Case Report

Compromise of renal transplant blood flow by an arteriovenous graft

Emily Symington¹, Behdad Afzali², Iain MacPhee¹ and Eric S. Chemla¹

¹South West Thames Renal Transplant Network, St Helier and St George's Hospitals and
²Department of Nephrology and Transplantation, Guy's Hospital, London, UK

Keywords: arteriovenous graft; renal transplant; thrombosis

Case report

A 61-year-old male developed end-stage renal failure in January 1994, with a presumptive diagnosis of hypertensive nephrosclerosis but no renal biopsy, and commenced peritoneal dialysis which failed in April 1996, requiring a change to haemodialysis via a left subclavian tunnelled venous line. A succession of arteriovenous fistulae (AVFs) was formed in both arms but by August 2004, native AVFs and anatomical arteriovenous grafts (AVGs) exhausted. He required placement of a series of central venous cannulae, complicated by complete superior vena cava obstruction. A subcutaneous right axillary artery to popliteal vein Poly Tetra Fluoro Ethylene AVG was formed in August 2004 and he was anticoagulated with warfarin. This allowed satisfactory dialysis until a transplant became available 12 days later.

He received a renal allograft (left kidney, single vein, single artery) from a 22-year-old non-heartbeating cadaveric donor with a 210 A/B/DR mismatch and a cold-ischaemia time of 16 h. The kidney was anastomosed to the right external iliac artery and vein, as is the standard practice for left kidneys (position on the right side makes access for correction of urological complications, such as hydronephrosis, easier). Initial immunosuppression was with corticosteroid, basiliximab, tacrolimus and mycophenolate mofetil. Warfarin was discontinued at the time of the transplant and replaced by aspirin. Delayed graft function was investigated by an ultrasound scan, which demonstrated a well-perfused kidney, and a technetium-99m mercaptoacetyltriglycine (MAG-3) renogram compatible with acute tubular necrosis (ATN). He remained dialysis-dependent, and a biopsy 7 days after transplantation confirmed the presence of ATN and excluded rejection. Subsequently, his renal function improved and dialysis was stopped on the twelfth post-operative day.

Three months later, he presented with swelling of the right leg and oligo-anuric acute renal failure requiring haemodialysis. A Doppler ultrasound scan revealed thrombosis of the superficial femoral and popliteal veins on the right and venography demonstrated the presence of a thrombus in the common iliac and the transplant renal veins. The obstruction was successfully cleared by local thrombolysis followed by the reintroduction of anticoagulation. He began to pass urine immediately after the procedure and recovered fully from this episode of renal failure with a serum creatinine concentration of 119 μmol/l.

One month later, the patient was re-admitted with pulmonary oedema and a significant deterioration in graft function. He required haemodialysis via the extra-anatomical AVG which had remained patent. A Doppler ultrasound scan of the transplant kidney showed poor flow in the transplant and common iliac veins, raising the possibility of partial re-thrombosis or stenosis. These veins were treated with venoplasty and stenting (Figure 1A and B). Despite this treatment, renal function did not recover completely and a new duplex scan showed a reversal of blood flow in the renal vein without any thrombosis, narrowing or external compression. The AVG thrombosed 2 days later and dialysis became impossible. Following loss of flow in the extra-anatomical graft, renal function rapidly recovered and the swelling in the right leg improved. At the latest follow-up, the patient remains well with a serum creatinine concentration of 90 μmol/l.

Correspondence and offprint requests to: Mr Eric Chemla FRCS, Consultant Transplant Surgeon, Department of Renal Medicine and Transplantation, St George's Hospital, Blackshaw Road, Tooting, London, SW17 0QT, United Kingdom. Email: eric.chemla@stgeorges.nhs.uk

© The Author [2006]. Published by Oxford University Press on behalf of ERA-EDTA. All rights reserved. For Permissions, please email: journals.permissions@oxfordjournals.org
Discussion

The presence of an incurable central venous stenosis [1] or occlusion not amenable to endovascular intervention renders the upper limbs unsuitable for formation of AVF or AVG. Similarly, a significant peripheral vascular disease in the lower limbs excludes a lower limb fistula based on the femoral vessels because there is a risk of a ‘steal syndrome’ or critical ischaemia. An extended axillary artery–popliteal vein PTFE graft is one solution for patients with central venous obstruction and significant peripheral vascular disease who are unable to undergo peritoneal dialysis [2,3].

We have reported the case of a patient with an axillary artery to popliteal vein graft who went on to have an ipsilateral renal allograft. Renal function was poor, and trailing thrombosis of both the common iliac and renal transplant veins occurred. The patient required haemodialysis on two separate occasions following transplantation. We postulate that the poor transplant function and venous thromboses were due to the flow of high-pressure arterial blood within the AVG resulting in high venous pressures in the right lower limb. Subsequently, the venous return from the transplanted kidney was impeded, then reversed and finally, the renal vein developed a thrombus. Following the loss of the AVG through thrombosis, venous drainage of the transplant improved and renal function recovered. It would seem plausible that venoplasty and stenting of the renal vein may also have contributed to renal recovery but this is of lesser probability as no complete improvement in renal function was manifested until almost after the AVG thrombosed. Equally, we feel that the propagation of thrombus from the deep venous structures of the leg into the transplant vein is unlikely as venography and ultrasonography did not demonstrate any thrombus in the portion of venous anatomy between the AVG and the transplant. Furthermore, the spontaneous recovery of renal function, that occurred almost immediately after the AVG thrombosed, is strongly in favour of the functional AVG as having been the causative factor in poor transplant function as a result of high pressures in the venous system. Finally, the patient was 61 years of age at the time of presentation, with no personal or familial history of prior venous or arterial thromboses and no further episodes of thrombus formation since discharge. He was already being treated with warfarin, and hence was not tested for hypercoaguable states. We feel that the likelihood of him having a procoagulant tendency is very slim. To our knowledge, this is the first report of an axillary artery to popliteal AVG in a transplant recipient and demonstrates the importance of paying attention to blood flow in the engrafted kidney. We recommend that renal transplantation on to the side of an existing axillary artery to popliteal AVG should be avoided if at all possible. If the transplantation cannot be performed on to the contralateral side of that type of AVG, we recommend its ligation at the same time.

Conflict of interest statement. None declared.

References


Received for publication: 10.2.06
Accepted in revised form: 28.2.06