Polytetrafluoroethylene Vascular Graft as a Rescuer of Short Renal Vessels During Kidney Transplantation

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INTRODUCTION

Short or damaged renal vessels represent a serious challenge during kidney transplantation. The increasing risk of thrombosis, bleeding, or compromised kidney function often leads to declining the donated kidneys with damaged vessels.[1] We here describe 5 kidney transplantations in which a polytetrafluoroethylene (PTFE) vascular graft was interposed between the short renal vessels and the recipient's vessels. The PTFE graft was used both as arterial and venous grafts. We could not use either of the described techniques as a means of lengthening the vessels[2,3]; therefore, we used a synthetic vascular graft for our patients.

TECHNIQUE

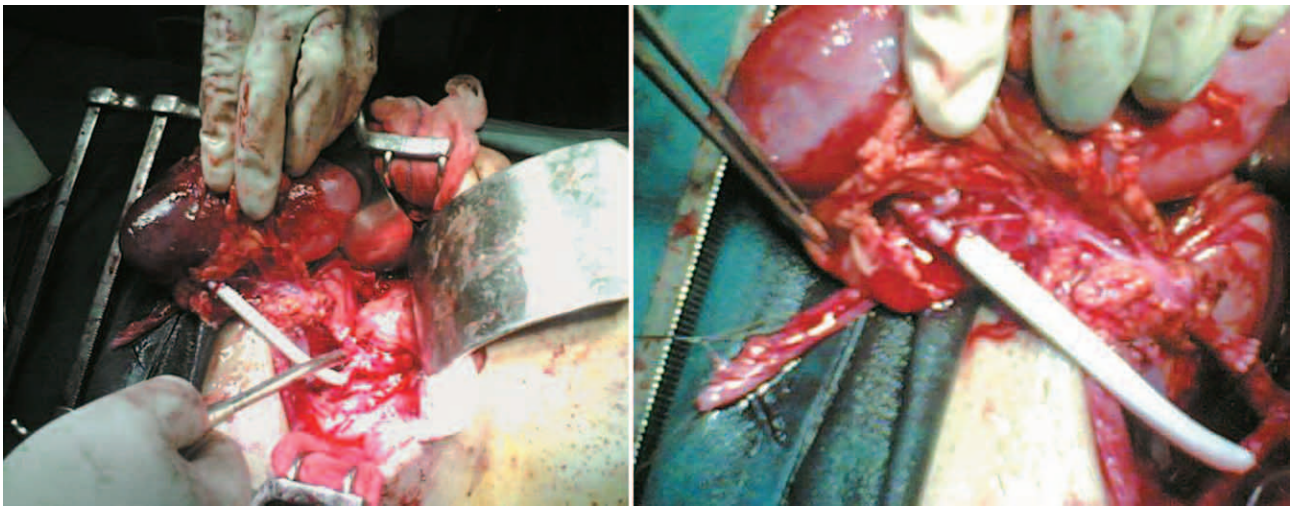
The patients' characteristics are listed in Table 1. We used the PTFE vascular graft (GORE-TEX, WL Gore & Associates, Newark, Delaware, USA) as an arterial graft in 2 kidney allograft recipients and as a venous graft in 3 others with short donor's renal vessels during kidney transplantation (Figure). In recipients 1 and 2, the graft was used to make end-to-end (recipient 1) and end-to-side (recipient 2) anastomoses between the donor's renal artery and the recipient's external iliac artery (Table 1). In these 2 cases, the donor's renal veins were anastomosed end-to-side to the external iliac veins.

In the 3 other recipients, shortness of the donor's renal veins made us use the PTFE vascular graft as a venous graft for lengthening the veins and making end-to-end anastomoses between the renal veins and external iliac veins (Table 2). The donor's renal arteries and external iliac arteries were successfully anastomosed by end-to-side anastomoses without any problems.

Table 1. Demographic and Clinical Characteristics of Kidney Allograft Recipients With Polytetrafluoroethylene Graft for Renal Vessels*

Patient	Age, y	Sex	Primary Disease	Donor Source	Graft Indication
1	36	Male	GN	Living Unrelated	Excision of the artery because of lymphocele and narrowing
2	36	Male	Graft Loss	Cadaver	Shortness of the donor's accessory renal artery
3	53	Female	VUR and ureteral Obstruction	Living Unrelated	Shortness of donor's renal vein
4	53	Male	Graft Loss	Living Unrelated	Shortness of donor's renal vein
5	36	Male	Hypertension	Living Unrelated	Shortness of donor's renal vein

*GN indicates glomerulonephritis and VUR, vesicoureteral reflux.



Left, Ischemia in the lower pole of the transplanted kidney was seen before the use of polytetrafluoroethylene graft. **Right,** All ischemic manifestations disappeared when the graft was used for anastomosis of the accessory renal artery with the external iliac artery (recipient 2).

Table 2. Outcome of Kidney Transplantation and Polytetrafluoroethylene (PTFE) Graft for Renal Vessels

Patient	Graft Type	PTFE Length, cm	PTFE Diameter, cm	Anastomosis Type	Serum Creatinine at Discharge, mg/dL	Follow-up, y	Last Serum Creatinine, mg/dL
1	Arterial	4	0.6	End-to-end, external iliac artery	1.70	6.0	1.40
2	Arterial	7	0.6	End-to-side, external iliac artery	1.60	2.0	1.20
3	Venous	4	0.6	End-to-end, external iliac vein	1.60	1.0	1.30
4	Venous	4	0.6	End-to-end, external iliac vein	1.10	1.0	1.20
5	Venous	4	0.6	End-to-end, external iliac vein	1.00	0.5	1.12

We did not use anticoagulant drugs in any of our patients, and they received only conventional immunosuppressive drugs.

RESULTS

The outcomes are listed in Table 2. The experience of using the PTFE vascular graft as venous and arterial grafts during kidney transplantation was successful in all of our patients, and postoperative Doppler ultrasonography showed no complications in any of them. The median follow-up period was 1.0 year (range, 0.5 to 6.0 years). All of the signs and symptoms existing due to end-stage renal failure before the transplantation were completely disappeared after the operation in our patients, and none of them experienced any kind of rejection. Serum creatinine level decreased remarkably and the median last creatinine level among these patients was 1.20 mg/dL (range, 1.12 mg/dL to 1.40 mg/dL). No complications were reported during the follow-up period.

DISCUSSION

Short and damaged vessels extend the length of the warm ischemia time during renal vessel anastomosis in kidney transplantation. Various methods have been described to repair these vessels, but most of them may cause serious adverse effects.[4] The use of synthetic vascular grafts such as PTFE can solve the problems without those adverse effects. However, there are few reported cases in which a PTFE vascular graft was used for reconstruction of the short or damaged renal vessels during kidney transplantation. Delpin described 2 cases of short renal vein repairs with the use of PTFE vascular grafts without any complications.[5] In another report, Blacklock and colleagues[6] described a successful case of renal autotransplantation with interposed PTFE vascular graft as a cure of loin pain/hematuria syndrome. In another study, Kamel and colleagues[7] described 3 cases in which the PTFE graft was used as a vascular graft during kidney transplantation. They did not report any

technical problems or complications.

Our report added 5 new cases of PTFE graft use as a renal vascular graft, as both arterial and venous grafts, to what has been described to date. Four of our patients were receiving a kidney from living unrelated donors. The use of PTFE vascular graft as a renal venous graft in 3 of the patients adds another successful experience to what has been reported previously. Since there were only 2 reported cases of PTFE usage as a renal venous graft before,[5] we hope that by adding 3 new cases to the literature, its utilization in the future will increase. In our cases, the patients had uneventful follow-up periods that convince the surgeons to use it more assuredly. Systemic heparin was not used for any of the patients due to the reported increased risk of bleeding and the greater need for blood transfusion in transplant surgeries associated with heparin use.[8]

Our report provides an easy-to-use technique for solving the problems of short and damaged renal vessels during kidney transplantation. Although we did not experience any complications in the use of the PTFE grafts, there is little information in the literature pertaining to the long-term outcome of the PTFE grafts in kidney transplantation. Most of the long-term data on the use of the PTFE grafts originate from its application in lower limb revascularization.[9,10] Those grafts tend to be long with a slow blood flow, while the PTFE grafts in kidney transplantation are short in length and have a high blood flow. Therefore, it seems renal PTFE grafts may have better long-term results than those used in lower limb revascularization.

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CONFLICT OF INTEREST

None declared.

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