CLINICAL CASE

Extra-anatomical hepatic artery reconstruction following post-embolization iatrogenic dissection and arterial anastomotic rupture in two liver transplant recipients

Reconstructions extra-anatomiques de l’artère hépatique après une dissection iatrogène et une rupture de l’anastomose artérielle chez deux patients transplantés hépatiques

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Summary When hepatic artery reconstruction is required during hepatic transplantation, this is generally performed with donor vessels. We describe two cases requiring a prosthesis. The first case was a 58-year-old man transplanted for cirrhosis complicated by hepatocellular carcinoma. During transplantation, dissection of the celiac trunk occurred due to arterial embolization and the use of the patient’s vessels was impossible. An extra-anatomical bypass between the infra-renal aorta and the donor hepatic artery was performed via the interposition of a graft tube. The second case was a 52-year-old man transplanted for cirrhosis complicated by hepatocellular carcinoma. On day 16, a ruptured anastomosis was suspected and the patient underwent emergency revision laparotomy. Arterial revascularisation was performed with an aortohepatic bypass using a synthetic GoreTex® graft. Patient follow-up was uneventful.

Résumé Quand une reconstruction de l’artère hépatique est nécessaire durant une transplantation hépatique, elle se fait habituellement à partir de vaisseaux prélevés chez le donneur. L’utilisation d’un matériel prothétique est rare. Nous décrivons ici deux cas où une reconstruction artérielle prothétique a été nécessaire. Dans le premier cas, il s’agissait d’un homme de...
Hepatic artery reconstruction is often performed during liver transplantation when anatomical variations of the donor’s or recipient’s hepatic artery are found, or after postoperative thrombosis. However, there are few reports about reconstruction for other rare vascular complications [1] and using prosthetic conduits. In most cases, the surgical strategy is based upon using the recipient’s celiac axis branches or if this is not possible, donor arterial conduits. But in some rare cases synthetic conduits must be used as an alternative.

We present two cases of rare iatrogenic arterial injury of the hepatic artery and celiac axis where prosthetic conduits were used for arterial reconstruction. Alternative options for arterial revascularisation are then briefly discussed.

Patients and methods

Case 1

A 58-year-old male patient was admitted to our liver transplantation department for a multifocal hepatocellular carcinoma secondary to alcoholic cirrhosis. The patient had suffered from recurrent oedema and ascites as well as multiple episodes of oesophageal variceal bleeding since 2005 (Child-Pugh B8). Tobacco consumption (40 cigarettes/day for 30 years) was the only cardiovascular risk factor. Abdominal computed tomography (CT) revealed a cirrhotic liver with four hypervascular lesions located in segment IV. The patient was admitted to the liver transplantation program and elective left liver arterial embolization was planned in December 2005. The embolization procedure was stopped due to iatrogenic dissection of the common hepatic artery, which could not be managed by the endovascular intervention.

The patient underwent orthotopic liver transplantation in July 2006. Venous anastomosis was performed with the standard Piggy-Back technique. The recipient hepatic artery as well as the celiac trunk and its branches were dissected entirely. Several attempts were made at arterial revascularisation using the recipient hepatic artery and the donor celiac trunk but arterial flow was found to be inadequate on liver Doppler. The donor’s splenic artery was also impossible to use due to extended celiac axis disease. Thus an extra-anatomical bypass between the infra-renal aorta and the donor hepatic artery was performed by interposing a standard polytetrafluoroethylene (PTFE) Ch graft tube. Aortic anastomosis was performed first using a standard termino-lateral technique with a continuous Prolene® 6/0 suture after side clamping. The anastomosis between the prosthesis and the hepatic artery was end-to-end, with a continuous 7/0 Prolene® suture. The intra-operative Doppler was satisfactory. The patient has been taking clopidogrel (75 mg/day) since postoperative day 1, and now receives bi-therapy (aspirin + vitamin K antagonist).

The postoperative day 7 CT scan showed a permeable conduit (Figs. 1 and 2). The CT scan 3 months post-transplantation was satisfactory and the Doppler was normal. Prosthesis permeability has been regularly monitored by CT scan and Doppler with good results. Four years after transplantation, radiological and clinical results are satisfactory; the patient is still disease-free and arterial flow is good. The same strategy of antibioprophylaxis was used for this patient as for others without prosthesis.

Case 2

A 52-year-old male patient presented with intravenous drug hepatitis C and alcohol induced cirrhosis (Child-Pugh B7, Figure 1 Case one. CT scan, 1 week after liver transplantation, confirming presence of permeable conduit between aorta and donor’s hepatic artery.
GoreTex® graft. A side-clamp of the aorta was made and infra-renal aorta and the hepatic artery with a synthetic from the celiac aorta, we performed a bypass between the too short, and it was impossible to revascularize the liver freed of thrombi by a Fogarty’s procedure and local heparin. By suture, it was ligated and the donor hepatic artery was emergency revision laparotomy. Tomosis rupture was suspected and the patient underwent follow-up period were satisfactory. Follow-up at 2 years was also satisfactory.

Bi-therapy (aspirin + vitamin K antagonist) was continued for 3 months, but the patient now takes only aspirin. No specific antibioprophylaxy was recommended.

Because the length of the hepatic artery remnant was too short, and it was impossible to revascularize the liver from the celiac aorta, we performed a bypass between the infra-renal aorta and the hepatic artery with a synthetic GoreTex® graft. A side-clamp of the aorta was made and the graft was anastomosed on the aorta with a Prolène® 6/0 overcast seam. As in the first case, the prosthesis went through the transverse mesocolon and was anastomosed to the hepatic artery with 7/0 running Prolene®. Peroperative control with Doppler and all the controls during the follow-up period were satisfactory. Follow-up at 2 years was also satisfactory.

Bi-therapy (aspirin + vitamin K antagonist) was continued for 3 months, but the patient now takes only aspirin. No specific antibioprophylaxy was recommended.

Discussion

There are many reports of hepatic artery reconstruction in cases of donor hepatic artery malformations or anatomical variations. These cases were well described and classified by Inomoto et al. in 1996 [2] and Melada et al. found that more than 20% of donors presented with a major hepatic artery variation requiring modification of the surgical technique [3]. In their experience, in 56 over 133 cases (42%), a back table arterial reconstruction was necessary with a loss of the graft for technical failure in 13 over 56 (23.2%) cases. Cappadonna et al. reported a series of 23 cases with reconstruction of hepatic arterial inflow using the donor iliac artery passed in a retromesocolic position and placed between the recipient infra-renal aorta and the donor hepatic artery [4]. According to this report, extra-anatomical hepatic artery reconstruction was technically feasible and was associated with good short- and long-terms results.

But the most frequently reported indication for hepatic revascularisation is postoperative thrombosis. In fact, this complication occurs in nearly 10% of adult recipients and even more in children [5]. However, iatrogenic lesions are an extremely rare indication for reconstruction. Although Shaked et al. reported 9% arterial reconstruction secondary to intimal dissection [6], only two cases were reported of patients with hepatocellular carcinoma treated with transarterial embolization complicated with dissection [7].

Moreover, although many cases of ruptured pseudoaneurysms may be found in the literature (this occurs in about 1% of patients after liver transplantation) treated by radiological embolisation [8], stent-graft [9] or retransplantation, we did not find any cases of revascularisation using aorto-hepatic prosthetic bypass.

Besides the use of a prosthesis in this indication, other alternatives have been described in the literature, most during living liver transplantation.

As previously reported the donor’s iliac arteries are frequently used for arterial reconstruction. In a review of 757 orthotopic liver transplantations, Muiesan et al. reported 218 revascularisations by donor conduits performed in patients at a high-risk of arterial thrombosis [10]. These authors concluded that the incidence of thrombosis when iliac arteries are used is the same as for standard direct arterial anastomosis (4%). However, we couldn’t use donor’s arteries in our first case because of atherosclerosis of the donor iliac arteries.

The use of cryopreserved vascular grafts are often complicated by aneurysmal dilatations and stenoses [11]. Moreover, their availability in emergency situations is uncertain.

Others possibilities of revascularisation are rarer and require specific experience. Splenic artery for hepatic revascularization is associated with a significant risk of pancreatitis and splenic infarction [12]. Arterial reconstruction using gastric vessels has been tried successfully, but it involves technical difficulties as well as a high-risk of thrombosis [7]. In both of our patients, none of the celiac axis could be used because the dissection involved the splenic and gastric arteries.

Others techniques exist, such as the use of autologous radial artery, but they require specific training and use in an emergency situation can be difficult [13].
Indeed, we were limited in a surgical strategy in our two cases, that’s why we have chosen synthetic tubes. The use of PTFE conduits for vascular reconstruction in experimental liver transplantation has been reported by Tanaka et al. using conduits for portal and caval anastomosis in pigs [14]. The use of a PTFE conduit has been reported in one case study by Calleja Kempin et al. with a good outcome six months after transplantation [15]. To our knowledge, there are no major differences between PTFE and GoreTex® in this indication.

Conclusion

We provide two original case reports of aorto-hepatic bypass, which are interesting because of the indications and the type of conduit used. There are not enough results to recommend more extensive use of this prosthesis but this report provides good short-term results of this technique. Although synthetic conduits are rarely used, they may be a valuable salvage option when it is impossible to use donor or receiver vessels.

Thus, this report extends the scope of etiologies requiring hepatic revascularisation and provides results on a therapeutic strategy that can provide a solution for possibly severe complications.

Conflict of interest

None.

References