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Post-regraft supra-hepatic caval obstruction in liver transplantation: a successful outcome with expandable stents. A case report

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Abstract Supra-hepatic inferior vena cava (IVC) obstruction is an unusual complication following an orthotopic liver transplantation (OLT) and is seen more often in hepatic regrafts. Dilatation of these stenotic lesions and the use of endovascular stents has been described in the past. Although the results of this technique are unquestionably superior to surgical correction, their use in the very early post-operative period is not without danger. Herein we describe a case where this modality was used successfully within 24 h of an OLT.

Key words Liver transplantation, venous stenosis, stent · Venous stenosis, liver transplantation, stent · Stent, venous stenosis, liver transplantation

Introduction

Stenosis of the inferior vena caval (IVC) anastomosis is a rare complication following orthotopic liver transplantation (OLT) [4, 8]. Supra- and infra-hepatic IVC stenosis following OLT have been managed by balloon angioplasty and stenting [7]. However, there have been no reports of the use of these techniques in the very early post-operative period. Herein we report our experience where this modality was used to treat a significant stenosis of the supra-hepatic IVC anastomosis in a 54-year-old patient within 24 h of a retransplant.

Case report

A 54-year-old male patient with a 30-year history of ulcerative colitis and primary sclerosing cholangitis underwent OLT. He had had a previous right hemi-colectomy for a Duke C adenocarcinoma of caecum and over recent months had been deteriorating from his liver cirrhosis. Having confirmed that there was no evidence of local recurrence or distant metastasis, he underwent an uneventful

OLT with a Roux-en-Y biliary reconstruction. The post-operative course was uneventful apart from an episode of cholangitis that responded to antibiotics. The patient was discharged on the 18th post-operative day only to be re-admitted on the 25th day with streptococcal septicaemia. He was found to have a late onset hepatic artery thrombosis with multiple abscesses in the right lobe of the liver. He was retransplanted 3 days later with a size-matched donor liver. Veno-venous bypass was used during the procedure. Both the upper and lower ends of the donor IVC were anastomosed end-to-end with the recipient IVC. The supra-hepatic IVC anastomosis was constructed below the old anastomosis. The anastomosis was created, as before, with a continuous 2–0 prolene suture (ethicon). On this occasion, a supra-renal aortic conduit was used for arterial reconstruction. On reperfusion some degree of hepatic engorgement was noted. Post-reperfusion, although the liver appeared to be clearing acid well, it became congested. At the completion of the operation the liver remained engorged to the point that the wound could not be closed and so was covered with a plastic sheet.

The patient was transferred to the intensive care unit where he appeared to be doing well initially. However, 5 h later, his condition started to deteriorate and over a 2-h period he became profoundly acidotic and hypotensive. Inotropic support was increased progressively, his prothrombin time deteriorated to 30 s and he be-

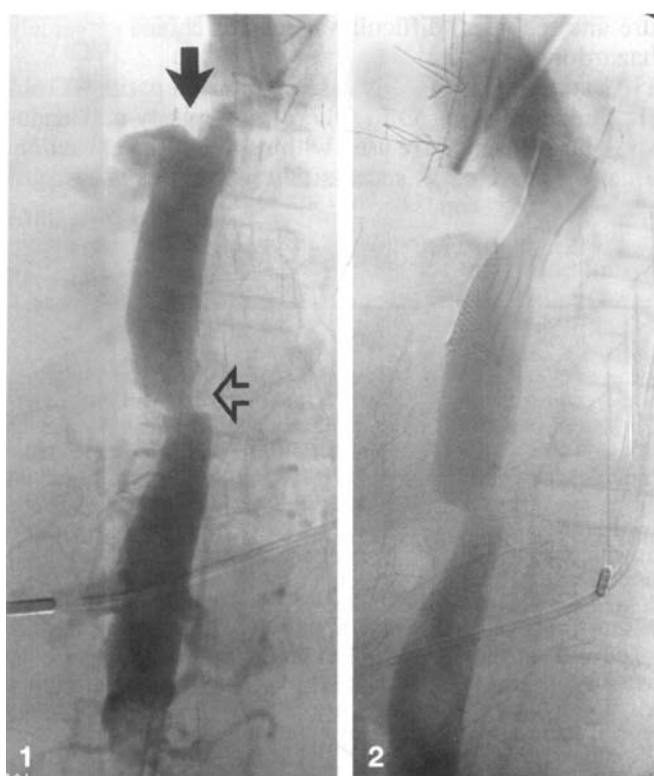


Fig. 1 Digital vena cavogram showing strictures at the supra-hepatic anastomosis (*bold arrow*) and narrowing at the infra-hepatic anastomosis (*open arrow*)

Fig. 2 Digital vena cavogram of the supra-hepatic IVC immediately following stenting

Table 1 Pressure parameters and inotropic support occurring at the time of caval dilatation.

Pressures	Pre-dilatation	Post-dilatation
Infra-hepatic IVC	65 cm water	35 cm water
Right atrium	15 cm water	25 cm water
Blood pressure	80/50 mm Hg	160/90 mm Hg
Infusions		
Dopamine	3 µg/kg per minute	2 µg/kg per minute
Dobutamine	7 µg/kg per minute	2.8 µg/kg per minute
Nor-adrenaline	0.3 µg/kg per minute	0.1 µg/kg per minute
Adrenaline	0.17 µg/kg per minute	None
Blood gas analysis		
pH	7.29 on 100 % oxygen	7.32 on 80 % oxygen

came anuric. Continuous veno-venous haemodialysis was instituted. A Doppler ultrasound scan confirmed good flows in the hepatic artery and portal vein. Because of the engorged appearance of the graft following reperfusion, a trans-femoral cavogram was made in order to evaluate the patency of the IVC. The infra-hepatic caval anastomosis was found to be patent. The supra-hepatic inferior vena caval anastomosis from the first transplant was found to be narrowed with a 50-cm water pressure gradient (Fig. 1). Because he was on maximal inotropic support and was markedly acidotic

despite dialysis, and because he had a progressively worsening coagulopathy, it was decided to dilate the stricture radiologically rather than correct it surgically.

The stricture in the IVC was balloon-dilated and then, because of the peri-anastomotic fibrosis, restenosis occurred immediately. Consequently, an intra-vascular stent was left in situ. As the stenosis in the IVC was close to the right atrium, a 16-mm expandable Wallstent was used, rather than a standard caval stent, to minimise the risk of migration (Fig. 2). The haemodynamic changes that occurred following stent placement are depicted in Table 1. The post-dilatation values were recorded within minutes of stent placement. Following placement of the stent, there was a dramatic improvement in all the haemodynamic parameters and the patient's condition stabilised rapidly. This procedure was performed in the radiology department with a surgical team present.

Subsequently, the patient had a prolonged and turbulent post-operative course. He developed a recurrent right-sided pleural effusion requiring repeated aspiration and needed prolonged ventilatory and dialysis support. This was probably more in keeping with his "extremis" condition at the time of the caval stenting than it was related to the stent itself. He has been successfully discharged from the hospital and is currently, 18 months post-OLT, free of respiratory or renal support. Anticoagulation therapy was not used.

Discussion

Stenosis of the supra-hepatic IVC anastomosis is a rare complication following OLT. When the venous outflow is severely compromised, the recipient develops a Budd-Chiari-like syndrome with lower limb oedema, ascites and impaired graft function. In this case the portal flow was surprisingly in a centrifugal direction, suggesting that the blood leaving the liver did so through the infra-hepatic cava. With the absence of collaterals the blood had great difficulty returning to the heart so that upper body blood pressure was dependent upon intravenous fluids that were administered into the upper body. The stricture presumably developed slowly after the first transplant and did not declare itself at this time, possibly due to reduced circulation through the liver from the hepatic artery thrombosis.

A number of centres have reported the use of simple balloon angioplasty for the treatment of IVC obstruction since it was first described in 1988 [4–8]. Intra-vascular stents have been used successfully in the management of superior and inferior vena caval obstructions due to malignancies [3]. When conventional end-to-end vena caval anastomotic techniques are used rather than vena-cavoplasty in OLT, stenosis of the supra-hepatic anastomosis resulting from fibrosis has been described [9]. Expandable vascular endoprostheses have been used to treat these cases [1, 2]. However, most of the reported cases of IVC obstruction managed by angioplasty and stenting have used this technique between 1 and 4 months following transplantation [5, 6]. The earliest use of this modality in OLT has been on day 5 following transplantation [2]. The use of such a stent so early after vascular anastomosis obviously carries a risk of anasto-

motonic disruption. However, we were confident that the new anastomosis was wide enough to take the stent though we declined the offer of a standard caval stent. This has fixation hooks, so we were concerned that these could have disrupted the anastomosis. In addition, migration of such a stent into the right atrium could have proved fatal. Surgical correction of the stenosis was another option available, but impending multi-organ fail-

ure and technical difficulty make this choice extremely hazardous.

In sum, this is the first case of supra-hepatic IVC obstruction following OLT where angioplasty and endovascular stenting were used within 24 h of the operation. This was carried out successfully without causing anastomotic disruption.

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