

# RECONSTRUCTIVE PLASTIC SURGERY ON THE URINARY TRACT OF A KIDNEY TRANSPLANT

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We present a clinical case of urolithiasis. A patient diagnosed with stage 5 chronic kidney disease due to autosomal dominant polycystic kidney disease after bilateral nephrectomy underwent kidney transplantation with ureteral graft stenting. Two months after the operation, a stone was found in the upper third of the ureteral graft, complicated by necrosis in this area. Reconstructive plastic surgery on the ureter of the transplanted kidney with removal of the ureteral stone achieved the desired clinical effect.

**Keywords:** urolithiasis, ureteroureteral anastomosis, kidney transplantation, urology.

## INTRODUCTION

The main long-term urological complications after kidney transplantation include ureteral strictures (3–12.6%) and development of vesicoureteral reflux into the renal graft (5–20%) [1–3]. Urolithiasis in kidney transplantation is a rare urological complication, occurring at a rate of less than 1% [4], often not diagnosed on time due to renal denervation.

Despite the increasing possibilities of percutaneous correction of obstructions, there remains a certain category of patients requiring open surgical intervention. The indications for surgery are narrowing of the lumen over a significant area, complete ureteral obliteration or technical impossibility of performing percutaneous elimination of obstructions to urine outflow. In a number of patients, endoscopic methods and open surgical intervention fail to restore an adequate urine passage from the graft. Such patients have to live with nephrostomy drainage, which can often lead to recurrent pyelonephritis and premature loss of graft function as well as social maladjustment.

In the post-transplant period with obstructive uropathy, in case of ineffective drainage of the kidney followed by antegrade/retrograde bougienage and stenting of the graft ureter, reconstructive surgical interventions on the urinary tract of the transplanted kidney by open or laparoscopic methods are used [5–7]. Given the incidence and severity of urological complications in kidney transplant recipients, various methods of prevention and correction of urological complications are currently being developed both at the stage of preparing the end-

stage chronic kidney disease patient for surgery and in the post-transplantation period [8].

## RECIPIENT BASELINE DATA

**Male patient T.**, born in 1975 with episodes of increased blood pressure, was admitted at the clinic in 1991 with urolithiasis, kidney stones. Examination revealed multiple renal cysts, diagnosed as autosomal dominant polycystic kidney disease. Later, there were exacerbations of chronic pyelonephritis, gradual increase in renal insufficiency. In 2002, he was diagnosed with end-stage chronic kidney disease. Renal replacement therapy with long-term hemodialysis was initiated.

In August 2019, laparoscopic bilateral nephrectomy was performed due to recurrent chronic pyelonephritis. The patient is on the waiting list for a deceased-donor kidney transplant.

## TRANSPLANTATION AND EARLY POSTOPERATIVE PERIOD

In August 2020, a left kidney transplant was performed from a deceased donor to the right iliac region with graft ureteral stenting. He received tacrolimus, everolimus, and methylprednisolone as immunosuppressive therapy. Delayed graft function was noted in the postoperative period. Oliguria persisted for a long time, the level of azotemia decreased extremely slowly. Percutaneous needle biopsy of the graft showed that the causes of graft dysfunction were acute tubular necrosis, 50% nephrosclerosis. On day 23 after transplantation, the water-excreting function of the graft was restored, creatinine and urea levels decreased. Eleven hemodialy-

sis sessions were performed. Graft function was restored on day 43.

## DIAGNOSIS AND TREATMENT

Two months after kidney transplantation, the patient complained of pain around the kidney graft, decreased urine output. Ultrasound examination of the kidney graft showed that the pelvicalyceal system (PCS) was moderately dilated (renal pelvis 20 mm, calyces 5–7 mm). A hyperechoic mass with clear acoustic shadow was visualized in the projection of the ureteropelvic junction (UPJ) and the upper third of the ureter. Contrast-enhanced spiral CT scan was performed; a series of images visualized a concretion in the UPJ area, extravasation of the contrast agent into the retroperitoneal space (Fig. 1). As a result of examination, urolithiasis in the

transplanted kidney, stone in the upper third of the graft ureter, necrosis in the graft ureter, and extravasation of urine were diagnosed.

To restore adequate urodynamics, it was decided that reconstructive surgery should be performed.

The retroperitoneal space was revised under endotracheal anesthesia. There was slight leakage of a light yellow liquid (urine), a culture was taken, electrolytes (potassium 9.5 mmol/L) were analyzed. On revision of the wound, a 2 cm long graft ureteral defect with a calculus (stone) in it was noted. The stone was removed (Fig. 2).

The necrotic section of the graft ureter was resected. It was decided to form an end-to-end uretero-ureteral anastomosis of the graft ureter. The proximal and distal ends of the ureter were intubated with ureteral stent #7CN (Fig. 3). A circular anastomosis was formed using a 5/0 monofilament thread.

## EARLY POSTOPERATIVE PERIOD

On the first day after surgery, there was a decrease in urine output through the urethral catheter, an increase in the amount of discharge (urine) through a stand-by drainage tube. According to ultrasound findings, there was no fluid accumulation around the graft, and the PCS was not dilated. Based on the above, uretero-ureteral anastomosis failure was diagnosed. A decision was made to drain the PCS with a nephrostomy tube.

Percutaneous nephrostomy of the renal graft was performed under ultrasound control. The flow of pink-colored urine at a moderate rate via the nephrostomy drainage was observed.

On the third day after operation, the stand-by drainage tube was removed due to the absence of discharge.



Fig. 1. Intravenous contrast-enhanced spiral CT imaging (urographic phase)



Fig. 2. Ureteral stone removed from the ureter graft

On day 14, the patient was discharged from the hospital with nephrostomy drainage (creatinine 250  $\mu\text{mol/L}$ ; urea 23.4 mmol/L) to restore renal graft function.

On day 30, the patient was admitted at the Shumakov National Medical Research Center of Transplantology and Artificial Organs in Moscow for antegrade pyeloureterography in the transplanted kidney.

Control antegrade pyeloureterography in the renal graft did not result in contrast agent extravasation, its passage into the bladder was timely. The nephrostomy drainage tube was removed. Control ultrasound scanning amid PCS drainage with urothelial stent did not show any dilatation.

Seven days after removal of the nephrostomy drainage tube, cystoscopy was performed, and the internal ureteral stent was removed.

Control ultrasound examination of the renal graft showed no PCS enlargement, and blood flow velocities in the graft were satisfactory. No urodynamic abnormalities were found. Azotemia at the time of discharge was creatinine 130  $\mu\text{mol/L}$  and urea 12.4 mmol/L.

## DISCUSSION

In the intra- and postoperative period, the patient had no evidence of calculus in the graft PCS. A clinical presentation of acute renal colic in kidney recipients was impossible because of renal graft denervation. Due to lack of clinical manifestations, diagnosis of these cases may be delayed, which in turn would lead to long-term obstruction of the urinary tract, leading to impaired urodynamics, graft dysfunction, necrosis, and perforation of the graft ureter.

It was impossible to use the recipient's own ureter due to the previously performed bilateral nephrectomy as a result of autosomal dominant polycystic kidney disease and recurrent attacks of pyelonephritis. Formation of uretero-ureteral anastomosis with graft ureter stenting or permanent drainage of the graft with a nephrostomy tube were the only ways to restore adequate urine flow from the graft.

Due to the presence of calculus at the border between the UPJ and the upper third of the graft ureter with extravasation of urine, it was decided to perform reconstructive plastic surgery on the native urinary tracts of the renal graft. At the same time, a nephrostomy drainage was used to provide an opportunity for healing of the uretero-ureteral anastomosis.

## CONCLUSION

Uretero-ureteral anastomosis formation in the upper third of the graft ureter with stenting and freeing up by the pelvicalyceal system with nephrostomy drainage can be used in perforative damage of the transplanted kidney ureter when using the native kidney ureter becomes impossible. The clinical effect achieved shows that the surgical tactics are correct. Hence, we recommend the technique for treatment of this rare post-kidney transplant urological complication.

*The authors declare no conflict of interest.*

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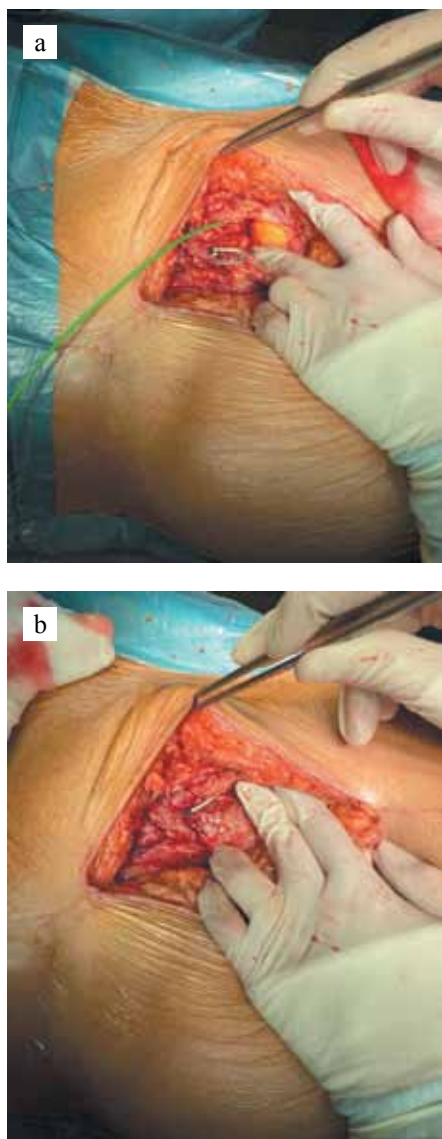


Fig. 3. Resection of the necrotic section of the ureter, formation of uretero-ureteral anastomosis of the ureteral graft

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