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# En-Bloc Pediatric Kidney Transplant to Adult Recipient with Two Different Ureterovesical Anastomosis Techniques

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
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**Conflict of interest:** None declared

## Case series

**Patient:** Male, 48 • Male, 54  
**Final Diagnosis:** Chronic kidney disease  
**Symptoms:** Auria  
**Medication:** —  
**Clinical Procedure:** Ureteroneocystostomy and ureteroplasty  
**Specialty:** Surgery

**Objective:** Unusual or unexpected effect of treatment





**Background:** En-bloc kidney transplantation from a small pediatric donor to an adult recipient has become more common owing to the shortage of deceased donor kidneys. In pediatric en-bloc kidney transplantation, ureterovesical anastomosis can be done either via ureteroneocystostomy or via partial bladder wall transplantation. We report 2 cases of en bloc kidney transplantation from a pediatric deceased donor to an adult recipient using different ureterovesical anastomosis methods and the long-term outcomes.

**Case Report:** Two pediatric en-bloc kidney transplantations to adult recipients were performed at our center. One case used a graft bladder segment from a 5-month-old male donor that was transplanted to a 45-year-old adult male recipient using the bladder patch technique and one case used 4-year-old male donor kidneys transplanted to a 54-year-old adult male recipient via ureteroneocystostomy with ureteroplasty for ureterovesical anastomosis. Both recipients have shown normal renal function and normal voiding, without urinary complications, such as vesico-ureteral reflux and ureter stricture, during the follow-up period.

**Conclusions:** These 2 case reports suggest that using small pediatric en-bloc kidneys would be a viable option to overcome the increasing shortage of donor kidneys for transplantation regardless of the method of ureterovesical anastomosis.

**MeSH Keywords:** Kidney Transplantation • Vesico-Ureteral Reflux • Urethral Stricture

**Full-text PDF:** <https://www.amjcaserep.com/abstract/index/idArt/914290>

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## Background

Kidney transplantation (KT) is one of the most recommended treatment options for patients with chronic kidney disease (CKD). Since Meakins et al. [1] reported the first successful pediatric en-bloc kidney transplantation (EBKT) to an adult recipient, many case reports of KT using small en-bloc graft kidneys to an adult recipient have been published with good long-term outcomes reported [2–5]. Kato et al. [6] first reported a partial bladder transplantation with EBKT to avoid double ureteroneocystostomies. However, it is unclear which type of vesico-ureteral anastomosis is better in pediatric EBKTs to adult recipients. Therefore, we report 2 cases to support that small pediatric EBKT to adult recipient, with different ureterovesical anastomoses, is a safe and acceptable treatment option for CKD. This case report was reviewed and approved by the Institutional Review Board at Chonbuk National University hospital (IRB No. 2018-03-024).

## Case Report

For the first case, the pediatric donor was a 5-month-old boy who weighed 7.24 kg, and who died of hypoxic brain death (initial serum creatinine of the donor was 0.41 mg/dL; estimated glomerular filtration rate (eGFR) was 194.8 mL/min/1.73 m<sup>2</sup>, with normal range of urine output, without proteinuria). The first case recipient was a 48-year-old man who weighed 76.8 kg and who had CKD secondary to diabetes and hypertension. He had been on peritoneal dialysis for 5 years before transplantation.

For the second case, the donor was a 4-year-old boy who weighed 15.5 kg, and who was declared brain death due to hypoxic brain injury (initial creatinine was 0.45 mg/dL; >2000 mL of daily urine output, without proteinuria). The second recipient was 54-year-old man who weighed 69 kg and who had CKD secondary to diabetes and hypertension. He had been on hemodialysis for 24 months before transplantation.

The first pediatric donor's urinary bladder was retrieved in continuity with bilateral ureters and kidneys that were harvested en bloc, with the proximal end of the aorta and inferior vena cava (IVC) oversewn (Figure 1A). The distal end of the donor's infrarenal aorta was anastomosed end-to-end to the recipient's right internal iliac artery with 7-0 Prolene (polypropylene) and the distal end of the donor's infrarenal inferior vena cava (IVC) was anastomosed end-to-side to the recipient's right external iliac vein with 6-0 Prolene by continuous non-locking suture. The graft bladder patch was anastomosed to the recipient bladder with running 5-0 Maxon (polyglyconate) suture by full-thickness technique without insertion of double-J catheters (Figure 1C), and the donor's en-bloc kidneys were

laid on the psoas muscle perpendicular to the right iliac vessels (Figure 1E). The cold and warm ischemic times were 170 and 39 minutes, respectively.

The second pediatric donor's kidneys were harvested en bloc with bilateral ureters (Figure 1B). In the bench work, the stump of both proximal aorta and IVC were closed with continuous suture, and ureteroplasty was accomplished by side-to-side anastomosis with the distal ureters (Figure 1D). The distal end of the infrarenal aorta and the IVC of the graft were anastomosed end-to-side to the recipient's right internal iliac artery and external iliac vein, respectively, by continuous non-locking suture with Vasculif (polybutester) 6-0. The graft ureter was anastomosed to the anterior dome of the recipient bladder with Maxon 5-0 in continuous suture by full thickness technique without double-J stent insertion (Figure 1F). The cold and warm ischemic times were 197 and 33 minutes, respectively.

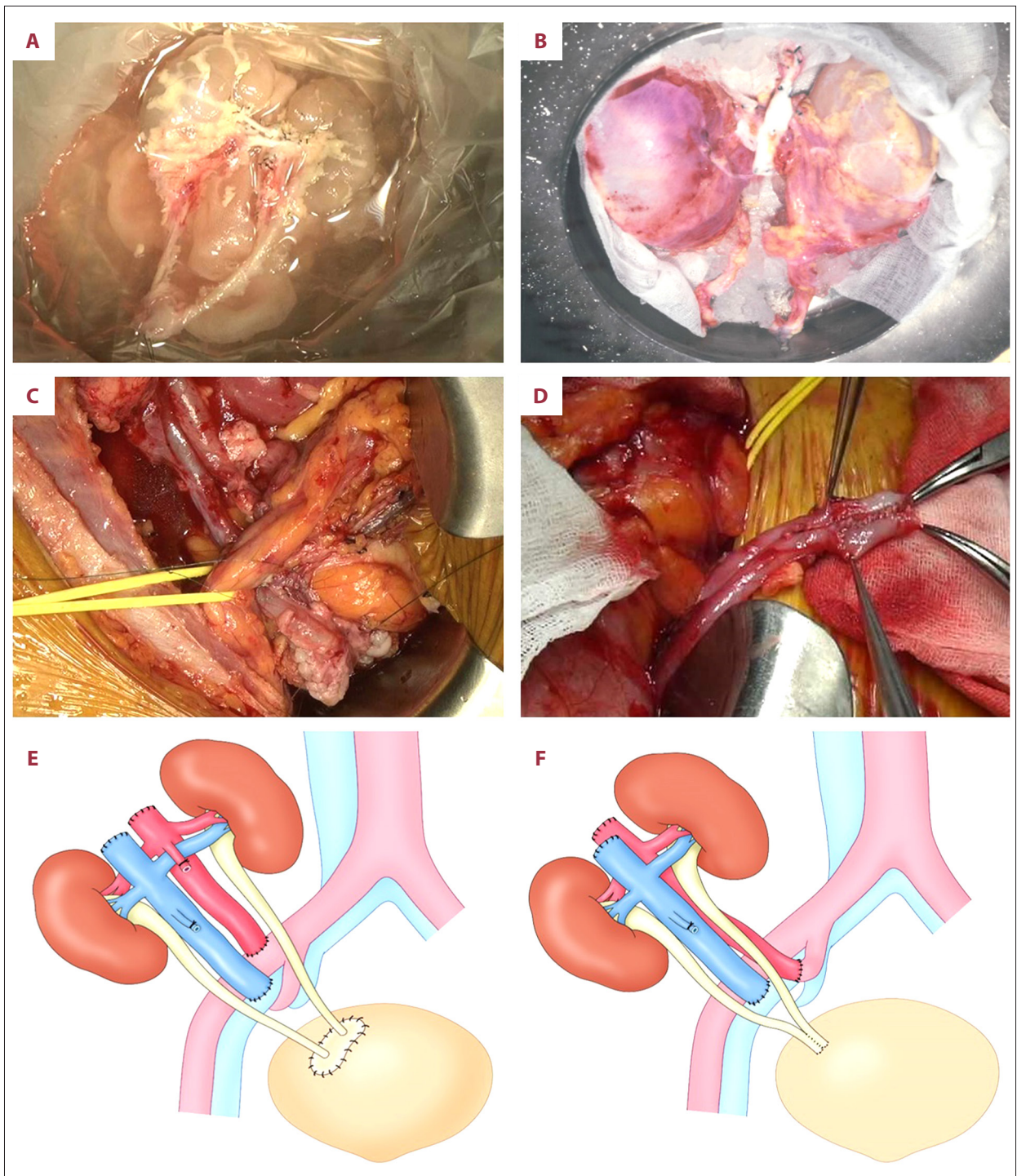
For the first recipient, tacrolimus, mycophenolate mofetil, and prednisolone were used as immunosuppressants. Renal Doppler ultrasound at postoperative day 4 showed normal range of kidney size (7 cm) and arterial resistive index (0.65–0.75), demonstrating normal patency of vessels in both graft kidneys, without stenosis (Figure 2A). Renal scan performed at postoperative day 5 with 99mTc-mercaptoacetyl triglycine revealed normal perfusion and excretion of both graft kidneys. Serum creatinine decreased to 1.67 mg/dL at 14 days post-transplantation. During follow-up at 29 months, the recipient was maintaining good urine output and normal serum creatinine (0.80 mg/dL) with normal eGFR (103.4 mL/min/1.73 m<sup>2</sup>).

The second recipient was also given tacrolimus, mycophenolate mofetil, and prednisolone under the same protocol. Renal Doppler sonography performed at day 4 showed normal range of kidney size (7 cm) and upper normal limit value of the resistive index (0.81) (Figure 2B). Renal scan with 99mTc-mercaptoacetyl triglycine on day 4 showed normal renal excretion. The patient was discharged on day 14 with decreased serum creatinine (1.12 mg/dL). Follow-up renal Doppler ultrasound at 14 months showed upper normal limit range of the resistive index (0.75–0.77). At 100 months of follow-up, serum creatinine was 0.69 mg/dL and eGFR was 101.0 mL/min/1.73 m<sup>2</sup>, without urinary complications.

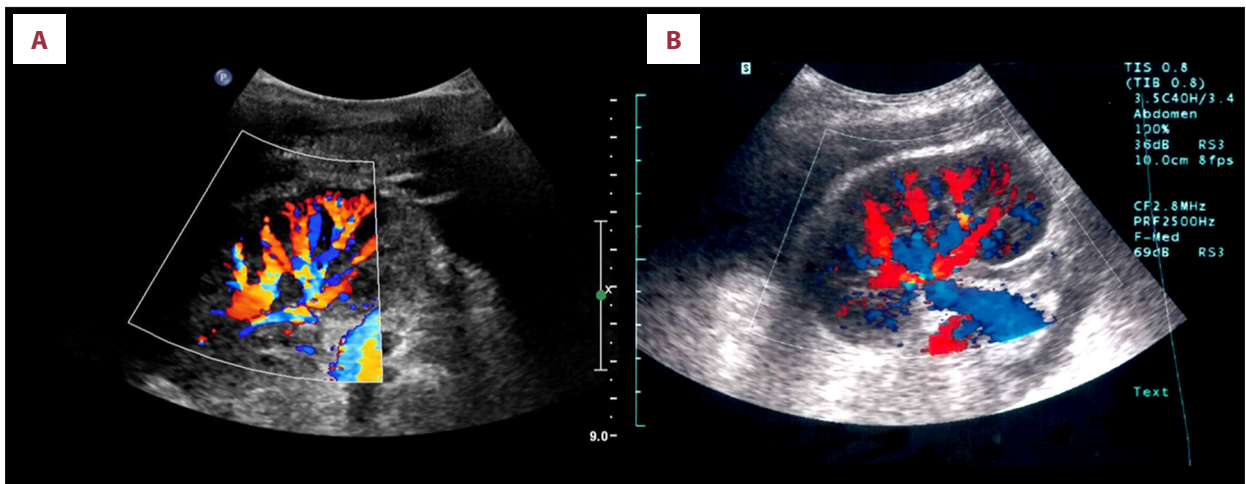
Clinical characteristics of the 2 recipients in this study are summarized in Table 1.

## Discussion

With the increasing demands for grafts for KT and the shortage of donor kidneys, pediatric EBKT to adult recipients should be considered a useful strategy for patients on



**Figure 1.** (A) In the first recipient, pediatric en-bloc kidneys harvested with both ureters and partial segment of bladder and proximal end of aorta and inferior vena cava were prepared. (B) In the second recipient, pediatric donor kidneys were harvested en bloc with bilateral ureters except bladder segment. (C) The partial graft bladder patch anastomosis to the dome of recipient bladder by full-thickness technique in the first recipient and (D) Ureteroplasty was done by side-to-side anastomosis with distal ureters of graft in the second recipient. (E) Donor bladder segment was transplanted with 2 ureters without insertion of double J stent in the first recipient. (F) Ureteroneocystostomy with ureteroplasty of both distal ureters of graft was done without insertion of double J stent in the second recipient.



**Figure 2.** Renal Doppler sonography performed on postoperative day 4 showed normal blood supply without stricture of ureters in both the first recipient (A) and the second recipient (B).

**Table 1.** Clinical characteristics.

	Recipient 1	Recipient 2
Patient age/gender	48 yr/M	54 yr/M
Cause: CKD	DM	DM, HTN
Patient weight (kg)/height(cm)/BMI (kg/m <sup>2</sup> )	76.8/170.8/26.3	69/165/25.3
Donor age/gender	5 mo/M	56 mo/M
Donor weight(kg)/height(cm)/BMI(kg/m <sup>2</sup> )	7.24/66/18.8	15.5/NR/-
Donor kidneys weight (g)	115.8	140.3
Pre-KT dialysis	CAPD	HD
Duration on dialysis (months)	59	24
Pre-KT urine output	Anuria	NR
Cold ischemic time (min)	170	197
Warm ischemic time (min)	39	33
Duration of follow-up (months)	29	100
Ureterovesical anastomosis	Bladder segment augmentation	Ureteroneocystostomy with distal ureteroplasty

yr – years; M – male; DM – diabetes mellitus; HTN – hypertension; CKD – chronic kidney diseases; BMI – body mass index; mo – months; KT – kidney transplant; CAPD – continuous ambulatory peritoneal dialysis; HD – hemodialysis; NR – not recorded.

the KT waitlist [2]. Small pediatric donor kidneys have been underutilized because of high rates of vascular complications and rejections [5,7]. Anastomosing small graft ureters and the bladder is a challenging technique that requires ureteroneocystostomy or augmentation of the bladder segment of graft. Ureteroneocystostomy requires technical skill for ureterovesical reconstruction and long surgery time. However, using the full length of the bilateral ureters with donor’s bladder segment has several benefits over ureteroneocystostomy [8,9].

It requires much less technical skill for ureterovesical reconstruction and has a shorter operation time. Furthermore, the natural anti-reflux mechanism at the ureterovesical junction and tension in ureters could be preserved.

In our 2 cases, we performed different anastomoses between the graft ureters and the bladder in each patient. The use of the bladder segment with EBKT was applied to the first recipient. In the second recipient, ureteroplasty was done by

joining the distal ureters to widen the diameter of the ureter, which would be beneficial in preventing stricture due to ureteroneocystostomy. All recipients showed increased kidney size and normal renal function during follow-up periods without serious complications such as rejection, thrombosis, or urinary complications.

## Conclusions

In conclusion, the favorable outcomes of our 2 cases could support the previous reports demonstrating that small pediatric

EBKT to an adult recipient is safe. Although anastomosis with the bladder segment of the graft is easier to perform and faster compared with ureteroneocystostomy, with careful and skilled management, both techniques could be acceptable and provide good outcomes. Therefore, pediatric EBKT to an adult recipient should be considered as an acceptable treatment option for CKD.

## Conflicts of interest

None.

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