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LAPAROSCOPIC URETERAL RECONSTRUCTION IN A KIDNEY TRANSPLANT: SUCCESSFUL CLINICAL CASES

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Treatment of ureteral strictures in the long-term post-transplant period is a complex surgical procedure. We present successful clinical cases of developed laparoscopic ureteral stricture reconstruction methods at three levels (in the pelvis, along the ureter, in the anastomosis area). These methods have shown their clinical efficacy: they are less traumatic, there are no adverse events in the early and long-term postoperative periods, and there is accelerated rehabilitation of recipients after surgery.

Keywords: ureteral stricture, laparoscopy, kidney transplantation, urology.

INTRODUCTION

Ureteral stricture is a common urological complication following kidney transplantation (3–12.6%), especially in the long-term postoperative period [1].

According to various sources, the causes of ureteral stricture are excessive length, insufficient blood supply to the ureter, fibrosis in the surrounding tissues, donor age over 65, cold ischemia time, presence of several feeding renal arteries, delayed graft function, and formation of vesicoureteral anastomosis without stenting [2, 3]. There have been individual cases of ureteral strictures in a renal graft in combination with tubulointerstitial nephritis caused by cytomegalovirus infection [4].

Depending on the location and extent of strictures (distal part in 73% of cases, middle part in 12%, and proximal part in 15%), the most common methods of ureteral stricture treatment are bougienage, endoscopic cold knife dissection, balloon dilation or surgical correction of graft ureteral stricture zone [2, 5].

Currently, laparoscopic correction of urological complications in a kidney transplant is rarely used in clinical practice due to the complexity of this technique. Despite this, it has significant advantages over other methods of treatment: better visualization, ability to accurately identify all structures, which in turn leads to accelerated rehabilitation of kidney recipients after surgery [5, 6, 7].

Development of laparoscopic technologies in transplantology has provided new opportunities for the treatment of urological complications following kidney transplantation. Our accumulated long-term unique experience at Shumakov National Medical Research Center of Transplantology and Artificial Organs allows us to offer various types of laparoscopic surgeries to correct urinary tract obstructions in a transplanted kidney.

Objective: to present successful clinical cases of laparoscopic ureteral reconstruction techniques in a kidney transplant.

CLINICAL CASES

Clinical Case #1: Laparoscopic correction of ureteropelvic junction stricture in a transplanted kidney

In 2013, 42-year-old female patient P., diagnosed with chronic glomerulonephritis, had a deceased-donor kidney transplant surgery. Kidney graft rotation by compression of the ureter at the level of the ureteropelvic junction (peculiarity – high ureteral insertion from the graft pelvis) was detected in the early postoperative period (Fig. 1). The patient repeatedly had nephrostomies and ureteral stent replacements. These were accompanied by persistent recurrent urinary tract infection and required combined antibiotic therapy. In December 2017, laparoscopic correction of ureteropelvic junction stricture in the transplanted kidney was performed.

Under general anesthesia, a 12 mm trocar is inserted into the abdominal cavity in the right paraumbilical region, then a laparoscope is inserted, and the abdominal cavity is examined. Next, 10 mm and 5 mm trocars are inserted in the left paraumbilical and right iliac regions. The peritoneum over the graft is dissected using the apparatus Harmonic© (USA). With a precision technique, the ureteropelvic junction with high ureteral insertion and acute bend of the ureter in this area is highlighted and visualized. As carefully as possible, taking into account the close location of the vascular pedicle of the

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graft, the pelvis and the proximal ureter of the kidney graft are mobilized. The pelvis of the graft is dissected for 1.5–2 cm, with the incision passing to the ureter, which is also dissected in its upper third for 1.5–2 cm. The posterior wall of the renal pelvis is sutured to the posterior wall of the ureter using a monofilament suture. A ureteral stent is placed into the lumen of the graft ureter in an antegrade fashion. The anterior wall of the renal pelvis is stitched to the anterior wall of the ureter with a monofilament suture. Hemostasis control is performed at the end of the operation. The abdominal cavity is drained.

The ureteric stent was removed 6 weeks after ureteropelvic junction plasty. There were no postoperative complications. No recurrent stricture or anastomotic leaks were detected 41 months after operation.

Clinical Case #2: Laparoscopic correction of mid-ureteral stricture in transplanted kidney

In 2016, 24-year-old male patient G., diagnosed with extracapillary glomerulonephritis, had a deceased-donor kidney transplant surgery without ureteral stenting with delayed graft function. Increased dilatation in the pelvicalyceal system two weeks after surgery required drainage of the graft with a nephrostomy tube. Antegrade ureteral stenting was unsuccessful. In February 2017, laparoscopic correction of the middle ureter of the graft was performed (Fig. 2).

Under general anesthesia, a 12 mm trocar is placed in the abdominal cavity in the left/right paraumbilical region, then a laparoscope is inserted, and the abdominal cavity is examined. Next, 10 mm and 5 mm trocars are

Fig. 1. Patient P. Graft rotation and high ureteral insertion from the: A) renal artery; B) nephrostomy tube balloon; C) pelvis, D) ureter; E) ureteropelvic junction (stricture area)

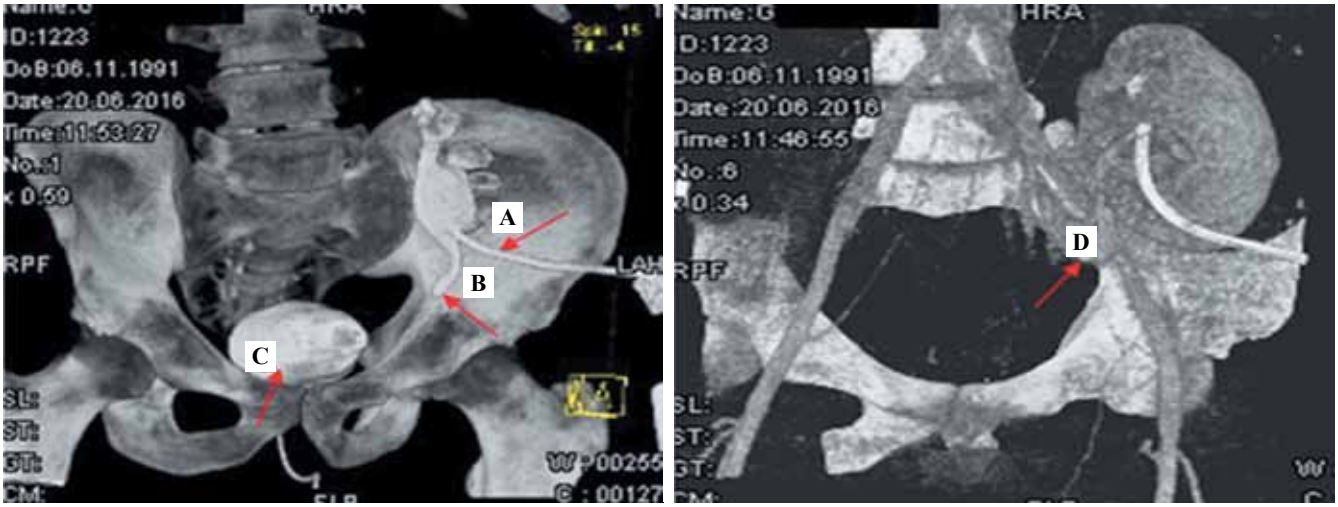

Fig. 2. Patient D. Mid-ureteral stricture in kidney graft: A) nephrostomy tube (antegrade pyeloureterography); B) graft ureter (stricture area); C) bladder (cystography); D) renal artery

placed in the right/left paraumbilical region and left/right iliac region.

The graft ureter is mobilized with an apparatus (Harmonic©, USA) within healthy tissues and the distal end is clipped. Next, ipsilateral nephrectomy is performed with preservation of the distal ureter. Uretero-ureteroanastomosis is formed with ureteral stenting. Hemostasis control is performed at the end of the operation. The abdominal cavity is drained.

After reconstruction, the stent stayed in the ureter for 42 days. There were no postoperative urological, infectious complications. The patient was followed up for 52 months after the operation, and no recurrent stricture was detected.

Clinical Case #3: Laparoscopic correction of uretero-cysto-anastomotic stricture in transplanted kidney

In 2016, 55-year-old patient K., diagnosed with chronic kidney disease of unknown etiology, had a deceased-donor kidney transplant surgery. During outpatient follow-up six months later, increased hydronephrosis was noted, and graft dysfunction developed, which required drainage of the kidney graft with a nephrostomy tube. Next, bougienage and stenting of the kidney graft ureter were carried out. Recurrent vesicourethral anastomotic stricture occurred three months after stent removal (Fig. 3). There was a need to reinsert the nephrostomy tube due to graft dysfunction. In November 2016, laparoscopic correction of the vesicourethral anastomosis was performed.

Under general anesthesia, a 12 mm trocar is placed in the abdominal cavity in the left/right paraumbilical region, then a laparoscope is inserted, and abdominal cavity is examined. Next, a 5 mm trocar is placed in the left/right iliac region and a 10 mm trocar is placed in the right subcostal area.

In the graft area, the peritoneum is dissected with an apparatus (Harmonic©, USA). The bladder is mobilized in the projection of the iliac vessels, the graft ureter is isolated from the scar tissue and its fibrously altered part is cut off. Uretero-cysto-anastomosis is formed with ureteral stenting. Hemostasis control is performed at the end of the operation. The abdominal cavity is drained.

After reconstruction, the stent stayed in the ureter for 28 days. There were no postoperative urological, infectious complications. The patient was followed up for 55 months after the operation, and no recurrent stricture was detected.

CONCLUSION

Despite accumulated experience, kidney transplantation comes with urological complications including ureteral strictures, which adversely affect graft survival and recipient's quality of life.

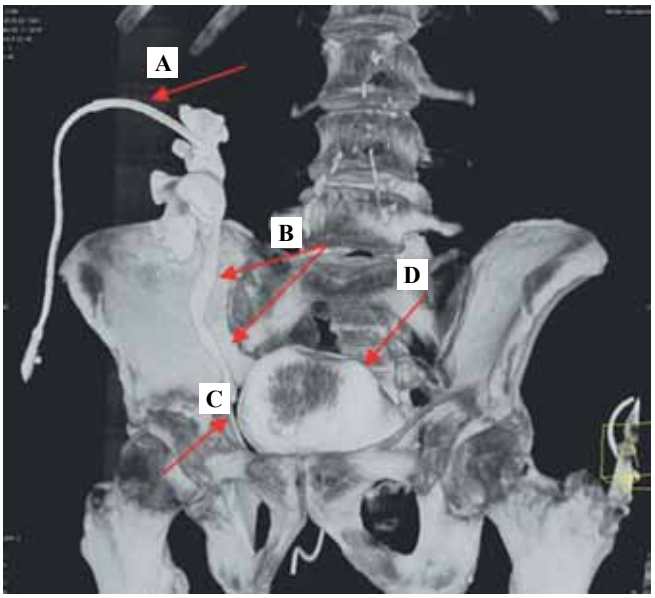

Fig. 3. Patient K. Uretero-cysto-anastomotic stricture: A: nephrostomy tube (antegrade pyeloureterography); B) graft ureter; C) bladder-ureteroanastomosis (stricture zone); D) bladder (cystography)

Laparoscopic ureteral reconstruction on the urinary tracts of a kidney transplant at different levels (in the pelvis, along the ureter, in the anastomosis area) compared to open surgical interventions are less traumatic, the patient requires minimal anesthetic drugs in the postoperative period, the patient is activated early, hospitalization period is less, and there is lower risk of adverse postoperative complications (postoperative wound infection, postoperative ventral hernia) [8–10].

The presented clinical cases of the use of laparoscopic ureteral reconstruction in kidney transplants, created and being used at Shumakov National Medical Research Center of Transplantology and Artificial Organs, have shown to be clinically efficient. Therefore, we recommend them for treatment of urethral strictures in transplanted kidneys at different levels.

The authors declare no conflict of interest.

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