FEATURES OF DOPPLEROGRAPHIC STUDIES IN THE DIAGNOSIS OF CHRONIC KIDNEY DISEASE

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Abstract. *The most pressing problems facing modern pediatrics and nephrology are chronic kidney disease (CKD), which is associated with the early onset of disorders in patients in childhood, a constant increase in the frequency of chronic progressive kidney disease and the occurrence of chronic renal failure (CRF). Despite recent advances in nephrology, reducing the risk of problems associated with delayed formation of CRF and decreased kidney function remains a difficult task in the early detection and prevention of kidney diseases of various etiologies.*

Keywords: *kidney, laboratory diagnostics, complex echography, dopplerography, chronic kidney disease.*

Relevance. Abnormalities in creatinine levels over a period of several months to several years are called chronic kidney disease (CKD). CKD is based on the degree of kidney damage calculated from a reduced glomerular filtration rate (GFR) (ie <60 ml/min per 1.7 m 2) for more than three months [1, 2].

Ultrasonography is a non-invasive and inexpensive method of examination with sufficient anatomical details necessary for the diagnosis of kidney diseases without irradiation or contrast of the patient, and, therefore, has replaced standard radiography in our country and abroad [3-5]. All these factors contribute to the early detection and prognosis of renal dysfunction necessary for making therapeutic decisions.

In B-mode echography are studied the length of the kidney, thickness and echogenicity of the renal parenchyma; in addition, this mode makes it possible to detail the pyelocaliceal system [6]. This information helps to determine the extent of damage to the renal parenchyma and the possibility of its reversibility [7, 8], as well as to make a decision on whether to perform a kidney biopsy [9].

In interstitial fibrosis and glomerulosclerosis, due to fibrosis, the echogenicity of the parenchyma increases [10], and an increase in echogenicity can also occur with interstitial inflammation. There is a significant correlation between kidney length, parenchymal echogenicity, glomerular sclerosis or tubular atrophy [2].

Kidney morphology can be determined using a number of methods, including measurement of kidney length and volume, and renal cortical thickness. Renal function can also be assessed by kidney length and cortical thickness, and important clinical decisions can be made based on this. Therefore, dynamic echographic studies are carried out to detect the progression of renal failure or its recovery. Although renal parenchymal volume is a fairly accurate measurement in patients with end-stage renal disease, in healthy patients, measuring the longitudinal length of the kidney is sufficient.

Therefore, ultrasound is an informative method for confirming renal failure and disease progression.

Purpose of the study. Improving the diagnosis of chronic kidney disease (CKD) through the use of Doppler ultrasound.

Material and research methods. Complex ultrasound examinations were carried out at the Republican Specialized Scientific and Practical Medical Center of Nephrology and Kidney Transplantation using Sonoscape S22 and Aplio 500 ultrasound diagnostic devices using a 3.5-5.0 MHz convex sensor. The study was carried out on 35 patients, of which 19 (54.3%) were male and 16 (48.7%) female. The mean, median and quartile range of speed indicators were calculated.

Patients with acute kidney injury, a transplanted kidney, hemodialysis, chronic liver disease, and a solitary kidney were excluded from the study.

Complex echography of the kidneys was performed using a standard Aplio 500 ultrasound device (Japan) in gray scale, color Doppler mapping (CDC) and pulsed wave Doppler modes using a convex sensor with a frequency of 3.5-5.0 MHz. The echogenicity of both liver and kidney parenchyma was assessed using low tissue harmonic imaging and speckle reduction to reduce intertissue offset. Gain and time gain compensation were manually adjusted. Volume and thickness were measured in a segment perpendicular to the estimated longitudinal axis of the kidney, according to longitudinal imaging. There was no need to hold the ultrasound transducer perpendicular to the skin, but the level of this cross-section was placed fairly close to the renal hilum while still clear of the pelvis.

Research results. When distributing patients with CKD, were used the 2012 KDIGO criteria, with group 1 consisting of 15 (42.8%) patients with stage 1 CKD who were of active working age from 20 to 45 years (mean age 32.5±4. 5 years); 11 (31.5%) patients with stage 2 CKD made up the 2nd group aged from 22 to 65 years (average age was 43.5±7.2) and 9 (25.7%) patients with 3 and Stage 4 CKD patients were included in group 3, the average age of which was 46±11 years.

The term <CKD> refers to progressive kidney damage that can worsen over time and is caused by structural or functional problems. Kidneys stop functioning as damage worsens, whether GFR declines or not. This is evidenced by histology, changes in markers of kidney damage, or variations in imaging tests. During the study, we studied the functional capacity of the kidneys in CKD using complex ultrasound methods and determining GFR using serum creatinine.

The mean serum creatinine level in our study was 1.25 mg/dL for grade 0, 1.85 mg/dL for grade I, 2.5 mg/dL for grade II, 3.27 mg/dL for grade III and 5 .03 mg/dL for grade IV.

The main ultrasound criteria in the gray scale mode were an uneven increase in the echogenicity of the renal parenchyma, with a decrease in the thickness of the renal parenchyma. As the pathological process progressed, a decrease in the anteroposterior size of the kidneys was determined, as well as unevenness and tuberosity of the contours, which meant fibrosis of the cortex. This study showed that the average thickness of the renal parenchyma was 8.3 mm. As echogenicity increased, a decrease in mean parenchymal thickness was observed.

Changes in ultrasound parameters in the color Doppler mapping (CDC) mode with stage 1 CKD were characterized by asymmetry of hemodynamic parameters, diffuse depletion of the intrarenal vascular pattern due to the reduction or absence of small branches of segmental arteries, turbulence of blood flow, location of rare, thinned and deformed vessels. It has been proven that in patients with CKD stage 2, compared with CKD stage 1, intrarenal hemodynamics were characterized by significantly more pronounced disturbances in the parameters of central circulation: blood flow turbulence, asymmetry of hemodynamic parameters, location of rare,

thinned and deformed vessels, diffuse depletion of vascularization. In addition, a statistically significant difference was revealed between groups of stages 3-4 compared with stages 1-2 in terms of speed indicators, namely Vmax - 49.6 cm/s (Q=35.6; Q3=53 ,1, p<0.001), Vmin (12.5 cm/s vs 15.2 cm/s, respectively, at p<0.001), TAMX (21.3 cm/s vs 25.5 cm/s, respectively, at p<0.001) at the level of the renal artery and Vmax - 22.1 cm/s (Q=17.4; Q3=23.5, p<0.001), Vmin (8.6 cm/s vs 10.4 cm /s, respectively, at p<0.001) and TAMX (11.2 cm/s vs 14.1 cm/s, respectively, at p=0.001) at the level of the arcuate artery. There was also an increase in resistance indicators (RI, PI) as the disease progressed at all levels of the renal vascular bed. In general, higher renal resistivity index values (>0.7) reflected more severe CKD stage. There were significantly significant differences between the groups when comparing renal RI at the level of the renal artery 0.72 (Q1=0.7; Q3=0.73, p<0.001), at the level of the arcuate artery 0.69 (Q1=0.68; Q3 =0.71, p<0.001.

Conclusions. Thus, the best echographic parameter that correlates with serum creatinine level is the echogenicity of the renal cortex and its gradation in comparison with the longitudinal length, parenchymal thickness and cortical thickness in patients with CKD, also Doppler ultrasound replaces x-ray angiography and the advantage of this method over other imaging modalities is that it provides real-time assessment of blood flow.

REFERENCES

1. Юлдашев, Т. А., Муртазаев, С. С., Мирсобидов, Б. М., & Алижонов, Ф. А. (2023, April). Ортодонтическое лечение направленое на исправление дефектов в жевательно-речевом аппарате. In Conferences (pp. 304-305).
2. Юлдашев, Т. А., Муртазаев, С. С., Фарходов, И. Ш., Элмурадова, А. Э., & Иргашев, Ю. (2023, April). Роль положения языка в формировании прикуса у детей подросткого возраста. In Conferences (pp. 305-306).
3. Юлдашев, Т. А., Муртазаев, С. С., Баратов, Ф. Ш., Даминова, А. Б., Куйлиев Ж, Ё. Ш., & Иргашев, Ю. (2023, April). Современные подходы к лечению ортодонтических пациентов с ортогнатической хирургией. In Conferences (pp. 303-304).
4. Yusupalieva, G. A., Yuldashev, T. A., Akhralov, S. F., Manashova, A. R., & Umarova, U. A. (2022). Complex Radiation Diagnostics of Non-Healed Fractures and Post-Traumatic False Joints of Long Tubular Bones. Advances in Clinical Medical Research, 3(1), 05-08.
5. Сокиева, Д., & Юлдашев, Т. (2023). Цифровые рентгенологические исследования в диагностике посттравматического и послеоперационного остеомиелита у детей. Научные работы одарённой молодёжи и медицина XXI века, 1(1), 184-184.
6. Юлдашев, Т. А., & Муртазаев, С. С. (2023, November). ВЛИЯНИЕ НАСЛЕДСТВЕННЫХ ЗАБОЛЕВАНИЙ НА ФОРМИРОВАНИЕ ЗУБОЧЕЛЮСТНОЙ СИСТЕМЫ У ДЕТЕЙ. In Conferences (pp. 221-222).
7. Юлдашев, Т. А., & Муртазаев, С. С. (2023, November). ИЗМЕНЕНИЯ ГИГИЕНЫ ПОЛОСТИ РТА ПРИ НОШЕНИИ НЕСЪЕМНЫХ ОРТОДОНТИЧЕСКИХ АППАРАТОВ. In Conferences (pp. 219-220).
8. Акрамова, Ф. А., & Юлдашев, Т. А. (2023, November). ВЛИЯНИЕ НАСЛЕДСТВЕННЫХ ЗАБОЛЕВАНИИ НА ФОРМИРОВАНИЕ РАЗМЕРА И КОЛИЧЕСТВА ЗУБОВ. In Conferences (pp. 132-134).

9. Юсупалиева, Г. А., Юлдашев, Т. А., Абзалова, М. Я., & Улугмуродова, К. Б. (2023). ОСОБЕННОСТИ ДОППЛЕРОГРАФИЧЕСКИХ ИССЛЕДОВАНИЙ В ДИАГНОСТИКЕ ХРОНИЧЕСКОЙ БОЛЕЗНИ ПОЧЕК. Евразийский журнал медицинских и естественных наук, 3(11), 41-44.
10. Юсупалиева, Г., Манашова, А., & Ахралов, Ш. (2023). Особенности преподавания клинико-лучевой диагностики спаечной кишечной непроходимости у детей в медицинских вузах. Современные тенденции при обучении иностранному языку в XXI веке, 1(1), 117-124.
11. Абруев, Б., & Юсупалиева, Г. (2023). Комплексная лучевая диагностика острого аппендицита и его осложнений у детей. Научные работы одарённой молодёжи и медицина XXI века, 1(1), 31-32.
12. Шоюсупов, С., & Юсупалиева, Г. (2023). Ультразвуковой диагностика пневмонии и их осложнений у детей в различные сроки заболевания. Научные работы одарённой молодёжи и медицина XXI века, 1(1), 254-254.
13. Баходирхужаев, А., & Юсупалиева, Г. (2023). Возможности ультразвуковой диагностики при остром калькулезном холецистите. Научные работы одарённой молодёжи и медицина XXI века, 1(1), 37-37.
14. Хаитов, З., & Юсупалиева, Г. (2023). Комплексная эхографическая диагностика хронических вирусных гепатитов у детей. Научные работы одарённой молодёжи и медицина XXI века, 1(1), 227-228.
15. Федосеева, К., & Султанова, Л. (2023). Возможности эхографии в диагностике узловых образований щитовидной железы. Научные работы одарённой молодёжи и медицина XXI века, 1(1), 226-226.