Introduction

Vascular complications in transplanted kidney are often the most devastating ones and are responsible for 2%–7% allograft losses in adults. Renal arterial thrombosis is the main cause with the incidence of 0.2%–0.75%. Majority of them occur within 48 h until the first few weeks of renal transplantation and are exceedingly rare after the 1st month. The usual presentation is anuria or inability of creatinine to reach baseline values. Risk factors can be summarized as recipient related, donor related, procedure related, and those related to immunosuppressants used.

Case Report

A 27-year-old male diagnosed with end-stage renal disease and hypertension underwent renal allograft transplant. He had been on maintenance hemodialysis for 3 years. There was no history suggestive of coagulopathy or connective tissue disorder. Routine thrombophilia work up was not contributory. The donor was his mother. The operation was performed following standard surgical technique by placing the donor kidney in the recipient’s right flank. Three types of anastomoses were performed. The recipient received appropriate immunosuppression in the form of methylprednisolone (500 mg) twice a day, tacrolimus (2.5 mg) twice a day, and mycophenolate mofetil (1 g) twice a day postoperatively. All hemodynamic indices, urine output, and laboratory parameters were maintained regularly. Despite adequate urine output and no complaints of flank pain, creatinine levels remained in the range of 4–5 mg/dL. Due to suspected renal arterial thrombosis, an emergent duplex ultrasound scan was performed which revealed slow flow in the distal polar artery. In view of the well-functioning upper polar arteries and risk re-exploration, percutaneous interventional approach was decided. The patient was immediately taken to the catheterization laboratory and grafted renal arterial angiogram was performed by 6F JR renal guiding catheter via the left femoral artery. It showed patent upper and mid polar arteries with TIMI III flow but complete occlusion of the distal polar artery [Figure 1a]. A 0.014 cm × 190 cm BMW guidewire was inserted, however, despite multiple inflations with a 2.0 mm × 12 mm Traveler compliant balloon (Abbott Vascular, Santa Clara, CA, USA) at 12 atm pressure, the artery failed to open [Figure 1b]. In view of the huge thrombus burden, Export Aspiration Catheter (Medtronic Corporation, California, USA) was used with multiple runs, which achieved Thrombolysis in Myocardial Infarction (TIMI) I flow [Figure 1c]. To maintain patency and considering the thrombus burden, we opted to stent the artery with 2.5 mm × 3.5 mm Prozeta bare-metal stent (BMS) (Vascular concepts, Bangalore, India) [Figure 1d]. BMS was chosen in an attempt to decrease dual antiplatelet therapy duration and bleeding chances. Check angiography showed perfusion into the lower polar artery with TIMI III flow. Within a few hours,
urine output increased further, and creatinine levels started falling reaching normal values in 3 days. Duplex ultrasound scan after 3 days of stenting showed good flow in all the polar arteries [Figure 1e].

**DISCUSSION**

We present an unusual case of early transplanted renal arterial thrombosis. High evidence of suspicion and stringent daily monitoring of parameters showed the inability of creatinine to touch baseline values even though urine output was maintained.

Causes of transplant renal arterial thrombosis are multifaceted and broadly stretched.[3] Arterial thrombosis may arise due to injury to diseased arteries, problematic anastomoses, hypercoagulability, or malpositioned allografts.[12] In a typical clinical background, Ball et al.[4] have attributed renal allograft compartment syndrome as the cause of allograft dysfunction. McCarthy et al.[13] have described extrinsic compression at the graft site as a direct consequence of renal arterial thrombosis. Severe cases of transplant renal arterial thrombosis leading to spontaneous arterial rupture secondary to invasive mucormycosis with backgrounds of infection have been also reported, but they usually occur late and are not related to the procedure.[6]

Srivastava et al.[7] reported nine cases of renal arterial thrombosis. They found cases presented within the 1st week after transplant had a technical etiology. The two cases which presented at 1 month and 3 years after transplantation had unrelated events as the cause of the complication.

A few studies have identified significant risk factors for arterial thrombosis. A study by Özban et al.[2] included donor age <6 years or >60 years, recipient age <5–6 years, perioperative or postoperative hemodynamic instability, peritoneal dialysis, diabetic nephropathy, history of thrombosis, and deceased donor as risk factors. Ponticelli et al.[1] reported the risk of thrombosis to be greater on receiving cadaver donors <5 years compared to older donors. They have justified this risk due to size disparity between vessels of the donor and recipient. Increased thrombosis rates from elderly donors have also been observed. This may possibly be explained due to the combination of hypotension with ischemic reperfusion injury causing the activation of procoagulants, in turn, triggering an immune response.[1]

Maintaining cold ischemia time <24 h is of utmost importance. Özban et al.[2] reported two patients suffering from allograft renal arterial thrombosis within 48 h after implantation. Due to ischemic intolerance of the allograft, the only option to salvage the allograft was re-transplantation. In another study, Srivastava, et al.[7] reported seven of nine cases of renal arterial thrombosis within the 1st week of transplantation. Management of these cases was through immediate surgical exploration. However, all the cases needed graft nephrectomy. No kidney had any viable parenchyma left during the preoperative assessment with biopsy, and therefore, no salvage procedures could be undertaken. This scenario once again emphasizes the degree of urgency required to handle such outcomes. The longer the duration of warm ischemia time, the poorer the prognosis.

Sudden reduction or cessation of urine output is one of the only clinical presentations that may lead to the diagnosis of transplant arterial thrombosis. In such cases, immediate ultrasound and color Doppler should be performed in the early postoperative period as well as within short intervals. This

**Figure 1:** Coronary angiography showing: (a) total occlusion of distal polar artery; (b) multiple predilations with 2 mm × 12 mm Traveler balloon; (c) multiple attempts to aspirate thrombus with thrombosuction catheter to achieve TIMI I flow; (d) deployed Prozeta bare-metal stent 2.5 mm × 35 mm; and (e) post stent TIMI III flow.
will help assess the arterial patency and search for secondary indicators of arterial compromise suggestive of early stenosis or developing thrombosis. Despite the preference of Doppler, computed tomography angiography presents as a more reliable imaging modality, especially with respect to increased tortuosity of both donor and recipient vasculature. Magnetic resonance angiography is also a novel modality which may be useful.\textsuperscript{[7]}

**CONCLUSION**

Swelling demands of organs have led to an increase in organ transplants. These demands have been responsible for parallel innovation and inception of novel medical and surgical advances as well as refined imaging modalities permitting vascular exploration. Moreover, improved imaging has increased sensitivity for the detection of transplant arterial thrombosis. Percutaneous or endovascular approach is one such parallel innovative approach to thrombotically occluded grafted arteries, especially in an early postoperative periodical.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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