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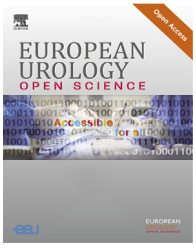

European Association of Urology

Case Report

Robot-assisted Kidney Transplantation in Patients Undergoing Cystectomy with Urinary Diversion: First Cases Reported by the ERUS-RAKT Working Group

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Abstract

The indication for kidney transplantation over a urinary diversion (UD) for patients with severe lower urinary tract dysfunction and end-stage renal disease is a controversial issue. Thanks to advances in robot-assisted kidney transplant (RAKT) programs, the boundaries are being pushed further. We present the first RAKT series reported for patients undergoing simple cystectomy and UD for benign bladder disease. The first case involved simultaneous robot-assisted simple cystectomy with intracorporeal UD and RAKT. The second case involved robot-assisted simple cystectomy with intracorporeal UD and bilateral nephrectomy in the first procedure, followed by RAKT 8 mo later. At 9 mo after surgery, both patients had experienced no complications and had stable renal function with no need for hemodialysis. This first experience of RAKT in patients with cystectomy and UD demonstrates the feasibility and safety of the procedure.

1. Case series

This case series describes the first two robot-assisted kidney transplantation (RAKT) procedures performed after simple cystectomy (SC) and urinary diversion (UD) for benign bladder disease using a da Vinci X (Intuitive Surgical, Sunnyvale, CA, USA) robotic platform.

1.1. Case 1

The first case is a 73-yr-old man with end-stage renal disease (ESRD) on hemodialysis because of vesicoureteral reflux (VUR) secondary to a low-capacity retractable bladder (20 ml) and poor diuresis, presenting with urinary incontinence and recurrent urinary tract infections. His

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body mass index (BMI) was 25 kg/m^2. After discussion, the multidisciplinary kidney transplantation board concluded that the bladder was not viable because of the patient's characteristics. Therefore, simultaneous robot-assisted laparoscopic cystectomy with an intracorporeal ileal conduit and heterotopic RAKT with a living donor graft from his 50-yr-old daughter was proposed.

The patient was placed in the supine position and robotic trocars were inserted in a four-arm configuration (Fig. 1). After cystoprostatectomy (Fig. 2), the ureters were ligated distally. The urinary bladder was removed with an Alexis retractor (Applied Medical, Rancho Santa Margarita, CA, USA). A 20-cm ileal segment was isolated using a SureForm 60-mm linear stapler with a white reload (Intuitive Surgical). A side-to-side anastomosis was used to restore bowel continuity. Finally, the right iliac vessels were prepared and the donor nephrectomy was started in a parallel operating theatre. The renal graft was introduced through the same Pfannenstiel incision. Renal graft vessels were anastomosed in an end-to-side continuous fashion to the external iliac vessels using 6-0 Gore-Tex sutures (Fig. 3). The renal graft was placed in a retroperitoneal pocket in the right iliac fossa (Fig. 4). Ureteroileal anastomosis was performed in an end-to-side fashion using a running 4-0 Monocryl suture after placement of a single-J stent (Figs. 5 and 6).

The cystectomy took 55 min and the transplantation took 110 min; the total operative time was 330 min. Vascular anastomosis for the two arteries took 43 min. Serum creatinine was 287 μmol/l on postoperative day 1, and 174 μmol/l on day 10. The single-J stent was removed on day 21. Normal perfusion of the graft was observed via ultrasound performed 2 mo after surgery (Fig. 7), and creatinine remained stable at 148 μmol/l at 90 d after surgery. No hydronephrosis was observed in the native kidneys and the patient remains asymptomatic.

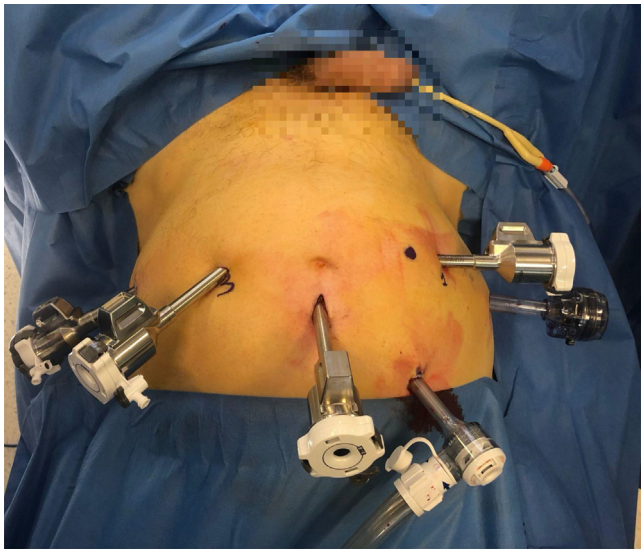

Fig. 1 – Port positioning for robot-assisted laparoscopic cystoprostatectomy and kidney transplantation.

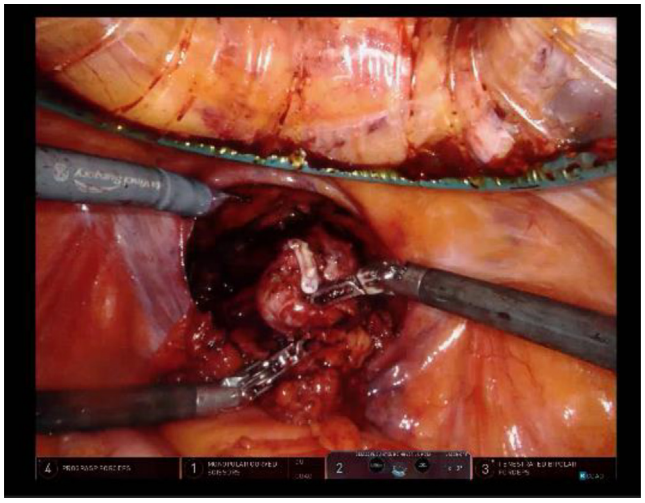

Fig. 2 – Final view of robot-assisted laparoscopic cystoprostatectomy.

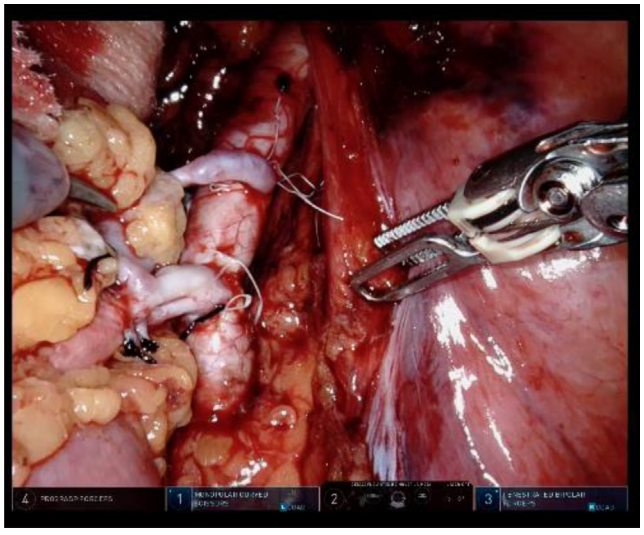

Fig. 3 – Appearance of the double arterial anastomosis.

1.2. Case 2

The second case is a 34-yr-old woman with interstitial cystitis and bladder pain syndrome who developed ESRD due to VUR and bilateral pyonephrosis. Her BMI was 22 kg/m^2. Owing to multiple admissions for urinary sepsis and a disabling painful bladder, it was decided to perform a robot-assisted organ-sparing SC and an intracorporeal ileal conduit with bilateral nephrectomy in a first-stage procedure. After 8 mo on hemodialysis and with the approval of the multidisciplinary kidney transplantation board, the patient underwent parallel surgery with a living-donor nephrectomy graft from her 70-yr-old mother via standard heterotopic RAKT at the right iliac fossa with ureteroileal anastomosis. The patient's creatinine on day 5 was 120 μmol/l. There were no Clavien-Dindo grade I–V postoperative complications at 90 d.

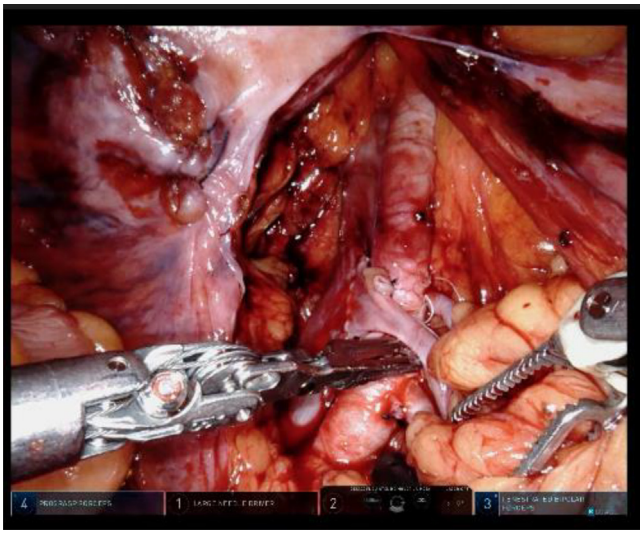

Fig. 4 – Final position of the graft and vascular pedicle.

Fig. 6 – Verification of the ureteroileal anastomosis with indocyanine green.

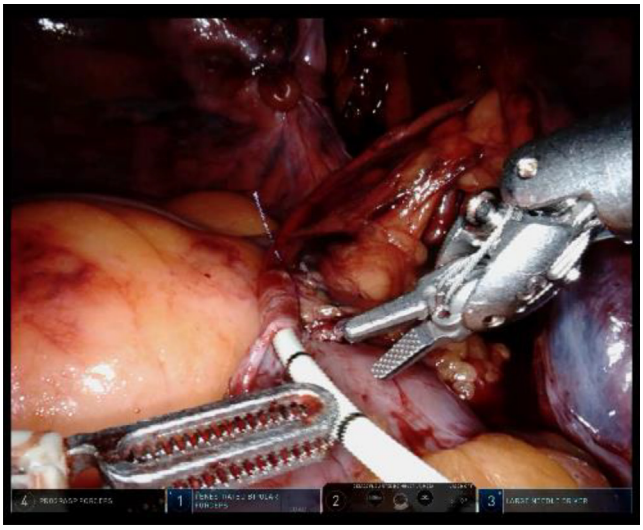

Fig. 5 – Placement of the ureteral single-J stent.

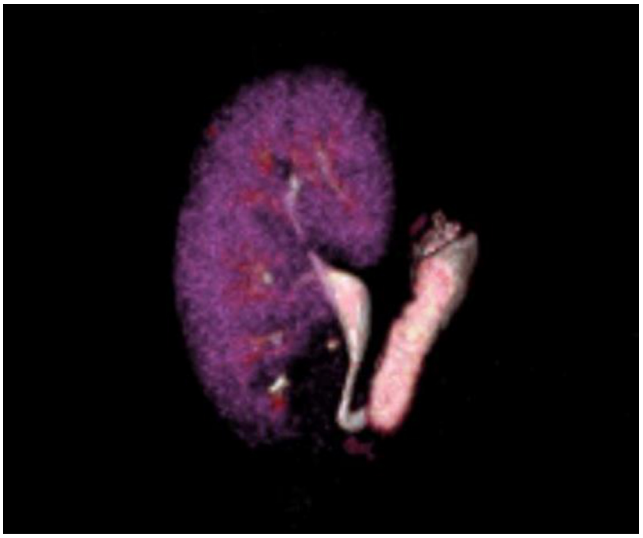

Fig. 7 – Computed tomography reconstruction of the kidney graft and ileal conduit.

2. Discussion

Creation of an ileal conduit during kidney transplantation is a valid method of managing patients with lower urinary tract dysfunction and ESRD [1] but this approach remains controversial. One reason is that immunosuppressive therapy may adversely affect healing of the anastomosis site or incision [2]. It has been shown that UD can be safely performed at the time of kidney transplantation, thus reducing the number of surgeries [3], or before it. From our perspective, performing the procedures simultaneously not only reduces the number of surgeries but also prevents patients from having a prolonged period with an ileal conduit that does not allow urine flow, leading to mucus accumulation and requiring careful management to avoid complications such as stone formation. Furthermore, conducting a second surgery in the right iliac fossa poses greater difficulty in dissecting the iliac vessels for transplantation, with potential for complications during the procedure. Different authors have discussed the possibility of performing continent UDs [4] or terminal cutaneous ureterostomies [5] with good results in terms of preserved renal function. In our opinion, these patients have a higher probability of needing self-catheterizations or stoma dilations, respectively, with a greater risk of infections. Surgical data show that RAKT reduces surgical morbidity in comparison to open kidney transplantation and is associated with good long-term results [6,7].

To the best of our knowledge, these are the first two RAKT cases described for patients who received SC and UD. Our preliminary experience shows the feasibility of this strategy. Especially in immunocompromised patients (ie, kidney transplant recipients), the minimally invasive

approach could potentially reduce surgical morbidity in comparison to the conventional open technique. However, RAKT after cystectomy with UD should be performed in referral centers with a high volume of complex robotic urological surgeries and kidney transplantations.

Conflicts of interest: The authors have nothing to disclose.

CME question

In a patient with lower urinary tract dysfunction and end-stage renal disease for whom robot-assisted kidney transplantation is being considered, when is the ideal time to perform robot-assisted cystectomy with urinary diversion?

A. Both procedures can be performed simultaneously.
B. Robot-assisted cystectomy with urinary diversion can be performed first, and robot-assisted kidney transplantation at a later date.
C. Robot-assisted kidney transplantation should never be performed with a urinary diversion.
D. Options A and B are correct.

Answer: D. Options A and B are correct.

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