Renal transplantation is generally accepted to be the best treatment for patients with end-stage renal disease, which is associated with better quality of life and better life expectancy compared with dialysis. Although the allograft survival following renal transplantation continues to improve, the absolute number of patients suffering from allograft loss continues to grow due to the increasing number of surviving renal transplant recipients. Thus, an increasing number of patients are willing to undergo renal re-transplantation. Due to the shortage of organ donors, the use of marginal donors including donors with ureteropelvic junction obstruction (UPJO) is becoming more prevalent. An anastomosis of allograft pelvis to native ureter has been reported to be a treatment for donor kidney with UPJO at initial transplantation; however, few studies focused on the surgical option for urinary tract reconstruction of donor kidney with UPJO in re-transplantation. The aim of this report was to provide and evaluate a novel surgical option for urinary tract reconstruction in third renal transplantation, using preexisting allograft ureteropyelostomy (UP), which we believe represents an innovative surgical technique for renal transplantation in the world.

A 49-year-old male was diagnosed with renal allograft failure caused by chronic allograft nephropathy and commenced hemodialysis 3 times/week in 2013. This patient had undergone renal transplants twice in the past. Initial transplantation was performed in 1990, with allograft in the right iliac fossa. Dual transplantation was performed in 2003, with allograft in the left iliac fossa. The internal iliac artery and external iliac vein were used both in previous transplants. The allograft ureters were Anastomosed to the bladder. Both allograft kidneys were preserved before third renal transplantation.

Due to dialysis intolerance, this patient underwent a third renal transplant in 2013, from a donor after cardiac death, with normal renal function. The preoperative examination showed negative results on both lymphocytotoxicity and panel-reactive antibodies test. The donor–recipient ABO was compatible. Furthermore, a computed tomography angiography of renal arteries was performed preoperatively. The surgery was performed through previous incision in the right lower abdomen. An allograft nephrectomy was performed at first, in which the middle and distal allograft ureters were preserved because the distal tissue was not dissociated [Figure 1a]. Subsequently, the third renal transplantation was performed. In this procedure, the external iliac artery and external iliac vein were used for anastomosis. After reperfusion of the allograft kidney, the function was recovered immediately. However, hydronephrosis was found unexpectedly, caused by a 5 cm-long congenital upper ureteral stricture of new allograft. The insertion of ureteric stent was failed due to the ureteral stricture. Thus, a ureteral resection was performed, leaving the pelvis for anastomosis [Figure 1b]. Unfortunately, bleeding during...
the dissociation of tissue due to the serious adhesions in the surgical field led to the failure of exposure of native ureter. While visual inspection found no obvious necrosis of preserved ureter following allograft nephrectomy, we anastomosed the preexisting allograft ureter to the new allograft pelvis for urinary tract reconstruction, with end-to-end anastomosis [Figure 1c], and no suture tension. A ureteric stent was placed in this procedure. The surgery was completed within 2.5 h and the amount of intraoperative bleeding was <100 ml.

The immunosuppressive regimen included basiliximab 20 mg/d twice (day 0 and day 4), tacrolimus 6 mg/d, sirolimus 1 mg/d, mycophenolate mofetil 1500 mg/d, and prednisolone 30 mg/d. The patient was discharged 3 weeks postoperatively, with a serum creatinine level of 133.0 μmol/L. The ureteric stent was removed 6 weeks postoperatively. After 1 year of follow-up, he had a well-functioning allograft with a serum creatinine level of 140.0 μmol/L, and without ureteral necrosis, urinary leakage, ureteral obstruction, reflux, calculi, hematuria, or urinary infection.

Re-transplants have been reported to account for 11.8% of all transplant recipients in the United States, and an increasing trend has been reported in previous studies. While a similar graft survival rate of third transplantation has been reported compared with initial transplantation, the clinical and surgical experience is still scarce due to a small amount of practice. A recent study on the third and fourth renal transplantation was performed by Halawa,[3] in which all ureters were implanted into the bladder dome using one of the standard techniques excluding orthotopic renal transplantation. However, with a greater acceptance of using marginal donor kidney, the presence of hydrenephrotic kidney is no longer an absolute contraindication to kidney donation, which may lead to impossibility to perform ureterocystostomy. Thus, an alternative to ureterocystostomy for urinary tract reconstruction was needed.

Although both native UP and ureteroureterostomy (UU) can be used for the management of donor kidney with anatomical abnormality, the serious adhesions in the surgical field in ipsilateral re-transplantation might lead to the failure of exposure of native ureter, which caused impossibility to perform native UP or UU routinely. There were also exceptions when the native urinary malformation existed which could not be used for anastomosis. In this report, we could not use the native ureter due to the serious adhesions. Besides, the native ureter was not investigated by retrograde pyeloureterography before re-operation, which was necessary for the use of native ureter. Thus, we chose a novel surgical alternative, using preexisting allograft UP. Visual inspection was necessary before anastomosis. This surgery must be performed according to the indications as follows: (1) ipsilateral re-transplantation (including multiple renal transplantation); (2) too short allograft ureter (including long or multi-segment ureteral strictures or complete ureteral necrosis); (3) patient with native urinary malformation (including vesicoureteral reflux and orthotopic or heterotopic diversion); (4) patient without preexisting allograft ureteral necrosis following allograft nephrectomy; and (5) patient without acute or chronic rejection. No need of further pelvic dissection for exposure of the bladder and avoidance of vesicoureteral reflux were advantages of this surgery.

This surgery was performed successfully without any complications, especially ureteral necrosis, urinary leakage, and ureteral obstruction, which indicated a feasible surgery. However, a longer follow-up was needed. Unfortunately, further data were insufficient because the patient did not undergo computed tomography urography or magnetic resonance urography scan due to the economic concerns and burden of unnecessary investigations postoperatively.

It is acknowledged that the transplant ureter is highly susceptible for damage due to reduced blood supply, because after explantation from donor, the only source of blood is from the renal pelvic vessels, which run in the periureteral adventitia. However, after 1 year of follow-up, neither necrosis nor stricture of the preexisting allograft ureter occurred following allograft nephrectomy, which raised a question whether there was another pathway for the blood supply of allograft ureter.

Even though several studies demonstrated a well-recognized role for angiogenesis in diseases and therapies,[4,5] none of them discussed the correlation between blood supply and angiogenesis. We supposed that the angiogenesis might
Contribute to the blood supply of preexisting allograft ureter, although further studies are needed.

In conclusion, this report revealed a novel surgical option for urinary reconstruction in third renal transplantation, using preexisting allograft UP, which was feasible as an alternative for urinary tract reconstruction in ipsilateral re-transplantation under certain conditions. Besides, this report also raised a question whether angiogenesis played a significant role in the blood supply of allograft ureter for long-term surviving recipients.

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Conflicts of interest
There are no conflicts of interest.

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