



Hepatic Vein Stenosis Developed During Living Donor Hepatectomy and Corrected with Peritoneal Patch Technique: A Case Report

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ABSTRACT

An 18-year-old male living donor for his father with end-stage liver cirrhosis due to hepatitis B underwent an extended right lobe donor hepatectomy. The middle hepatic vein was visualised on the cut surface of the graft and dissected up to the confluence of the middle and left hepatic veins. After vascular clamping, right and middle hepatic veins were cut to removed the graft. While starting the stump closure, the clamp over the middle hepatic vein slipped and the vein stump sutured quickly under suboptimal exposure. Soon after this closure, the remnant liver showed increasing congestion. Intraoperative Doppler ultrasound revealed obstruction of venous outflow at the remnant left liver due to stenosis in the left hepatic vein. Under total hepatic vascular occlusion, the sutures were removed from the narrowed left hepatic vein. A 2 × 2 cm peritoneal patch from the subcostal area that was prepared to close the defect was sutured to the edges of the left hepatic vein defect. Venous congestion of the liver disappeared when the clamps were removed. Intraoperative Doppler ultrasound confirmed normal hepatic venous flow. The postoperative course of the donor was uneventful. There was no clinical, biochemical, or radiological problems at 47 months of follow-up. An autogenous peritoneal patch may be a good option to repair vascular defects, which are not suitable for primary sutures, due to easy accessibility and size adjustment, cost effectiveness, as well as relatively low risk of infection and thrombosis. Close dissection of the left hepatic vein during parenchymal transection over the middle hepatic vein can result in narrowing, particularly at the bifurcation of the middle/left hepatic veins that can cause congestion in the remnant liver. When we include the middle hepatic vein with the right graft, we now believe that dissection away from the left hepatic vein seems much more secure for donors.

THE MOST fearsome situations for living donor liver transplantation are the development of donor mortality or life-threatening complications during or after surgery. Herein, we have presented a serious stenosis of the donor left hepatic vein after right donor hepatectomy including middle hepatic vein. The stenosis was noticed during surgery and corrected with a peritoneal patch technique.

CASE REPORT

A 46-year-old men with end stage chronic liver failure due to hepatitis B virus was admitted for transplantation. His height, weight, Child-Pugh score, and model for end stage liver disease (MELD) score were 165 cm, 70 kg, C/10, and 15, respectively. The patient's 18-year-old son was evaluated as a candidate for live donation. He was 172 cm tall, weighed 69 kg, and her normal preoperative laboratory evaluations.

Radiologically, his liver parenchyma, hepatic vein, hepatic artery, portal vein, and biliary anatomy were consistent with donor oper-

ation. A right donor hepatectomy including the middle hepatic vein was planned after evaluation of the computed tomography of the donor liver. At surgery, the hepatic hilum was dissected before the liver parenchymal transection. During the extended right lobe donor hepatectomy the middle hepatic vein on the cut surface of the graft was dissected to its confluence with the left hepatic veins. Before removing the graft, the hilar structures were transected first. After vascular clamping and transection of the right and middle hepatic veins, we removed the graft, which weighed 730 g. While starting the stump closure, the clamp over the middle hepatic vein slipped; the vein stump was sutured quickly under suboptimal exposure. Soon after this closure, the remnant liver appeared to

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show increasing congestion. An intraoperative Doppler ultrasound revealed a venous outflow problem in the remnant left liver due to a left hepatic vein stenosis. After the Pringle maneuver with a combination of suprahepatic and infrahepatic vena cava clamping (total hepatic vascular occlusion), the sutures were removed from the narrowed left hepatic vein. It was clear that there would be a restenosis, if the defect was closed primarily. A 2 × 2 cm peritoneal patch from the subcostal area prepared to close the defect was sutured to the edges of the left hepatic vein defect with a continuous 6/0 prolene (Fig 1A and B). The venous congestion in the liver disappeared when the clamps were removed an intraoperative Doppler ultrasound confirmed normal hepatic venous flow.

The postoperative course of the donor was uneventful; there was no clinical, biochemical, or radiological problem at 47 months of follow-up.

DISCUSSION

Donor complications and particularly the risk of mortality are the main barriers to widespread adoption of live donor liver transplantation. It is well known that a donor hepatectomy can be done safely with increased experience. We started liver transplantation in 1997, which now includes mainly (85%) living donation. So far, we have performed more than 500 donor hepatectomies, mainly including the right lobe with no donor mortality. However, we have experienced several donor complications. Herein, we have presented one of our early cases with an intraoperative complication.

Intraoperative donor hepatectomy complications have unfortunately been investigated poorly in the literature. Those complications include injuries to major hepatic vessels,¹ bile ducts,² parenchymal,^{3,4} other organs,⁵ and technical errors.² In such cases, the donor procedure can be aborted or the complications corrected intraoperatively.

Adding the middle hepatic vein to the right donor hepatectomy is still a continuing debate. We prefer to do this to diminish the risk of postimplantation venous congestion of the right anterior sector. However, inclusion of the middle hepatic vein with the right graft can increase the risk of donor complications.⁶ Therefore, if the middle hepatic vein is included, one must be more careful particularly regarding the left hepatic donor vein and the remnant liver volume.

Close dissection of the left hepatic vein during parenchymal transection over the middle hepatic vein can

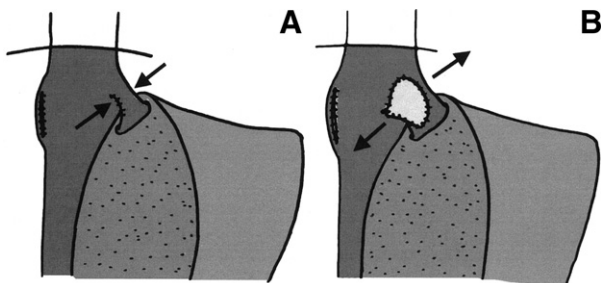


Fig 1. (A) Stenosis of the left hepatic vein and (B) correction with peritoneal patch.

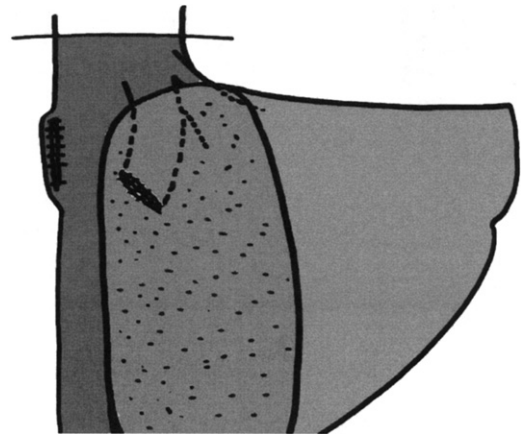


Fig 2. Remnant left liver after partially included middle hepatic vein to the right graft.

result in narrowing particularly at the confluence of the middle and left hepatic veins, causing congestion in the remnant liver. We believe that including the middle hepatic vein partially to the graft with dissection away from left hepatic vein is more secure for donors (Fig 2). Combining the right and middle hepatic vein openings on the back-table eliminates the problem of venous drainage of the anterior sector. Additionally, joining venous orifices as one ostium by surrounding them with a cryopreserved saphenous vein makes the graft easier to implant.⁷

Autogenous, allogeneic, or synthetic vascular grafts can be used to close major vascular defects. In our case, we did not have a donor autogenous vein graft and wished to not increase the risk of donor morbidity. We believe that synthetic patch grafts pose technical difficulties during the closure of venous defects such as bleeding from suture lines. There was no bank of cryopreserved vascular grafts at that time in our center and we decided to use a peritoneal patch. We quickly created a peritoneal patch and successfully repaired the defect by keeping the duration of total hepatic vascular clamping to the minimum.

The first time a peritoneum was used as a vascular patch was by Carrel in 1910.⁸ Experimental studies have shown that endothelialization occurs in the peritoneum over time.⁹ A small number of benign and malignant cases have been reported with peritoneal vascular patches with a low risk of thrombosis and infection.^{10,11} In these studies there was not sufficient information about the long-term patency of the peritoneal patch. In our case, there was no problem with the peritoneal patch and the hepatic vein after nearly a 4-year follow-up.

Autogenous peritoneal patch use may be a good option to repair vascular defects, which are not suitable for primary suturing, due to the easy accessibility and size adjustment, cost effectiveness, as well as relatively low risk of infection and thrombosis.

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