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CASE REPORT

Transplantation of en bloc pediatric kidneys with a partial bladder segment in an adult recipient

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Summary

The success of transplantation of the urinary bladder en bloc with pediatric kidneys remains undetermined. We transplanted a large portion of the bladder with en bloc kidney allografts from a 13-month-old donor into a 45-year-old adult male. The recipient, who was on long-term hemodialysis, had a small urinary bladder consistent with long-standing anuria. Informed consent was given and bilateral kidneys were transplanted en bloc with both ureters and bladder. The patient's bladder was augmented with the donor bladder and bilateral ureteroneocystotomies of small ureters was avoided. At 3 and 18 months post-transplantation, cystoscopies revealed a viable bladder with new vessels and normal donor bladder. Cystogram revealed no reflux. The bladder segment was reperfused via blood supply from both ureters and then from the recipient's bladder. It seems that bladder transplantation en bloc with pediatric kidneys is a viable option for augmentation of a small recipient bladder that allows avoidance of very small bilateral ureteroneocystotomies.

Introduction

Deceased donor kidneys from small pediatric donors have been considered marginal and underutilized. The discard rate of kidneys from donors weighing <10 kg is 40.3%, which is high when compared with 10.5% of the 10–21 kg subgroup [1]. Vascular complications and acute rejection are the most common causes of early and late graft losses [2,3]. Urinary complications are less common and have less impact on allograft survival but they impact on morbidity after transplantation [2]. Over the years, pediatric en bloc kidneys have been used more and more in our institution including kidney and simultaneous pancreas and kidney transplantation [4,5]. Just recently, Kato *et al.* [6] reported a partial bladder wall transplantation that was performed with en bloc pediatric kidney transplant. The recipient was a 12-month-old girl. It was done to avoid double ureteroneocystostomies and as augmentation cystoplasty.

We proceeded to perform the same procedure in an adult recipient with small bladder capacity. The main reason was to avoid double ureteroneocystotomies using small caliber donor ureters in a contracted bladder. This technique could facilitate the use of kidneys from very small donors and also to avoid augmentation cystoplasty in pediatric recipients waiting for a deceased donor.

Case report

Pediatric en bloc kidneys and bladder from a 13-month-old donor who weighed 9 kg was transplanted in a 45-year-old male kidney transplant candidate. He had end-stage renal disease secondary to membranous glomerulonephritis and had been on hemodialysis for 10 years prior to transplantation. There was a one-antigen match in the HLA-DR locus. T- and B-lymphocyte crossmatches were negative. The donor kidneys both measured 5.5 × 3 cm. Written informed consent was obtained prior

Figure 1 Pediatric en bloc kidneys with both ureters and intact bladder. Ureters and bladder were removed with abundant surrounding tissue.

to surgery and complications associated with the procedure were explained to the patient including, vascular and urological complications. The institutional review board (IRB) at the University of Miami reviewed the informed consent, and written permission was given by the patient for publication. IRB approval was granted for this case report.

Surgical technique

The donor urinary bladder was retrieved in continuity with bilateral kidneys and ureters (Fig. 1). The donor bladder was transected at the level of the bladder neck. The vascular anastomoses were performed at the level of

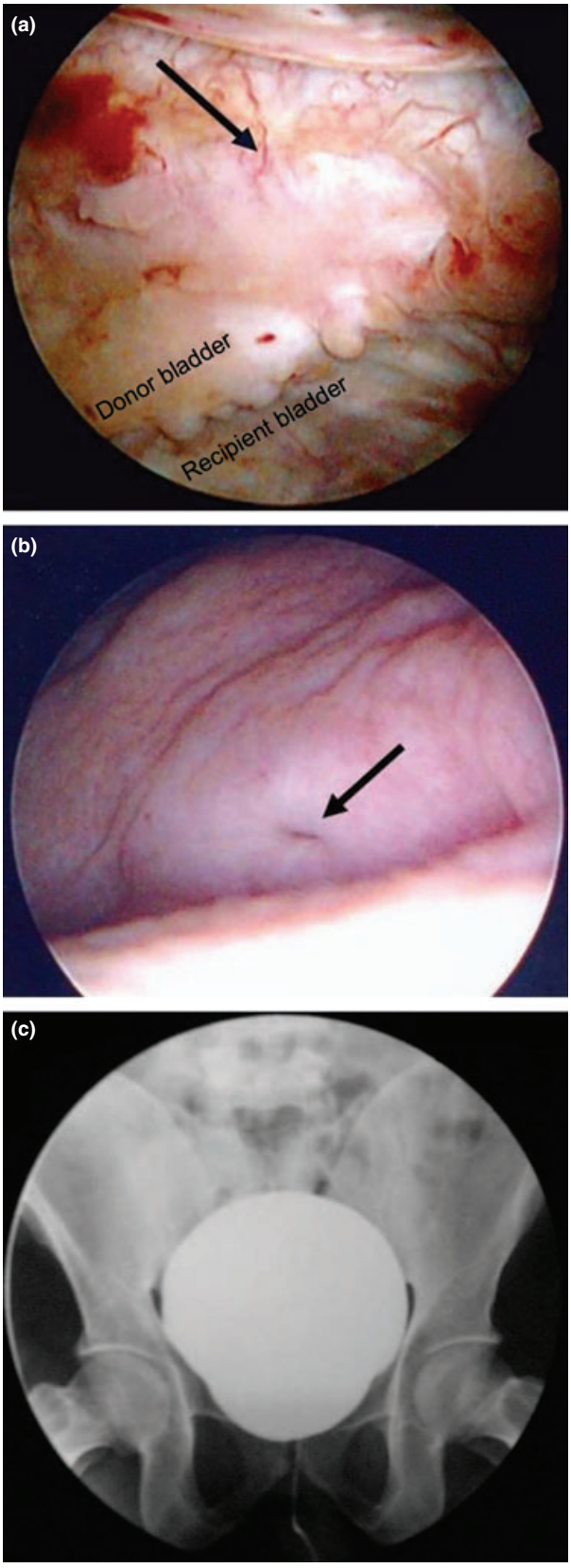

Figure 2 (a) Cystoscopy at 3 months. Bladder is viable with the formation of new vesssels. The margin of the donor bladder is still identifiable as a suture line. (b) Cystoscpy at 18 months. Bladder is still viable with intact trigone with normal donor ureteral orifices. It is difficult to distinguish the donor bladder patch from the recipient bladder. (c) Cystogram shows no reflux with bladder capacity of over 400 cc.

the donor aorta and inferior vena cava, respectively to the recipient's right external iliac artery and vein. The trigone with both ureters and a large segment of bladder was anastomosed using running 4–0 polydioxanone to the recipient bladder's dome. Double-J stents 4.5 French 10 cms (Gyrus ACMIA, Southborough, MA, USA) were placed in both ureters. The ureters were not redundant. The patient was induced with thymoglobulin and daclizumab. Thymoglobulin (1 mg/kg) was given intraoperatively, with similar additional postoperative doses on days 3 and 5. The first dose of daclizumab (1 mg/kg) was also given intraoperatively, with one additional dose 14 days later. Tacrolimus was initiated at a dose of 0.1 mg/kg twice daily after renal function had improved, i.e., serum creatinine concentration decreased to <4 mg/dl absent dialysis. Target (12 h) trough level of tacrolimus was 4–6 ng/ml. The target mycophenolate mofetil dose was 1 gm twice daily. Methylprednisolone was given intravenously at 500 mg per day for 3 days postoperatively, with subsequent weaning to complete withdrawal after the first postoperative week (steroid avoidance). The postoperative course was uneventful. Ureteral stents were removed at 6 weeks post-transplantation. Cystoscopy at 3 months revealed a viable donor bladder wall with new recipient vessels going into the donor bladder wall (Fig. 2a) and at 18 months a viable trigone with normal ureteral orifices (Fig. 2b). Finally, the cystogram showed a good bladder capacity and no reflux (Fig. 2c).

Discussion

The use of a segment of bladder with the trigone and both ureters with intact anti-reflux mechanism is a viable option in cases involving the use of very small en bloc pediatric kidneys donors. The other surgical alternative is to perform two separate ureterovesical anastomoses which is technically challenging, with the potential of increasing postoperative morbidity. Hiramoto *et al.* [7] reported good results in utilizing pediatric en bloc kidneys from young low-weight donors. Long-term graft survival and renal function were excellent. With those results, more transplant centers would be utilizing en bloc pediatric kidneys and we offer the option of using a segment of a bladder with preservation of the natural anti-reflux mechanism. Capizzi *et al.* [8] reported that 20% of pediatric patients requiring renal transplantation will have a bladder either poorly compliant or working under high pressure. In this condition augmentation cystoplasty is an accepted recommendation [8], although successful rehabilitation of a severely contracted bladder without augmentation has also been reported [9]. Using en bloc pediatric kidneys with a bladder patch could eliminate the need of the augmentation procedure before renal transplantation [6].

The ureters of these en bloc kidneys could be short and small in size with a compromised blood supply which translate to an increase of the incidence of urinary complications after the ureteroneocystostomy. These complications have been reported to be between 2.5% and 28.5% [10,11]. Using the complete length of the ureters and anastomosing the donor bladder segment to the native bladder would avoid two ureteroneocystostomies and any degree of tension in case of shorts ureters.

One of the main concerns of this technique was ischemia and contraction of the bladder segment, but cystoscopy revealed viable tissue with presence of new blood vessels from the native to the transplant bladder and the cystogram also revealed a good bladder capacity. Gutierrez Calzada *et al.* [12] have previously reported en bloc kidney and bladder transplantation from a 3-year-old donor to an adult recipient, although the kidney graft had had a limited function and was eventually lost because of refractory rejection. Our findings of the cystoscopy and the cystogram concur with their findings at 6 months post-transplant, demonstrating uniformity of the entire vesical mucosa of the donor-recipient bladder complex. There was no evidence of vesicoureteral reflux.

In conclusion, the technique of using en bloc pediatric kidneys and suturing the donor bladder to the native bladder has been shown to be feasible and safe and it is another approach to avoid pre or intra-transplantation bladder augmentation and bilateral ureteroneocystosotmies of very small pediatric ureters.

Authorship

GC, TK, LC, JS, ASL, and GWB: performed, reviewed, and wrote the case report.

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