

## REHABILITATION OF KIDNEY FUNCTION IN THE PERIOPERATIVE PERIOD

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**Relevance.** Analysis of the literature, conducted preliminary own research convincingly proved that unilateral lesion of the paired organ of the kidneys by any pathological process affects the state of blood circulation in the renal parenchyma [1]. This not only leads to a violation of the functional state of the affected kidney, but also leads to the development of pathological morphological changes in the kidney tissue. However, the negative impact extends to the opposite kidney. This is a negative reason for the delayed compensatory-adaptive response to the restoration of the overall function of the paired organ [2]. Even, the kidney that remained after the removal of the affected, can not fully compensate for the total function and is not a «healthy kidney.» The kidneys, due to their functional and anatomical features, are a good model for studying their hemodynamics. This allows the use of Doppler renal arteries to determine the extent of organ damage in systemic diseases [3, 4]. Circulatory disorders in both kidneys with their unilateral damage are due to the pathological effect of the disease on the affected kidney and the development of a stable vascular spasm of the opposite kidney parenchyma through the reno-renal reflex (especially during the development of an acute disease). The flow of vasoactive substances into the bloodstream causes a number of vascular reactions. In this case, the alternation of vasoconstriction and vasodilation disrupt the course of adequate adaptive reactions to the restoration of blood circulation in the kidneys [3, 5]. The additional effect of surgery also negatively affects the adequate recovery of total renal function. It is possible to positively influence the blood circulation condition by improving the rheological properties of blood and preventing or eliminating vascular spasm of the renal parenchyma.

**Purpose of the study.** Develop and use in the clinic a method of perioperative correction of renal blood flow in patients with unilateral kidney damage.

**Material and methods of research.** A clinical study was conducted in 108 patients aged from 18 to 65 years with the study of changes in the blood flow of the renal parenchyma in various types of unilateral pathology, which was carried out for surgical treatment. A clinical study was conducted in 108 patients aged from 18 to 65 years with the study of changes in the blood flow of the renal parenchyma in various types of unilateral pathology, which was carried out for surgical treatment. Patients were divided into 2 comparison groups. Group I consisted of 58 patients who received conventional treatment according to the protocols for providing medical care for a specific pathology. Group II consisted of 50 patients, who additionally carried out perioperative measures to improve blood flow in the parenchyma of both kidneys.

All patients on the device Philips HDI 1xE conducted a Doppler examination of the renal arteries to determine the state of blood circulation in the renal parenchyma. At the same time, such indicators as the maximum systolic velocity of the arterial flow ( $V_{max}$ ), final diastolic velocity ( $V_{min}$ ) were evaluated. In the analysis of Doppler patterns, such indicators as the resistance index (IP), the pulsation index (PI), and the index of systolic-diastolic ratio (SD) were also determined. In the quantitative analysis of renography, the duration of the vascular segment was determined (20-60 s); the time to reach the maximum level of the T<sub>max</sub> curve (3-5 min), the half-life of the <sup>131</sup>I hippurana from the kidneys is T<sub>1/2</sub> (8-12 min).

**Results and its discussion.** The Doppler study of the arteries of the kidneys on the affected side and in the opposite kidney allowed us to obtain the following data. Thus, in all cases, the lesion determined a persistent decrease in the systolic velocity of the arterial flow in the artery of the affected kidney, which was most pronounced in its distal section, which confirmed the presence of the predominant changes in the arteries of the kidney parenchyma. So,  $V_{max}$  at the level of the renal artery was reduced to  $0.80 \pm 0.13$  m / s (control –  $0.87 \pm 0.03$  m / s), and  $V_{min}$  at the level of the main trunk was  $0.25 \pm 0.12$  m / s (control –  $0.32 \pm 0.06$  m / s). Показатель СД при этом составлял  $3,60 \pm 0,23$ , что почти в 1,5 раза превышало контрольный показатель ( $2,70 \pm 0,23$ ). The changes belonged to IR, which also increased and at the level of the renal artery was  $0,69 \pm 0,09$  (control –  $0,63 \pm 0,05$ ). PI at the same time was  $1.37 \pm 0.06$  (control –  $1.27 \pm 0.06$ ), which also exceeded its control value. The increase in peripheral vascular resistance in unilateral kidney damage, especially in case of acute obstruction of one of the kidneys, was associated with an increase in intra-pelvic pressure in the pelvis-pancreas system. This condition can provoke an increase in the level of prostaglandins and other vasoactive substances, which in turn cause vasoconstriction, maintain irritation of the vascular endothelium, and be an additional stimulation of sustained vasoconstriction.

The determination of the hemodynamic state of the contralateral kidney showed the following values.  $V_{max}$  at the renal artery level was increased to  $0.90 \pm 0.16$  m / s (control -  $0.87 \pm 0.03$  m / s), and  $V_{min}$  at the level of the main trunk, it was  $0.48 \pm 0.11$  m / with (control -  $0.32 \pm 0.06$  m / s). An increase in the speed of blood flow was a pronounced compensatory nature. Insignificant changes occurred with indexes of the index of resistance and pulse index. Thus, IR slightly increased and equaled to the renal artery  $0.57 \pm 0.16$  (control -  $0.63 \pm 0.05$ ). PI in this case was  $-1.55 \pm 0.08$  (control -  $1.27 \pm 0.06$ ). The latter indicates a certain inconsistency of the total capacity of the bloodstream of the opposite kidney to compensatory increase in the rate of blood flow.

In view of the above, we have developed and implemented in practice the following scheme of perioperative method of correction of blood flow of both kidneys with one-sided defeat that requires surgical intervention. All patients in the experimental group received treatment in accordance with the protocols for the provision of medical care in accordance with the type of disease. Operative intervention was carried out in an adequate amount aimed at eliminating the pathological process and its consequences with the implementation of intraoperative measures to restore the functional state of the affected kidney. Taking into account the results of the clinical study of blood flow, experimental data on the modeling of pathological conditions with a stable blood flow and urodynamics disturbance, the terms of the largest circulatory disorder were determined: 3rd, 7th, 10th, and 14th days. To eliminate the spasm of the vessels of the renal parenchyma prescribed drugs that belong to the group of sympatholytic substances and do not cause adrenolytic effects. They were used for 3 days before surgery and for 2 weeks of surgery. Obligatory was the appointment of anticoagulants before surgery and within 3 days after surgery. In the postoperative period, disaggregation was prescribed for 2 weeks. In the remote postoperative period up to 3-4 months, patients were offered phytopreparations that have anti-inflammatory, antispasmodic, antiseptic effect. In order to control the quality of blood circulation restoration in kidney parenchyma after full activation of patients after the operation for 10-14 days, the study of blood flow with ultrasound or radioisotope renography was performed. The developed method is used in the treatment of 50 patients with unilateral kidney damage.

After perioperative correction of renal blood flow in patients with one-sided renal impairment for 10-14 days, there was a decrease in the IR index on the renal artery of the affected kidney to  $0.64 \pm 0.24$  versus  $0.69 \pm 0.09$ , in the segmental arteries the index of resistance increased to  $0.50 \pm 0.16$  versus  $0.47 \pm 0.08$ , and on inter-articular arteries it was  $0.45 \pm 0.24$  versus  $0.41 \pm 0.08$ . These data indicate an improvement in blood flow, but this improvement was more related to the effects of surgical treatment with the elimination of the pathological process. The changes in the index of the opposite healthy kidney were as follows. At the renal artery, its value was  $0.55 \pm 0.14$  versus the initial value of  $0.57 \pm 0.16$ , in the segmental arteries -  $0.29 \pm 0.24$  versus  $0.31 \pm 0.06$ , and in the inter-articular

arteries –  $0,29 \pm 0,16$  versus  $0,31 \pm 0,06$ . That is, changes were systematically noted improvement in blood flow by 7-8%.

**Conclusions.** The use of medical correction of blood flow in the kidneys of patients with one-sided lesions in the perioperative period allows not only to improve it by 7-8%, but also to create favorable conditions for adequate adaptive-compensatory reactions to restore the functional state of both kidneys.

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