

## Late onset arterial conduit aneurysm in a liver transplant patient

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We describe the occurrence of an aneurysm in an arterial conduit that developed 8 years after liver transplantation. The patient presented with abdominal pain and high erythrocyte sedimentation rate level, but was afebrile and had negative blood cultures. The aneurysm was treated successfully with endovascular stent grafting. The patient is now 18 months since the repair symptom-free and with normal liver function.

Liver transplant arterial conduits, performed with donor iliac artery, were found to be an effective and safe revascularization technique in patients at high risk for arterial thrombosis, undergoing re-transplantation, or in patients with hepatic artery aneurysm/pseudoaneurysm [1–3].

Complications after the use of an arterial conduit are rare, the commonest of which is thrombosis, especially in the late phase [2,4]. Other reported complications include torsion of the graft, internal hernias and pseudoaneurysms developing early after liver transplantation [3,5,6]. In this case, we report the delayed occurrence and successful endovascular stent-graft repair of a nonanastomotic aneurysm in a donor iliac artery that was used as an infra-renal jump graft.

### Case report

The patient is a 55-year-old Hispanic female who underwent cadaveric liver transplantation in 1997 for liver cirrhosis secondary to the hepatitis C virus (HCV) infection. An arterial conduit was used due to a small native hepatic artery. This was constructed by an end-side anastomosis of donor common iliac artery to the recipient's infra-renal aorta using continuous 4/0 prolene suture. The internal iliac artery portion of the conduit was ligated close to its origin, while the external iliac artery portion of the conduit was used for the end–end anastomosis to the graft's artery using 6/0 prolene suture. She has been on cyclosporine and low-dose steroid-maintenance therapy. The HCV polymerase chain reaction level was undetectable on combination antiviral therapy. The patient presented 8 years later with a vague left upper quadrant abdominal pain that radiated to the back. A computed tomography scan with i.v. contrast of the abdomen and



**Figure 1** Computed tomography angiogram of the abdomen demonstrating a saccular aneurysm (arrow) with a thrombus causing stenosis of the lumen (white dot inside).

pelvis revealed a saccular aneurysm measuring  $3 \times 2$  cm in the mid-portion of the infra-renal jump graft. The aneurysm was distant from the proximal and distal anastomoses of the conduit and contained a thrombus that caused significant narrowing of the lumen (Fig. 1). The patient denied having fevers or chills. Her liver function test was normal with a normal duplex ultrasound of the liver vessels. The erythrocyte sedimentation rate (ESR) was elevated to 101 mm/h and multiple blood cultures remained negative. This symptomatic aneurysm was successfully treated by an endovascular approach using a stent graft. Another reason for treating this aneurysm was the significant narrowing in the iliac graft and the possibility of near future thrombosis. Interestingly, the patient's pain was resolved after the procedure. She is now 18 months since the repair symptom-free and with a normal liver function.

### Discussion

Arterial complications after liver transplantation are important causes of graft failure and mortality. As outcomes continue to improve after liver transplantation, patients are living longer, and as a result are more susceptible to arterial complications like stenosis, throm-

basis and aneurysm formation. Although the incidence of abdominal aneurysms after abdominal organ transplantation is not higher than in nontransplant patients, the risk of aneurysm expansion and rupture is significant, possibly requiring early intervention [7].

The data on immunosuppression and aneurysm expansion are mixed. A single animal study in mice genetically susceptible to aneurysms suggested an increased rate of rupture when treated with steroids [8]. Similarly, a clinical study looking at patients with autoimmune diseases found increased growth in patients who were treated with steroids for their autoimmune disease [9]. However, a different animal model failed to show increased rupture with steroid exposure [10], and several clinical studies have corroborated this finding [11,12]. New onset or worsening hypertension as well as worsening hyperlipidemia associated with the calcineurin inhibitors may also be implicated as aggravating factors. The data suggest that immunosuppression, in particular corticosteroids, can be either harmful or helpful; however, there is no strong evidence to reduce immunosuppression in patients with post-transplantation aneurysms.

Endovascular stent-grafting repair, which was successful in this case, is becoming widely recognized as an acceptable option for aneurysm repair, particularly in high-risk patients [13]. We believe that there are advantages to this modality of treatment compared with the traditional open surgical technique, which include avoidance of general anaesthesia, less risk of bleeding, shorter postoperative recovery and less postoperative morbidities.

Most reported post-transplantation aneurysms were of the pseudoaneurysm type, developing early after transplantation and around suture lines. This case might represent the occurrence of an inflammatory aneurysm in the iliac graft because of the delayed occurrence, saccular shape, distance from suture lines, elevated ESR, negative blood cultures and resolution of symptoms after the repair. This case also emphasizes on the possible need for long-term surveillance of hepatic artery to detect silent complications for early intervention particularly in the face of an increasingly limited donor pool.

### Authorship

HH, SN: wrote the paper. RZ, DM, MA: collected data. TS: performed the procedure. AT: critical revision.

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