

Feasibility of using the graft's umbilical vein as a patch graft for hepatic vein reconstruction in pediatric living donor liver transplantation

doi:10.1111/j.1432-2277.2009.00953.x

A 5-month-old male (body weight, 9.4 kg) underwent living donor liver transplantation (LDLT) for ornithine transcarbamylase deficiency arising out of several episodes of hyperammonemia refractory to the medical management. The recipient's hepatectomy was uneventfully performed by retaining the inferior vena cava (IVC), and a reduced left lateral segment (weight, 266 g) was donated by his 37-year-old father. All of the recipient's hepatic vein orifices were connected to create a wide orifice, and the hepatic venous branches of the graft were anastomosed to the recipient's orifice in an end-to-side manner using continuous 6-0 monofilament sutures. After reperfusion, the graft became congested and ultrasound (US) revealed dilated intrahepatic veins. Although the graft was placed in an appropriate position without any torsion, a narrowing of the IVC was observed at the anastomotic site. While the hepatic inflows were clamped, the anastomosis was detached with the circumferential excision of the stenotic site of the IVC. Then, the posterior walls of the IVC were anastomosed to each other and the hepatic venous branches of the graft were anastomosed to the

anterior wall of the IVC in an end-to-side manner using continuous 6-0 monofilament sutures. However, there was no improvement in the outflow obstruction. The graft's umbilical vein had sufficient length and its patency had been well maintained. The umbilical vein was longitudinally opened to make a sheet (Fig. 1a). The hepatic inflows were clamped, the anterior side of the previous anastomosis was released and the sheet of the umbilical vein was applied as a patch graft (Fig. 1b and c). The graft's congestion was resolved and US revealed hepatic venous outflow to be adequate. The recipient demonstrated a good recovery without any signs of outflow obstruction.

Emond *et al.* [1] reported that hepatic venous outflow obstruction soon after implantation resulted in acute graft failure. Takayama *et al.* [2] cautioned that a direct anastomosis of the hepatic veins to a thin IVC can sometime cause a bend in the IVC at the anastomotic site. In the current case, the recipient's IVC was thin and the acute outflow obstruction was similar to that which they described. Venoplasty techniques with patch grafts can be

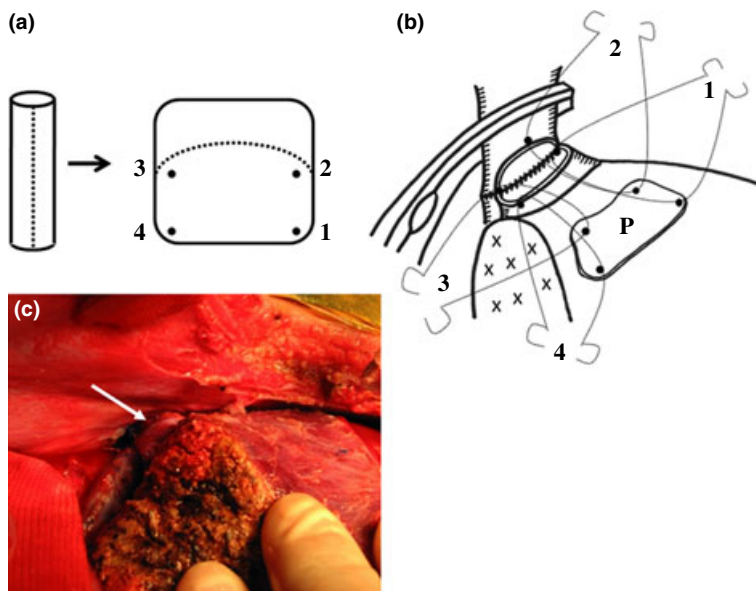


Figure 1 The umbilical vein was longitudinally opened to make a sheet, and then the sheet was trimmed to a proper shape (a). The sheet of the umbilical vein was applied as a patch graft (P) to the anterior side of the previous anastomosis. The anastomosis was performed by placing 4-points stay sutures. The numbers indicate the sites of 4-points stay sutures (b). The white arrow points the patch graft of the umbilical vein (c).

used to avoid outflow obstruction. Several types of vascular grafts have been reported as effective for hepatic vein reconstruction [3]. A few reports described the beneficial use of the umbilical vein as a vein conduit [4,5] or a patch graft [6] in right-lobe LDLTs. Facciuto *et al.* [7] reported that the mean length of recanalized and usable umbilical veins from the deceased donors was 10 cm, long enough to be used as a vascular graft. The patency or durability of the umbilical vein is the biggest concern. In the same report, they reported 80% of the umbilical veins were successfully recanalized, and in 73% of the recanalized veins the lumen was lined by endothelial cells [7]. These features support the durability of using umbilical veins as a patch graft.

The graft's umbilical vein was successfully used as a patch graft for hepatic vein reconstruction in the current case, while no other vascular grafts were available during the emergency situation. Although the authors' carelessness in performing the hepatic vein reconstruction is undeniable, it is important to keep in mind the use of a graft's umbilical vein as an effective vascular graft in emergency situations.

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