

Liver Transplantation in Patients With Complete Portal Vein Thrombosis: Renoportal or Varicoportal Anastomosis Using Cryopreserved Vein Grafts

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ABSTRACT

Background. Despite technical developments in transplantation surgery, complete portal vein thrombosis still remains a challenge for restoration of adequate portal vein inflow. Renoportal or varicoportal anastomosis provides an effective alternative solution for patients with complete portal vein thrombosis. This study describes our experience with renoportal and varicoportal anastomosis during liver transplantation.

Patients and methods. Between January 2014 and May 2016, 5 patients with complete portal vein thrombosis underwent extra-anatomic portal anastomosis. In 3 cases, varicoportal anastomosis was performed and for the others, end-to-end renoportal anastomosis. We used iliac cryopreserved vein grafts to restore portal anastomosis in 3 cases. Epidemiology, risk factors, surgical techniques, complications, and outcomes of these procedures were evaluated over short- and long-term follow-ups.

Results. The follow-up time is 3 years for our first renoportal case, which was performed in a cadaveric liver transplantation; it was also first nationwide case. The other renoportal anastomosis was practiced in a living donor liver transplantation and the follow-up time is 8 months. The patient and graft survival rates were 100% at the last follow-up. The follow-up times are 10.9 and 4 months for the patients with varicoportal anastomosis. One of these patients died due to recurrence of hepatocellular carcinoma. The other two patients are alive with good graft functions.

Conclusion. Our experience suggests that reno-varicoportal anastomosis is a useful technique for patients with complete portal vein thrombosis and cryopreserved grafts may be safely used.

ENSURING sufficient portal vein flow is mandatory for both cadaveric as well as living donor liver transplantation (LDLT). Portal vein thrombosis (PVT) is no longer considered a contraindication for liver transplantation. Despite this, very few reports in the literature discuss and detail how to deal with complete PVT. There are still several technical challenges involved in the process, along with a significantly higher rate of both morbidity and mortality [1].

Recent improvements and advancements in surgical techniques have allowed for the development of several strategies designed specifically to overcome this problem. Depending upon the grade of PVT in question, there are

several potential surgical options available for use. In case of early grades of thrombosis, a thrombectomy can usually solve the issue, but complete PVT is a more complex condition that frequently requires extra-anatomic portal vein anastomosis. Varicoportal (VPA) and renoportal anastomosis (RPA) are two such creative surgical strategies available in case of complete PVT [2,3].

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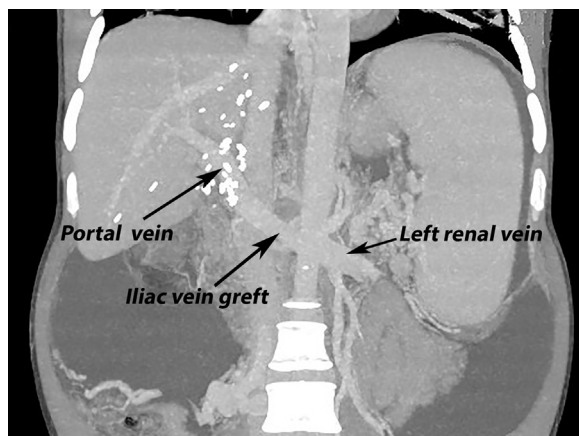


Fig 1. Renoportal anastomosis between left renal vein and portal vein using iliac vein graft.

There are limited reports in the literature regarding cases that present with anastomosis between variceal collateral veins and the portal vein. For the purpose of reconstructing a VPA, the left gastric vein varix is the variceal vein of choice for most [4,5]. RPA was initially described by Sheil et al [6] and subsequently further modified by Kato et al [7]. The first LDLT using RPA was reported by Miyamoto et al in 2003 [8]. In recent years, reports by several single-center studies have demonstrated the practicality of liver transplantation in the presence of complete PVT when various surgical variations of RPA are used [9,10]. Despite several such positive reports, many centers still harbor doubts regarding liver transplantation in case of complete PVT, citing reasons such as technical difficulties or ethical considerations. In light of this, it can be concluded that it is imperative to undertake further studies and garner more data regarding these procedures to reach a decision.

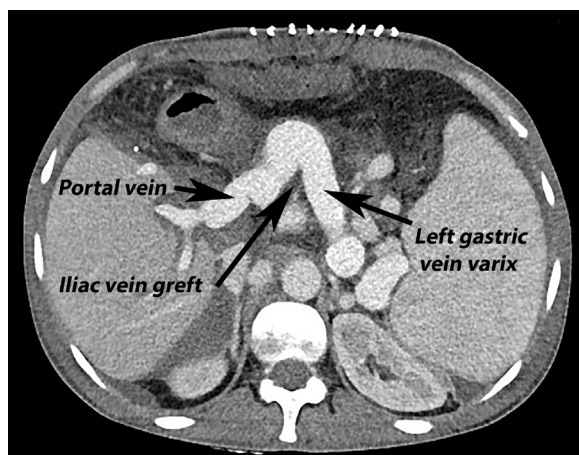


Fig 2. Varicoportal anastomosis between left gastric vein varix and portal vein using iliac vein graft.

In this series, we represent our experience with VPA and RPA in both cadaveric as well as LDLT. We would like to draw attention to the fact that our cadaveric as well as LDLTs using RPA were also the first such cases reported nationwide.

MATERIALS AND METHODS

Between January 2014 and May 2016, a total of 285 liver transplantations were performed at our institution. Among these cases, 108 were cadaveric (38%) and 177 were LDLT (62%), and 30 had PVT (10%). Five patients with complete PVT underwent extra-anatomic portal anastomosis. In three of these cases, VPA was performed, and RPA was employed for the remaining ones (Figs 1 and 2).

All patients enrolled in the study were male, and the mean age of the subjects was 50 years (range 37–64 years). Three of the patients presented with hepatitis B-related liver cirrhosis. The first patient also had hepatocellular carcinoma (HCC) that met the Milan criteria (single tumor; size: 2.7 cm). This particular patient had undergone right hepatectomy for HCC 2 years prior to the study, and a liver transplantation had been performed as a salvage procedure due to the recurrence of HCC. The second patient had cryptogenic liver cirrhosis, and the last patient presented with hepatitis C-related liver cirrhosis with HCC beyond the Milan criteria (single tumor; size: 7 cm).

Preoperative screening of all patients was performed using Doppler ultrasonography and angio-computed tomography. As per criteria described by the Yerdel classification [11], all patients were designated as Yerdel 4. In both cases of RPA, the portal vein, superior mesenteric vein, and splenic vein were totally occluded and there was a spontaneous large splenoportal shunt. In cases that presented with VPA, although splenic and left gastric veins were open, reconstructing portoportal anastomosis was impossible either due to unsuccessful thrombectomy or because of chronic stricture of the portal vein.

For RPA, in both cases, the left renal vein of the recipient was used for reconstruction of portal flow. Both of these interventions were end-to-end type of RPA. One patient underwent a cadaveric liver transplantation, and right lobe LDLT was performed in the other case. It is to be noted that in cases wherein oversized collateral veins are observed not far from the hilus of the liver, it was our preference to employ the VPA procedure. In the two VPA cases, the left gastric vein varix was used to provide portal vein inflow, and the pericholedochal varix was used in the third case. In all patients with VPA, the technique employed was side-to-end anastomosis except in the case where there was a pericholedochal varix. Our preference was to use the iliac vein grafts and to try to interpose a shortest vein graft between the graft portal vein and the collateral vein with the objective of obtaining the shortest graft route.

In one patient, a fresh donor iliac vein graft was attached to the graft portal vein so as to constitute anastomosis, and cryopreserved iliac vein grafts were used in 3 other patients. In one patient, the portal flow was restored by using a pericholedochal varix without graft.

The iliac veins used for grafting purposes in this study were preserved in a conserving solution at -80°C . The composition of this conserving solution was as follows: 80 mg gentamicin, 55 mL allogeneic fresh frozen plasma, and 5 mL dimethyl sulfoxide. Vein grafts that were cryopreserved in this fashion were presumed to be valid for a period of 1 month, after which they were regarded as expired or unusable. Preoperative Doppler ultrasonography was

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