



## Role of Kidney Ultrasound in the Choice of Tactics for Treatment of Acute Renal Failure

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**ABSTRACT:** Until now, the question of predicting the outcomes of acute renal failure (ARF) remains open. The dynamics of indicators of nitrogen metabolism is far from always, the results of generally accepted methods for the clearance of various substances correspond to the predicted outcome. The first experience of using nephrosonography in patients with acute renal failure at our institute revealed the following characteristic features of the ultrasound picture of acute renal failure: symmetric enlargement of the kidneys with a significant thickening of the parenchyma, an increase in the size of the renal pyramids and the medulloparenchymal index (MPI), an increase in the echogenicity of the cortical layer and varying degrees of compression of the pyelocaliceal complex. The method of ultrasound examination (US) of the kidneys is described in sufficient detail in one of the works of our employees and supplemented by the generally accepted calculation of the volume of the kidneys (RV).

**Keyword:** acute renal failure, sonography, treatment tactics.

To determine the place of renal ultrasound among the generally accepted clinical and laboratory methods for monitoring patients with acute renal failure, it seems reasonable to us to demonstrate the dynamics of the ultrasound picture of the kidneys in two patients with different outcomes of acute renal failure.

Patient K. transferred to the intensive care unit (RO) from the urological hospital, where he was treated for chronic pyelonephritis against the background of urolithiasis. Kidney function was normal. A week before the transfer to the RO, the patient was started intramuscular administration of a cephalosporin antibiotic in combination with gentamicin. One day after the start of the administration of the indicated antibiotics, the patient developed hematuria, diuresis progressively decreased to anuria. The edematous syndrome increased. During ultrasound, blood creatinine was 0.88 mmol / L, blood urea was 34.7 mmol / L, and serum potassium and sodium were 4.8 and 136 mmol / L, respectively. The urinary excretion of these substances was not determined due to anuria. Central venous pressure (CVP) was +5 cm H<sub>2</sub>O. Art.

Ultrasound revealed: the right kidney - 11x3.7x5.0 cm. Parenchyma - 1.2-1.0 cm. Contours are uneven, echogenicity is increased (II degree). The calyx-pelvis complex is moderately heterogeneous. The left kidney is 12.5x5.6x5.0 cm, the parenchyma is 1.8x1.4 cm, the contours are markedly uneven, the calyx is expanded to 1.3-1.5 cm. In the lower calyx there are two calculi with a diameter of 0.8 and 0.9 cm. OD was 144.5 cm<sup>3</sup>. The pyramids were not clearly defined.

Given the presence of overhydration, hyperkalemia, the patient was started hemodialysis therapy. 2 weeks after the start of treatment, due to regular hemodialysis sessions. stabilization of nitrogenous parameters of blood and concentration of plasma electrolytes was achieved. Diuresis appeared in a volume of up to 300 ml / day. After 1 month of continuous therapy, the possibility of resolving ARF became questionable. An ultrasound of the kidneys was performed, which revealed a decrease in the linear dimensions of the nocturnal, respectively: the right kidney - 10x2.6x4.7 cm, the left one - 11.0x4.1x4.6 cm. The OD was 85 cm<sup>3</sup>. A decrease in the size of the kidneys was accompanied by a further thinning of the parenchyma, the unevenness of the contours became more pronounced, and the echogenicity remained high. MPI was not calculated, since the pyramids were not clearly located. Thus, the ultrasound picture indicated an increase in sclerotic changes in the kidneys, which confirmed the assumption of irreversible damage to the renal parenchyma and the transition of ARF to chronic renal failure (CRF). Based on this, the patient has formed an arteriovenous fistula, and the hemodialysis program is transferred to the chronic version.

Patient X-c, 45 years old, was hospitalized in RO on the 2nd day after the development of complete anuria. From the anamnesis it is known that there were no kidney diseases before, he regularly underwent professional examinations, passed urine tests. On the eve of the development of anuria, he abused alcohol of dubious origin. Upon admission to the RO, a state of moderate severity, edema on the line and lower extremities. BP 160/90 mm Hg. Art. In the analysis of blood neutrophilic leukocytosis up to 13.7x10<sup>9</sup> cells / l without a shift in the blood formula to the left. ESR 33 mm / h. In the analysis of urine protein 0.18 g / l, urinary posture without features. Blood creatinine 0.94 mmol / L, blood urea 26.6 mmol / L, serum potassium 5.8 mmol / L, serum sodium 144 mmol / L. blood pH 7.35, BE (-7 mmol / l). CVP is negative. Ultrasound of the kidneys revealed: right kidney 11.2x5.9x6.0 cm, parenchyma 1.8-1.4 cm, left kidney 11.4x5.5x5.9 m, parenchyma 2.4-1.7 cm, echo of both kidneys was moderate increased (I st.), on both sides triangular pyramids with dimensions of 1.2 cm were determined, MRI increased to 65%, OD - up to 184.8 cm<sup>3</sup>. The patient started infusion therapy, corrected to normal CVP numbers. Twelve hours after the start of treatment, diuresis appeared, the value of which for the 1st day of treatment was 4.2 liters. Subsequently, therapy was carried out aimed at correcting the water-electrolyte balance. After 21 days, the state of renal homeostasis did not differ from normal values. Repeated ultrasound revealed a moderate decrease in the linear dimensions of the kidneys and, accordingly, the normalization of OD (153 cm<sup>3</sup>), a decrease in the size of the pyramids and a significant decrease in MDI (43%).

Thus, the demonstrated case confirms our earlier data that in the presence of reversible ARF, there are ultrasound signs in the form of a transient increase in the size of the kidneys, pyramids and MPI.

In conclusion, it should be noted that the method of renal ultrasound is able to significantly supplement the clinical and biochemical data necessary to predict the reversibility of acute renal failure.

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