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Significance of Ultrasound Examination in Clinical Diagnosis of Nephroangiopathies in Latent Diabetes Type 2

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Abstract:
Currently, diabetic nephropathy (DN) is one of the most common causes of the development of terminal chronic renal failure (CRF) and dramatically reduces the overall and cardiovascular survival of patients with diabetes mellitus (DM). The need to use expensive methods of renal replacement therapy for the treatment of patients in the terminal stage of DN, as well as social adaptation, makes the problem significant not only in the medical, but also in the socio-economic aspect.
The proportion of DN in the overall structure of renal pathology depends on the regional epidemiological characteristics of the disease. The scale of this problem at the national level has been clarified only recently and turned out to be quite comparable with global data.

Keywords: arterial hypertension, blood pressure, mean blood pressure, angiotensin II, glomerular basement membrane, diastolic blood pressure, diabetic glomerulosclerosis, diabetic nephropathy, coronary heart disease, insulin-dependent diabetes mellitus.

INTRODUCTION

The term "diabetic nephropathy" (DN) in modern nephrology is understood as a number of typical morphological changes in renal tissue that develop in patients with DM and concern almost all structures of renal tissue - glomeruli, tubules, interstitium and vessels. Glomerular changes are associated with thickening of the basement membrane, an increase in the mesangial matrix, the development of diffuse or nodular intercapillary glomerulosclerosis, sometimes with the appearance of so-called "capsule drops" and "fibrin caps". Tubulointerstitial changes usually occur later than glomerular ones and consist in the development of hyaline-drip and granular dystrophy of the tubule epithelium, deposition of glycogen deposits in the pars recta of the proximal tubule, tubule atrophy, interstitial fibrosis. Vascular changes are represented by arteriologialinosis and arteriosclerosis. Interstitial changes are accompanied by

inflammatory infiltration, consisting mainly of lymphocytes, to a lesser extent of plasmocytes and histiocytes.

Other specific aspects of the involvement of the urinary system in patients with DM, which we did not specifically address in this study, may include bacteriuria, cystitis, acute (including emphysematous) and chronic pyelonephritis, papillary necrosis, perinephral abscess, as well as bladder atony with the development of hydronephrosis.

DN is a renal disease that has a distinct stage. Currently, the classification of the stages of DN, proposed in 1983 and including the main stages of the evolution of this renal pathology, is generally accepted.

The stage of hyperfunction (1) begins at the onset of DM. In these patients, there is usually an increase in the glomerular filtration rate (GFR) by 20-50%, as well as increased urinary albumin excretion from 20 to 200 mcg/min (30-300 mg/day). Clinically, such patients often have pronounced glucosuria and polyuria.

Purpose of the study. Detection and early diagnosis of vascular disorders in patients with type 2 diabetes without clinical signs of renal artery stroke using bilateral scanning.

Material and research methods. The clinical part of the study, devoted to the analysis of the natural course of DN and the determination of factors associated with the progression of the disease, included 180 patients with diabetes mellitus, of which 77 people with ISD, 103 people with INSD (the main group), as well as 41 patients with chronic glomerulonephritis without NS and 40 healthy volunteers who made up control groups (I and II).

Research results and their discussion. The results of a sonographic examination of the kidneys in the control groups showed that patients with CGN and healthy individuals did not significantly differ in all the sonographic parameters determined. At the same time, in patients with DN, all linear dimensions, as well as the estimated volumes of the right and left kidneys were significantly larger than in patients with CGN. Healthy volunteers had the same kidney length, however, the width, thickness and OP in this control group were significantly lower than similar indicators in the group of patients with DN.

There were no differences between the 2 control groups in the values of PI, MPI, the thickness of the renal parenchyma and the thickness of the cortical parenchyma. At the same time, the group of patients with DN was distinguished by significantly greater parenchymal thickness, higher MPI values, they were more likely to have changes in the shape of pyramids - in 21% of cases, rounded or triangular pyramids were found with DN, compared with 3% in the group of patients with CGN ($p=0.001$). Patients with DN also had a lower PI value. According to other indicators, including the total thickness and echogenicity of the parenchyma, the thickness of its cortical layer and

PI, no differences were found in the described groups. OP and the prevalence of renomegaly in patients with DN are significantly and significantly higher than in healthy volunteers and in patients with CGN ($p<0.0001$ in both cases). By definition, there was no renomegaly in healthy volunteers.

The described nature of the differences in sonographic structural changes, the ratio of OP and the prevalence of renomegaly in the kidneys was fully preserved in a comparative analysis of a group of patients with CGN who had GFR in the range of 60-89 ml/min and cases of DN with similar indicators of the functional state of the kidneys. Among patients with CGN and DN, the levels of SPB were, respectively, 1.25 + 1.4 and 1.52 + 2.1g/day ($p=0.52$), and GFR - 77.2 + 14.1 and 75.2 + 15.2 ml/min ($p = 0.71$). The proportion of cases with renomegaly in patients with DN was 38%, and the average OP was 152 + 29 cm3, and in patients with CGN these indicators were 10% and 121 + 31 cm, respectively (all $p <0.0001$).

Thus, the data obtained allow us to conclude that an increase in the linear dimensions of the kidneys (mainly width and thickness), OP and the development of renomegaly is a characteristic feature of the course of DN, distinguishing it from other diseases with primary involvement of the glomeruli (CGN).

When comparing the linear dimensions of the kidneys, it turned out that there were no significant differences in the length and thickness of the organ between patients with different types of diabetes. At the same time, the width of both the left and right kidneys was significantly larger in patients with INZSD against the background of higher values of body surface area and age - characteristic features of this type of disease.

In the general group of patients with DN, consisting of both types of DM, the length of the kidneys was significantly directly influenced by the shape, size of the pyramids, the thickness of the parenchyma as a whole, and the thickness of its cortical layer. The width, thickness and OP of the kidneys were significantly and directly influenced only by the shape of the pyramids, the total thickness of the parenchyma and the thickness of the cortical layer of the parenchyma, and the value of PI was inversely related to the width of the kidneys.

Thus, OP, first of all, by definition depends on the linear dimensions of the kidney - length, width and thickness. It is obvious that the OP, consisting of the volume of the renal sinus (the abdominal system, vessels and adipose tissue) and the volume of the parenchyma, anatomically depends, in our case, on the state of the parenchyma, since cases of gross changes in the volume of the abdominal system were excluded from the study. The results of the correlation analysis confirmed that the thickness of the parenchyma is the main factor that determines the variability of the linear dimensions of the kidney and OP in patients with DN. At the same time, the size and shape of the pyramids were also highly reliably and directly related to the length of the kidney. Therefore, the OP may, at least in part, depend on an increase in the pyramids (brain matter) through an increase in the length of the kidney.

Conclusions

In patients with diabetic nephropathy with any type of diabetes mellitus, the average kidney volumes and the prevalence of renomegaly are the same, but significantly more than in healthy individuals and patients with primary glomerular pathology; the risk of developing renomegaly in patients with diabetic nephropathy and insulin-dependent diabetes mellitus increases against the background of insulin therapy.

Renomegaly in diabetic nephropathy is formed by increasing the thickness of the kidney parenchyma. In patients with insulin-dependent diabetes mellitus, an increase in kidney volume occurs both due to hypertrophy of the cortical and due to hypertrophy of the medulla. In insulin-independent diabetes mellitus, the volume of the kidneys depends mainly on the cortical layer of the parenchyma.

In patients with insulin-dependent diabetes mellitus and diabetic nephropathy, the development of renomegaly is associated with an increased risk of severe forms of retinopathy.

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