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Successful transplantation of a divided horse-shoe kidney following prolonged donor hypotension and long-distance transportation

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Sir:

The pool of patients with end stage renal failure awaiting kidney transplantation has expanded over the past years, whereas the number of cadaver organ donors has remained constant. Due to this progressive shortage, kidneys with atypical anatomy may also be considered for transplantation.

A 16-year-old male (blood group AB, Rhesus positive) without a history of urinary tract disease (Blood urea nitrogen 3.3 mmol/l; serum creatinine 82 $\mu\text{mol/l}$) was diagnosed as being brain dead after a severe cerebral trauma. Permission for organ donation was granted by the family. In spite of adequate infusion and inotropic support, hypotension due to excessive capital blood loss persisted for almost 3 h. The maximal systolic blood pressure was 60 mm Hg. A DBTL (double-balloon-triple-lumen) catheter was inserted into the right common iliac artery after an abdominal incision, and perfusion with University of Wisconsin solution was started. A horseshoe shaped kidney was explanted, following a standard surgical approach. Inspection revealed a single vein and ureter on each side. The right side had one main and one accessory artery. One artery was

present on the left side. Macroscopically, the isthmus contained normal parenchyma. A radiopaque contrast medium was retrogradely injected into both ureters, revealing two separate urinary collecting systems. The horseshoe kidney was divided sharply through the isthmus and the two halves were perfused in a Gambro preservation machine (Gambro, P.O. Box 2169, 4800 CD Breda, The Netherlands) for viability testing. Established parameters indicated that both halves of the horseshoe kidney were suitable for transplantation [1]. The AB bloodtype was an obstacle against finding recipients within the Eurotransplant exchange programme, so the kidneys were offered to the Sindh Institute of Urology and Transplantation in Karachi, Pakistan, where they were accepted. Both halves were transported to Pakistan while still being machine perfused.

After a cold ischemic time (CIT) of 59 h, the left side of the kidney was transplanted into a 35-year-old female with end stage renal failure of an unknown origin. She had 5 HLA mismatches. The renal artery was anastomosed to the external iliac artery. Reperfusion was good, and the second warm ischemic time (WIT2) was 55 min. Diuresis started 4 days post-operatively, and haemodialysis was stopped after 11 days. A graft biopsy, obtained one month after transplantation showed no signs of rejection. Her serum creatinine was 162 $\mu\text{mol/l}$ two months after transplantation.

The right side of the kidney was transplanted into a 45-year-old female who suffered from end stage renal failure due to hypertension. She also had 5 HLA mismatches. The cold ischemic time (CIT) was 61 h. The renal- and the accessory artery were anastomosed to the external iliac artery. Reperfusion was good, and the second warm ischemic time (WIT2) was 81 min. Function was delayed, and first diuresis was

observed 7 days after transplantation. In this patient, haemodialysis was discontinued at day 14. A graft biopsy was not taken. Two months after transplantation, she developed a respiratory tract infection, leading to a septic shock and death.

Horseshoe kidneys are one of the most common congenital renal anomalies, with an estimated incidence of 1:600–800 people. It is frequently accompanied by urinary tract abnormalities (e.g. infection, hydronephrosis, calculus formation) [2, 5]. Horseshoe kidneys can be transplanted en bloc or they can be split and transplanted into two recipients, depending on the number of vessels and the anatomy of the urinary collecting system [3, 4]. Several cases of transplantation of horseshoe kidneys have been described, and the results are considered good [2–5]. However, certain conditions should be met when harvesting and transplanting a horseshoe kidney. The donor should be meticulously evaluated for a history of renal disease or recurrent urinary tract infections. The kidney should be explanted en-bloc and separated on a back table after careful inspection of the vascular anatomy. All calyceal openings and parenchymal layers should be repaired. Transplantation should take place into the ipsilateral side because of the usual short vessels [2, 5]. This case shows that the combination of a hypotensive donor with an unexpected anatomical variation such as a horseshoe kidney and a long cold ischemic time can lead to good posttransplant kidney function. Considering the shortage of cadaveric donors, horseshoe kidneys should be used for transplantation, either divided or en-bloc.

References

1. Daemen JHC, Oomen APA, Janssen MA, van de Schoot L, van Kreeel BK, Heineman E, Kootstra G (1997) Glutathione S-transferase as predictor of functional outcome in transplantation of machine-preserved non-heart-beating donor kidneys. *Transplantation* 63: 89–93
 2. Ratner LE, Zibari G (1993) Strategies for the successful transplantation of the horseshoe kidney. *J Urol* 150: 958–960
 3. Shen GK, Salvatierra O Jr, Dafeo DC, Alfrey EJ (1998) Use of split horseshoe kidney for transplantation. *Surgery* 123: 475–477
 4. Thomson BN, Francis DM, Millar RJ (1997) Transplantation of adult and paediatric horseshoe kidneys. *Aust N Z J Surg* 67: 279–82
 5. Vromen MAM, Kootstra G (1988) The use of horseshoe kidneys for transplantation. *Transplant Proc* 20: 765–766
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