Pelvic kidney for living transplantation: case report and review of the literature

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Abstract

Introduction: The difference between available kidneys and the number of patients on waiting list for kidney transplantation continues to grow. For this reason the trend is to use donors with expanded criteria, such as a pelvic kidney, as we describe below. **Case report:** Male patient 25 years-old with end-stage kidney disease, receives as a graft a pelvic kidney from his father, 49 years-old, known to have controlled systemic arterial hypertension and nephrolithiasis by history without new episodes in the last 10 years. Function and anatomy of the pelvic kidney were evaluated through magnetic angioressonance, computarized tomography and scintigraphy. After an initial rejection episode promptly treated, the patient has had an uneventful recovery. **Conclusion:** To increase the number of kidneys available for transplantation, it is reasonable to use a pelvic kidney, after a thorough investigation.

Keywords: adult; chronic, kidney failure; kidney pelvis; living donors; organ size; pelvis; treatment outcom; urogenital abnormalities.

Introduction

Despite the efforts of transplantation centers, the growing number of patients with end-stage renal disease and the limited offer of kidneys from living donors produce longer lines of individuals waiting for a kidney transplant.[1] Thus, the relevance of kidneys removed from deceased donors and individuals with expanded criteria, which may be characterized as less than ideal kidneys, has increased. One example is the case of kidneys procured from deceased individuals aged 55 or older or subjects diagnosed with *diabetes mellitus* or systemic hypertension, which may be biopsied before transplantation to assess graft viability and survival.[2] Another possibility is using an ectopic kidney as in the case described below.

Case report

A 25-year-old male individual diagnosed with systemic hypertension for four years and a possible case of familial nephropathy underwent a preemptive renal transplant procedure when his creatinine clearance reached 11 ml/min/1.73 m^2. Except for a prior tonsillectomy and a procedure to repair a deviated septum, the patient had no comorbidities. He was 172 cm tall and weighed 60 kg, and had a body mass index (BMI) of 20. The patient had never had a blood transfusion; his panel-reactive antibody (PRA) was 0, and his serologic tests for hepatitis B, hepatitis C, and HIV were negative.

The donor was his father, a 49-year-old man diagnosed with systemic hypertension for two years. He had been treated with single-drug therapy and had normal ambulatory blood pressure monitoring (ABPM) findings. The donor had undergone a laparoscopic cholecystectomy procedure three years

before and had had two episodes of kidney stones, the most recent 13 years prior to transplantation. He was 163 cm tall and weighed 70 kg (BMI 26). Immune tests revealed he had the same blood type as his son (O), negative test results in flow cytometric crossmatching and 3/6 mismatches. His creatinine clearance was 132 ml/min/1.73m^2 and his 24-hour urinary protein was 50 mg.

Computed tomography (CT) urography showed the right kidney was in the usual position, while the left kidney was in a pelvic position with a 22-mm parenchyma and an 11-mm cortical cyst in the middle third with thin septa (Bosniak 2), without alterations to the collecting duct system. Scintigraphy (Figures 1 and 2) revealed the pelvic kidney had 45% function and patent excretory pathways. Magnetic resonance angiography (MRA) scans (Figures 3 and 4) showed two arteries starting from the lower third of the aorta and the left common iliac artery nourishing the pelvic kidney. The renal vein drained to the external iliac vein and the ureters had no anatomic variation.

The donor kidney was removed in a laparoscopic procedure through a Pfannenstiel incision. The Eurocollins® perfusion solution was used. The arteries were implanted separately; one had a thrombus in one of its branches, which yielded poor perfusion later on. End-to-side anastomoses were produced between the common iliac artery, the external iliac artery, and the external iliac vein with Prolene® 6.0. Cold ischemia time was 1 hour and 36 minutes and warm ischemia time was 3 minutes and 55 seconds. Diuresis occurred immediately and no drains were put in place.

After an initial improvement in renal function, the recipient presented with high levels of plasma urea and creatinine three days after surgery and required two hemodialysis sessions. A biopsy was performed four days after surgery and the patient was diagnosed with acute vascular rejection (Banff IIA); he was prescribed pulse therapy with 1.5 gram of methylprednisolone and a cumulative

Figure 1. Scintigraphy.

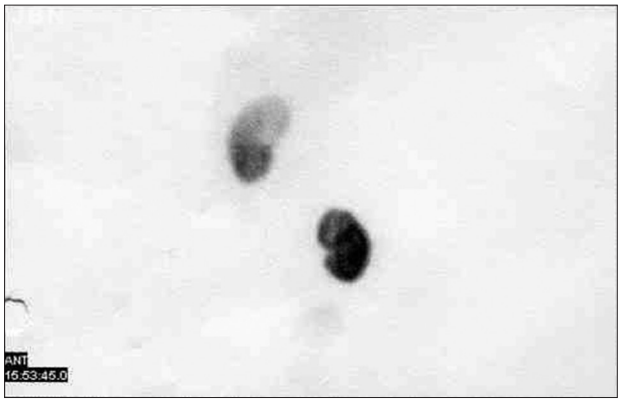
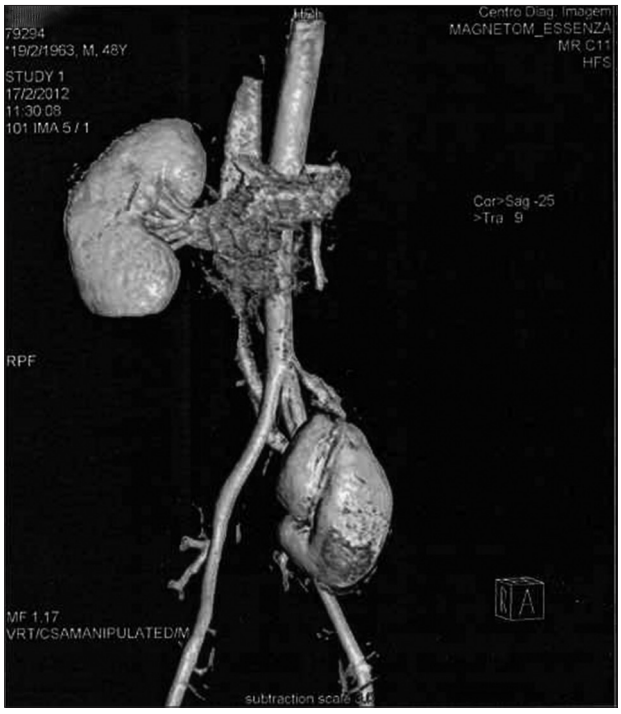


Figure 2. Scintigraphy.



dose of 6 mg/kg of a lymphocyte-depleting agent (Thymoglobuline®). The patient's nitrogenous waste levels decreased gradually, and he was discharged 18 days after surgery with a creatinine level of 2.0 mg/dl and a prescription for tacrolimus 6 mg/day, mycophenolate mofetil (MMF) 2 g/day, and a corticosteroid withdrawal regimen. It has been two years and nine months since the transplantation, and the patient's creatinine level has been around 2.0 mg/dl. The donor is still being treated with a single-drug therapy for systemic hypertension and his creatinine level has been around 1.5 mg/dl.

Figure 3. Magnetic resonance angiography.

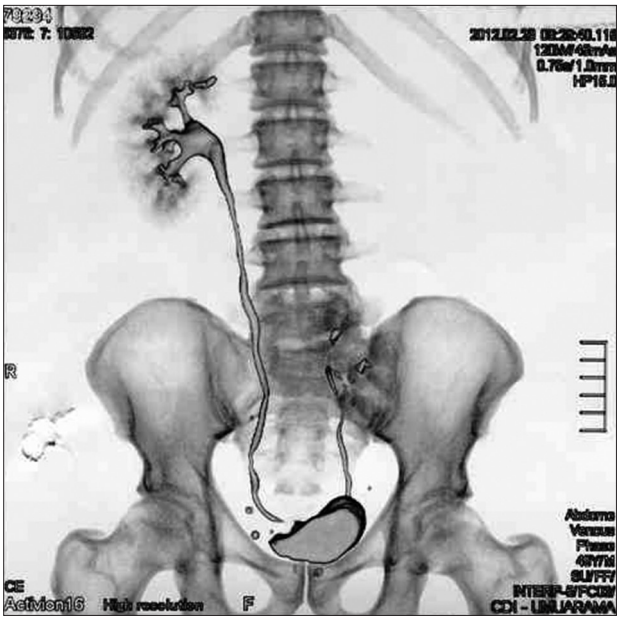
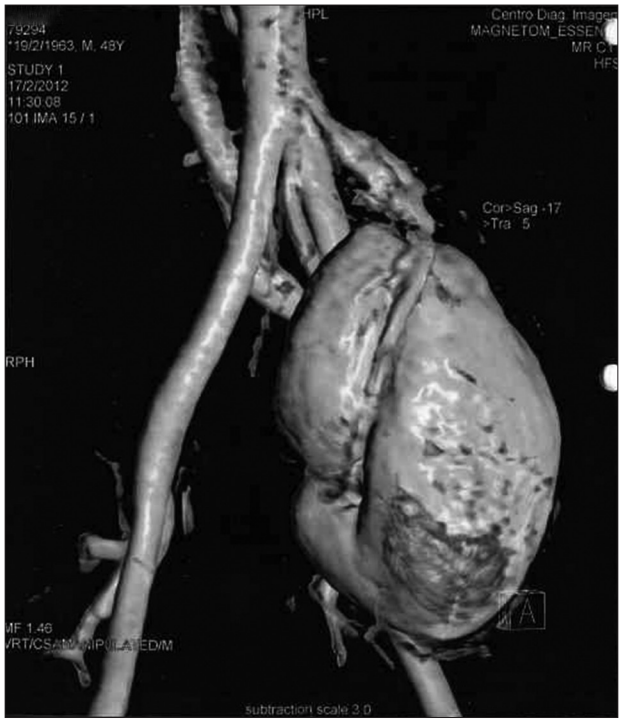


Figure 4. Magnetic resonance angiography.



Discussion

The incidence of pelvic kidneys as observed in necropsy studies is around 1:1000, with a slight predominance in male subjects.[3] Pelvic kidneys are often ruled out as candidates for donation for being smaller than the average kidney, presenting altered arterial and venous irrigation, and a rotated implantation axis in some occasions.[4] Just over half of the cases are diagnosed with hydronephrosis due to altered urinary pathways.[4] A small number of cases of pelvic kidney transplantation have been reported in the literature to date.[5-11]

As a result of possible anatomic variations, pelvic kidneys must be thoroughly examined for the anatomy of arterial and venous irrigation and collecting duct systems. The patient described in this case report had multiple renal arteries, as also described by other authors.[6,9,12] The function of candidate kidneys must also be assessed through scintigraphy, once collecting duct anomalies may increase the risk for repeated episodes of pyelonephritis, renal scarring, and urolithiasis.

The recipient described in this case report had three mismatches, and although donor-specific antibodies (DSA) were not found and the pre-transplant PRA level was zero, he had an episode of acute vascular rejection which required therapy with a lymphocyte-depleting agent and pulse methylprednisolone therapy, in addition to two hemodialysis sessions for oliguria and congestion. Pelvic kidney transplantation is a technically feasible procedure and should be considered as a viable option, as shown in the case described.

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