

Auxiliary reno-portal anastomosis in living donor liver transplantation: a technique for recipients with low portal inflow

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Dear Sirs,

A sufficient level of portal blood flow is required for a graft in liver transplantation to function optimally. End-stage liver disease may be accompanied by various degrees of portal venous thrombosis (PVT), low portal inflow, and large splenorenal shunts [1,2]. Previously, PVT was regarded as a relative contraindication for liver transplantation. Recently, thanks to advances in surgical techniques, liver transplantation has become feasible in some patients with PVT [3,4].

A number of surgical approaches have been developed to sustain graft viability in cases with PVT related insufficient portal flow. These approaches include eversion thrombo-endo-venectomy, ligation of collateral splanchnic veins, venous grafting between graft portal vein and recipient superior mesenteric vein, anastomosis with left gastric or gastroepiploic veins, portal arterialization, combined liver-intestine transplantation, cavoportal anastomosis, and end-to-end renoportal anastomosis (RPA) [3,4]. Our goal in this study is to describe the application of a porto-portal anastomosis and an auxiliary end-to-side RPA in a case with low portal flow with grade III PVT.

A 53 year-old male patient (weight, 55 kg; height, 160 cm; BMI, 21.4 kg/m²; blood type, B Rh positive) of the gastroenterology department was being treated for chronic liver disease secondary to hepatitis B infection and was admitted to our clinic for a living donor liver transplantation. His MELD and Child score were calculated as 18 and 13 (Child C), respectively. The patient's previous medical history revealed recurrent episodes of bacterial peritonitis. Three-dimensional multi-slice computed tomography (CT) showed reduced calibration of the portal vein, without any evidence of thrombosis. CT demonstrated large spleno-renal venous collaterals.

The donor was his 30 year-old daughter (57 kg; 154 cm; BMI, 24 kg/m²; B Rh positive). Based on multi-slice CT, the total bloodless liver volume was 1174 ml, with the right and left lobes being 732 ml and 392 ml, respectively (remnant liver, 33%). A right donor hepatec-

tomy was performed in the female patient, and a graft weighing 715 g was obtained (graft weight/body weight = 1.3%). During recipient hepatectomy, multiple large collateral vessels with retroperitoneal extensions were observed at the same level as the pancreatic tail. Recipient hepatectomy with caval preservation was performed uneventfully. A thrombus was observed in the portal vein causing a partial obstruction. The thrombus was removed by eversion thrombo-endo-venectomy, but portal vein flow appeared insufficient despite the total patency of the entire lumen to the superior mesenteric vein. There were no alternative veins (left gastric or gastroepiploic) with suitable anatomy and blood flow for portal anastomosis. We performed the porto-portal anastomosis of the recipient and the donor liver and reperused the graft. The liver did not swell well with portal blood and Doppler ultrasound showed insufficient portal flow. A renoportal anastomosis was planned because of the possible complications of individual ligations of each collateral vessels and the benefit of those ligations would be questionable. To localize the left renal vein, we just followed the anterior side of the inferior vena cava caudally where the left renal vein branched off the inferior vena cava and we did not use duodenal mobilization (Kocher maneuver). The left renal vein was transected from the vena cava and the orifice on the vena cava was closed. The renal vein was extended with a cryopreserved deceased donor iliac vein graft. Iliac vein graft was anastomosed to the recipient portal vein by an end-to-side anastomosis (Fig. 1). The aim was to provide an auxiliary blood flow. Doppler ultrasound in the intraoperative and postoperative periods proved that the blood flow was sufficient.

Incidence of PVT varies from 0.6% to 64% in cirrhotic patients, depending on the diagnostic method, the criteria for patient recruitment, and the accepted definitions [3,5]. Yerdel *et al.* [6] defined PVT grading system which ranges from Grade I to IV, is based on the obstruction ratio of the portal vein lumen and the degree of distal extension of the thrombus material. This grading system

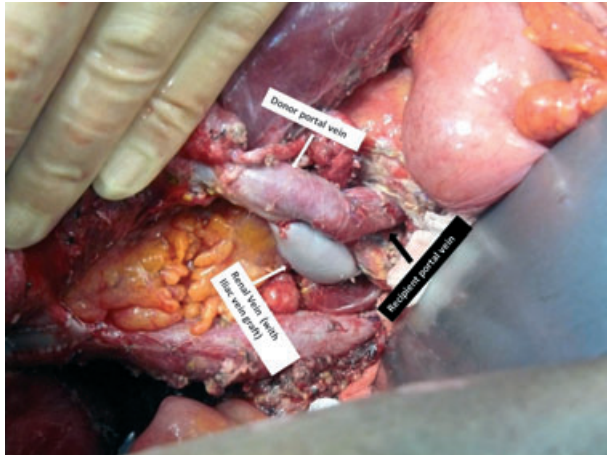


Figure 1 Auxiliary end-to-side renoportal anastomosis with iliac vein graft.

has also modified the strategies implemented in PVT patients undergoing liver transplantation. Eversion thromboendovenectomy is the treatment of first choice for cases with Grade I and II. For Grade III–IV thrombosis, a jump graft from the superior mesenteric vein to the donor portal vein or interposition grafts between the portal vein and the left gastric or gastroepiploic vein can be applied. We checked the superior mesenteric vein lumen through the portal vein orifice but could not find any occlusion and did not perform jump graft. For cases in whom sufficient blood flow cannot be achieved using these algorithms, an arterialization to portal vein or cavoportal hemitransposition can be attempted. However, due to poor long-term outcomes of the arterialization procedure and the risks of lower extremity edema, deep vein thrombosis, and pulmonary embolism of cavoportal hemitransposition we did not prefer those techniques.

We did not decide to ligate the spleno-renal venous collaterals to increase the portal vein flow, instead we preferred using those shunts for RPA which could be only suitable in cases with patent splenorenal shunts [3,5]. Hepatic perfusion with splanchnic growth factors via the patent splenorenal shunts and through the RPA is an advantage of this technique. A successful liver transplantation along with an end-to-end RPA was first described by Sheil and colleagues in a case with a totally occluded distal portal vein [7]. This technique was then modified by Kato and Azulay, who used a venous interposition graft [8,9]. Ringers and colleagues reported end-to-end anastomosis between the left renal vein and the portal vein of the graft, without involving the native portal vein, in auxiliary a partial liver transplantation due to acute hepatic failure [10]. Nearly 45 RPA cases involving end-to-end anastomosis created between the portal vein of the graft and the left renal vein have been reported in the lit-

erature. Best of our knowledge, auxiliary reno-portal anastomosis has not been reported yet. Channeling the splanchnic blood flow draining into the left renal vein toward the liver by means of auxiliary RPA technique may be a suitable approach for treating Grade III–IV PVT cases in whom a liver graft has insufficient perfusion because of low portal inflow.

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Conflicts of Interest

The authors declare that there is no conflict of interest.

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