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Case Report

Detection of transplant renal artery stenosis with contrast-enhanced ultrasound

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ABSTRACT

Transplant renal artery stenosis (TRAS) is a vascular complication occurring during the first 2 years after kidney transplantation, with an incidence and a prevalence ranging from 1% to 23%, and from 1.5% to 4%, respectively. Detection of TRAS is the key, since most stenoses may progress to renal graft loss, however it may be difficult to detect due to its nonspecific clinical manifestations. Although Doppler ultrasound has become a primary imaging technique, digital subtraction angiography (DSA) remains the gold standard for diagnosing TRAS. We present a case of delayed graft function following kidney transplantation complicated by a lateral by-pass with prosthesis upstream and downstream of renal anastomosis, TRAS criteria were unclear using Doppler ultrasound, contrast-enhanced computed tomography-scan, and DSA. Only contrast-enhanced ultrasound (CE-US), observing a delayed and pulsating contest impregnation of renal parenchyma, supported the hypothesis of TRAS that was confirmed by the measurement of trans-anastomosis pressure gradient during DSA.

Introduction

Successful kidney transplantation (KT) improves the quality of life and increases survival compared with long-term dialysis treatment in patients with end stage renal disease [1]. Despite advances in KT and allografts preservation, early surgical complications are reported in up to 10% of patients, and most of them are caused by vascular pathologies such as arterial or venous thrombosis, leaks or pseudo-aneurisms,

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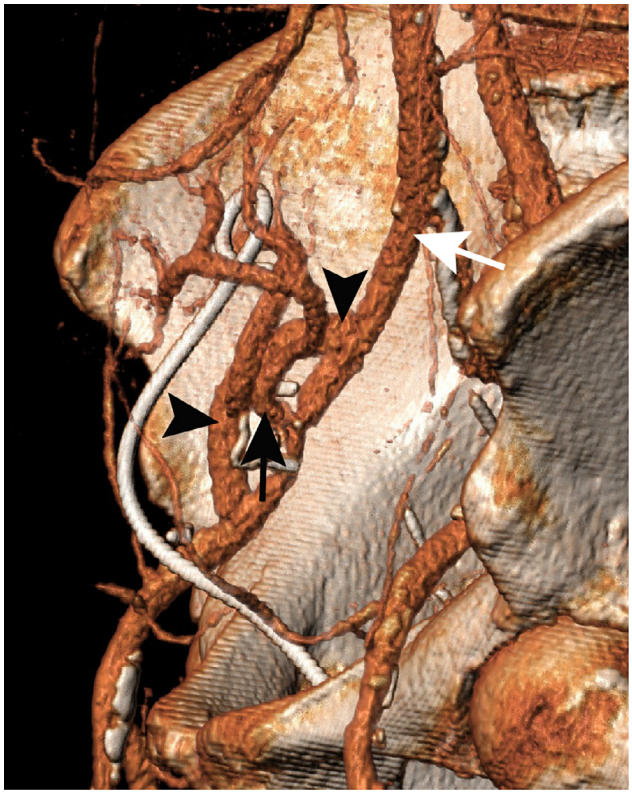

Fig. 1 – Angio-computed tomography scan volume rendering reconstruction. Renal artery (black arrow), iliac-iliac bypass (black arrowhead), external iliac artery (white arrow).

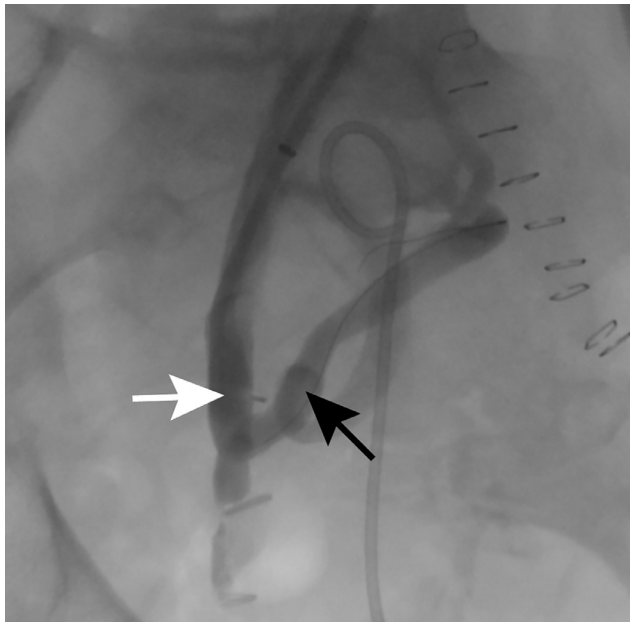

Fig. 2 – No morphological evidence of TRAS at digital subtraction angiography. Renal artery (black arrow), external iliac artery (white arrow).

and transplant renal artery stenosis (TRAS) [2]. Clinical TRAS, defined as a stenosis greater than 70%, has an angiographic incidence up to 10%. Early detection of TRAS is difficult due to nonspecific clinical manifestations but remains important to diagnose because most untreated stenoses may progress to renal graft loss [3]. Doppler ultrasound (DUS) has become the primary imaging technique in the initial screening of TRAS, but digital subtraction angiography (DSA) remains the gold standard for its diagnosis [4,5]. The recent introduction of contrast-enhanced ultrasound (CE-US) has given new perspectives for the evaluation of vascular complications after KT [6]. We present 1 case of KT in which only the use of CE-US allowed to achieve the diagnosis of TRAS (Figs. 1–3).

Case report

A 74-year-old Caucasian woman on hemodialysis secondary to diabetic nephropathy underwent KT from a deceased heart beating donor in May 2017. The patient's comorbidities included a history of severe vascular disease and hypertension, atrial fibrillation, mitral valve stenosis, and diffuse vascular atherosclerosis. The donor was a 78-year-old male receiving antihypertensive treatment. Karpinski score of preimplant renal biopsy was 4 (glomerulosclerosis 1, tubular atrophy 1, interstitial fibrosis 0, and arteriolosclerosis 2).

KT was performed with a right kidney positioned in the extraperitoneal right iliac fossa. Termino-lateral venous, and arterial vascular anastomoses between the kidney and the external iliac vessels were performed with a double running suture in a Prolene 6.0. After revascularization the kidney was well perfused. Few minutes later, no arterial flow was evidenced in the external iliac artery distally to the anastomosis. To avoid any damage to the kidney, the iliac artery was clamped after the anastomosis, incised longitudinally, and a wall flap, completely occluding the atherosclerotic artery lumen was evidenced. Since it was not possible to restore the flow to the leg by removing the flap, we performed a lateral by-pass with a polytetrafluoroethylene prosthesis with removable ring of 4 mm in diameter, upstream and downstream of renal anastomosis. By reducing to minimum kidney ischemia, we first performed distal anastomosis leaving renal flow, and after proximal anastomosis, clamping the iliac artery upstream the renal artery only for 5 minutes. The anastomosis was performed with a double running suture in Prolene 6.0.

After reperfusion all the vessels were patent and the graft was discreetly perfused.

In the postoperative period immunosuppressive regimen was started with mofetil mycophenolic acid, methylprednisolone, and a low dose of tacrolimus. The patient was first put on endovenous heparin followed by warfarin.

After transplantation, the kidney evidenced delayed graft function, compatible with intraoperative double ischemia reperfusion injury, characterized by high creatinine and azotemia levels (7.08 mg/dl and 78 mg/dl, respectively), low urine output (400 ml/24h), and need of hemodialysis (2 times