volume (181.0 (169, -188.0), intraglomerular hypertension RI (0, 5 (0.47 - 0.55), PI (0.72 (0.5 - 0.9), Vmax (0.95 (0.89-1.01) and an increase in the level of NO in daily urine (15, 8 (15.2-16.8). That is, the absence of MAU in a patient with DM 2 does not at all indicate the absence of renal problems. that with the appearance of MAU (33.0 (28.0- 37.0) GFR decreases and reaches the normal level (134.0 (122.0-143.0)). However, at the same time, there is a decrease in renal blood flow RI (0.6 (0.57-0.68), PI (1.36 (1.11.6), Vmax (0.77 (0.73-0.83) with an increase in peripheral vascular resistance, as well as a decrease in NO in urine (15 , 6 (15.1-15.9), characterizing endothelial dysfunction. A significantly elevated blood pressure level in patients with diabetes mellitus 2 has a sharp negative effect on renal function, as evidenced by a decrease in GFR (89.0 (81.0-96.0) with an aggravation of the vasospastic reaction of renal blood flow, with elements of endothelial damage (a decrease in the level of nitric oxide in urine (13.7 (13.3-14.3). Apparently, even a slight increase in blood pressure in DM 2 leads to depletion of NO stores, as a result of which the vessels become rigid to the effect of the hemodynamic factor. Therefore, the balance of substances that maintain adequate blood flow in the vessels is shifted towards vasoconstrictors. So, the analysis of the data obtained during the study allows us to say that with type 2 diabetes, the kidneys are actively involved in the pathological process already at the very onset of the disease. The appearance of MAU or normally elevated blood pressure in a patient with diabetes mellitus 2 indicates an already advanced pathological process in the kidneys from the point of view of the

possibility of its reverse development. Changes in the functional state of the kidneys take place already in the prealbuminuric stage of DN development, and it is this stage that should be a "springboard" for aggressive action on hyperfiltration, renomegaly, and endothelial dysfunction. Only such an approach to renal problems in type 2 diabetes, in our opinion, will make it possible to stop the epidemic of DN in the world today; this is the only way to reduce the economic costs experienced by the budgets of developed countries, unsuccessfully trying to treat patients with advanced stages of DN.

Conclusion

1. In 78% of patients with diabetes mellitus 2 already in the prealbuminuric stage of the disease there is a functional impairment of the kidneys. 2. Diagnostic criteria for the prealbuminuric stage of development of DN in type 2 diabetes should be considered GFR, SOP, parameters of intrarenal hemodynamics, and the level of NO in daily urine. 3. In patients with diabetes mellitus 2 in the prealbuminuric stage of DN development, hyperfiltration is observed in 68% of cases, renomegaly in 76% of cases, vasodilatory type of intrarenal hemodynamics in 64% of cases, endothelial dysfunction in 58% of cases. 4. In patients with DN caused by DM 2 in the MAU stage, hyperfiltration is observed in 48% of cases, renomegaly - 70.5% of cases, vasospastic type of intrarenal hemodynamics in 65.5% of cases, endothelial dysfunction in 68% of cases. 5. In hypertensive patients with DN caused by DM 2, in the MAU stage in 37.5% of cases, there was a decrease in the level of filtration, renomegaly - in 72.5% of cases, vasospastic type of intrarenal hemodynamics in 78.4% of cases, endothelial dysfunction in 75, 6% of cases. The prospect of further research is the development of measures to prevent changes in the functional state of the kidneys up to the albuminuric stage of DN development.

REFERENCES

1. International Diabetes Federation. Diabetes Atlas. Sixth edition; 2013 p20

2. Dedov II, Shestakova MV. Saharny`i` diabet i khronicheskaia bolezn` pochek. Meditcinskoe informatcionnoe agentstvo, M., 2009[In russian]

3. Shestakova MV, Shamhalova MSh, Iarek-Marty`nova IIA i dr. Saharny`i` diabet i khronicheskaia bolezn` pochek: dostizheniia, nereshenny`e problemy` i perspektivy` lecheniia. Saharny`i` diabet 2011; 1: 81-88[In russian]

4. Granier C, Makni K, Molina L et al. Gene and protein markers of diabetic nephropathy. Nephrol Dial Transplant 2008; 23: 7922-8799 8. Caramori

5. Shulutko B.I. Nephrology – 2002. – 780 p.

6. Shiga Microalbuminuria Reduction Trial (SMART) Group: Reduction of microalbuminuria in patients with type 2 diabetes: the ShigaMicroalbuminuria Reduction Trial (SMART) // Diabetes Care. – 2007. – Vol. 30. – P. 1581-1583.

7. Мухамеджанова М.Х., Сафарова Г.А. Оценка вазоренальной гемодинамики у больных с хронической болезнью почек в ассоциации с артериальной гипертензией. Проблемы биологии и медицины 2020, №6 (124) 87-90

8. Akhmedova N.Sh. Current approaches to early diagnostics of chronic kidney disease and evaluated risk factors// European Sciences review. – 2019. Volume № 1-2. – P. 277 – 279.

9. Akhmedova N.Sh., Ergashov B.B., Nuralieva H.O., Safarova G.A.. Influence of Collected Modified Risk Factors on the Development and Progression of Chronic Kidney Disease// International Journal of Current Research and Review Vol 13 • Issue 02 • January 2021 Pagts 13-17.