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Kidney transplantation in a patient with absent right common iliac artery and congenital renal abnormalities

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ABSTRACT

INTRODUCTION: Congenital atresia of the common and external iliac arteries is a rare vascular anomaly that may be associated with congenital renal or genitourinary malformations. In ESRD patients, its presence may pose potential problems during renal transplantation.
CASE PRESENTATION: We report a rare case of kidney transplantation in a patient with VACTERL syndrome who was found to have absent right common and external iliac arteries during pre-operative imaging. Vascular supply to the right lower limb is derived from an anomalous branch from the left internal iliac artery which takes on a convoluted course across the pelvis. Kidney transplantation was performed successfully with implantation performed on the left side.
DISCUSSION: Isolated cases of congenital iliac artery atresia have been described in association with urological abnormalities but no clear association has yet been established. However, we feel that it may be useful to perform routine angiographic evaluation for ESRD patients with congenital genitourinary abnormalities being planned for kidney transplantation. While most cases of congenital iliac artery anomalies are symptomatic with claudication, some remain asymptomatic with normal physical examination findings. There is some evidence in literature suggesting the usefulness of routine pre-operative CT in a selective group of patients.
CONCLUSION: Kidney transplantation in such cases is safe and we recommend routine pre-operative imaging of patients known to have congenital genitourniary abnormalities. The kidney should be implanted heterotopically to the contralateral side of the vascular anomaly and care must be taken to preserve vascular supply to the lower limbs.

1. Introduction

Renal transplantation has become the standard of care for end stage renal disease (ESRD), including cases secondary to congenital genitourinary malformations. However, the literature on kidney transplantation in patients with associated congenital malformations of the iliac vessels is limited. Congenital vascular malformations of the ilio-femoral arteries are less common than those in the thoracic and abdominal aorta and usually discovered incidentally or by the presence of chronic lower limb ischemia [1,2]. Congenital hypoplasia or atresia are the most commonly reported malformations of the iliac arteries, and may be associated with a persistent sciatic artery [3,4]. Also, the majority of vascular malformations are unilateral, usually on the right side [1]. We herein report a very rare case of kidney transplantation in a patient with of absent right common iliac artery and VACTERL (vertebral anomalies, anal atresia, cardiac defects, tracheo-esophageal fistula/atresia, renal and radial anomalies and limb defects) association.

2. Case presentation

A 24 year old male underwent an elective living-related kidney transplant (LRRT) for ESRD secondary to neurogenic bladder and vesico-ureteric reflux (VUR). He has a background history of VACTERL association with imperforate anus (previous colostomy creation and subsequent closure), sacral hemivertebrae (neuro-

Abbreviations: CT, computed tomography; ESRD, end stage renal disease; LRRT, living related renal transplant; MAG-3, mercaptoacetyltriglycine-3; VACTERL, vertebral anomalies, anal atresia, cardiac defects, tracheo-esophageal fistula/atresia, renal and radial anomalies and limb defects; VUR, vesico-ureteric reflux.

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Table 1
Timeline.

Timeline of previous surgical interventions	
1991	Right colostomy creation and subsequent closure (for imperforate anus)
1991	Re-implantation of right ureter
1994	Re-implantation of left ureter
June 2013	Initiated on hemodialysis
July 2013	Colonic bladder augmentation and Mitrofanoff creation
December 2013	Nephrectomy of cross-fused kidney

logically normal) and renal/urological defects: (a) bilateral grade 5 VUR with previous bilateral ureteral re-implantation, (b) neurogenic bladdder status post-colonic bladder augmentation and mitrofanoff creation, (c) crossed fused ectopia of the left with right kidney with prior nephrectomy in preparation for LRRT (Table 1).

In view of his multiple congenital anomalies and previous surgeries, computed tomography (CT) of the abdomen and pelvis was done for pre-operative planning. The CT revealed aberrant iliac vasculature – the right common and external iliac arteries are not visualized as the abdominal aorta ends with the left common iliac artery bifurcating into the left internal and external iliac arteries (Fig. 1). A branch arising from the right distal abdominal aorta superior to the bifurcation gives off a lumbar branch before passing posterior to the right psoas muscle into the pelvis. It gives off several pelvic branches before continuing anteriorly along the pelvic side wall to receive a large anomalous branch from the left internal iliac artery, just proximal to the femoral canal. The large anomalous branch, which is the main vascular supply to the right lower limb, demonstrates a convoluted course across the pelvis from left to right. The combined vessel then continued distally as the right common femoral artery (Fig. 2).

Despite the vascular abnormalities detected on radiological imaging, the patient was asymptomatic. He had no evidence of limb ischemia and pulses were symmetrical bilaterally in the lower limbs. He subsequently underwent LRRT with implantation of kidney performed in the left iliac fossa. Intra-operatively, dissection of the left iliac vessels clearly demonstrated the anomalous vessel branching off the left internal iliac artery and this was carefully preserved (Fig. 3). The renal artery and vein were anastomosed end-to side to the left external iliac artery and vein, respectively, a significant distance distal to the origin of the anomalous vessel. Ureteral anastomosis was performed to the augmented colonic cystoplasty. Good perfusion to the kidney was observed after vascular clamps were released and bilateral dorsalis pedis pulses were palpable intra-operatively. Post-operatively, the patient did not develop any

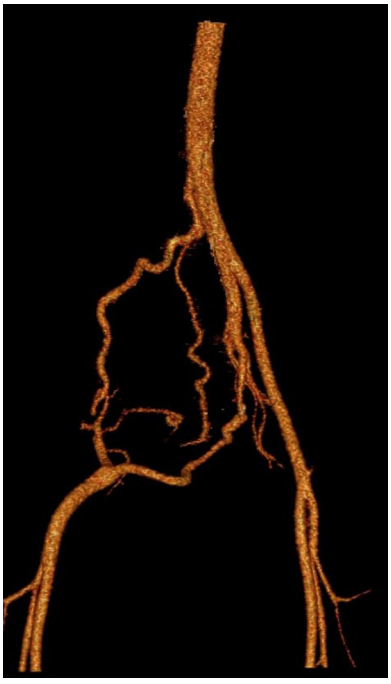

Fig. 2. 3D reconstruction of CT showing a missing right common iliac artery and the anomalous branch from the left internal iliac artery crossing the pelvis. A branch arising from the right side of the distal abdominal aorta, superior to the bifurcation, gives off a few pelvic branches before continuing along the pelvic side wall to receive the anomalous branch from the left internal iliac artery just proximal to the femoral canal. This then continues distally into the right lower limb as the right common femoral artery.

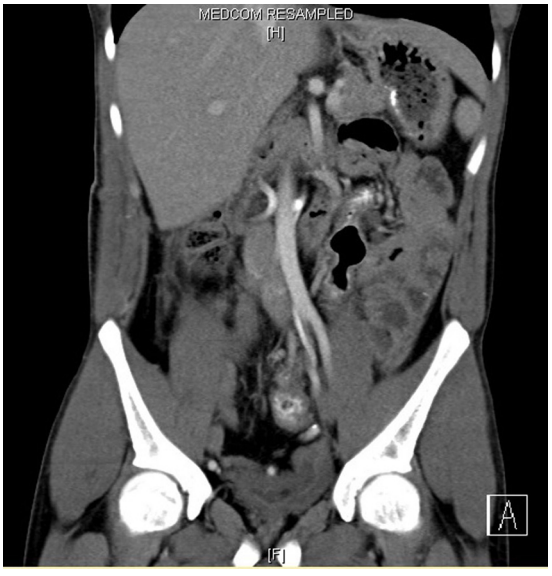

Fig. 1. Coronal section of CT showing the abdominal aorta continuing as the common left iliac artery which bifurcates into the left internal and external iliac arteries. The right common iliac artery is absent.

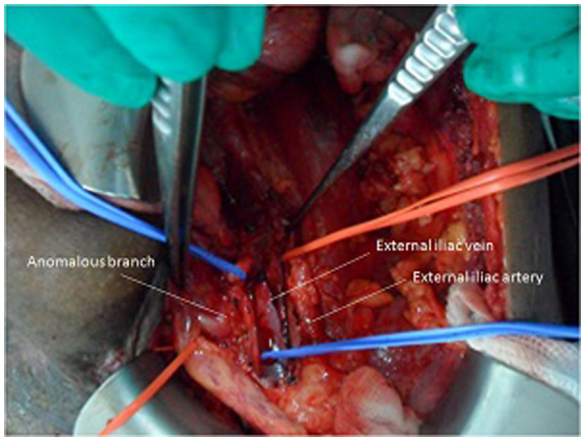

Fig. 3. Intra-operative image of the left external and internal iliac arteries, as well as the preserved anomalous vessel branching off the internal iliac artery.