JOURNAL OF INONU LIVER TRANSPLANTATION INSTITUTE

DOI: 10.14744/jilti.2026.78941
J Inonu Liver Transpl Inst 2025;3(3):121–124

Case Report

A Rare Case in Living Donor Liver Transplantation: Graft-to-Graft of Portal Vein Anastomosis

Mehmet Hadin Karadag, Sertac Usta

Department of General Surgery, Inonu University Faculty of Medicine, Malatya, Türkiye

Abstract

In RL-LDLT, both APVB and PVT are associated with adverse operative outcomes. Portal vein thrombosis surgical planning depends on the type and extent of portal vein thrombosis. While completely occlusive portal vein thrombosis is associated with higher morbidity and an unfavorable postoperative course, long-term outcomes may be comparable to those of patients without portal vein thrombosis when physiological portal venous inflow can be achieved. In this report, we present a successful liver transplantation in which a living donor graft with APVB was reconstructed on the back table using a homolog portal Y-graft. This reconstructed graft was then anastomosed to a cadaveric interposition graft of the recipient with Yerdel grade 3 portal vein thrombosis, resulting in a graft-to-graft portal vein anastomosis.

Keywords: Jump graft, Jump graft and Y-graft anastomosis, Liver transplantation, Portal vein reconstruction

Please cite this article as "Karadag MH, Usta S. A Rare Case in Living Donor Liver Transplantation: Graft-to-Graft of Portal Vein Anastomosis. J Inonu Liver Transpl Inst 2025;3(3):121–124".

Local or systemic pro-thrombotic conditions play a significant role in the pathogenesis of portal vein thrombosis (PVT).[1] PVT is a common complication occurring in 5–26% of cirrhotic patients listed for liver transplantation (LT). Although previous studies suggest that anticoagulant therapy may achieve portal vein recanalization, the timing and choice of anticoagulant therapy in these patients have not yet been clearly established.[2] When necessary, transjugular intrahepatic portosystemic shunt (TIPS) can be used as a minimally invasive option for PVT.

In advanced PVT cases, complex vascular reconstructions may be required to achieve a successful LT.[3] The commonly used classification was defined by Yerdel et al.[4] Early PVT (Yerdel grade I/II) can generally be managed by thromboendovenectomy, whereas grades III–IV may require a jump graft from the superior mesenteric vein (SMV).

Completely occlusive porto-mesenteric thrombosis poses major surgical challenges. Historically, LT was considered contraindicated in such patients, with multivisceral transplantation accepted as the only alternative.[5] Today, the main goal in PVT management for transplant candidates is to restore portal inflow through anatomical end-to-end portal vein anastomosis by achieving recanalization whenever possible.[6]

Our patient required both portal venous reconstruction with homolog portal Y-graft on the donor graft and a jump graft from the portal confluence due to PVT. This case involves highly complex procedures. In this report, we aim to emphasize that when physiological reconstruction pathways are used, long-term outcomes can be favorable and this case represents an encouraging example.

Address for correspondence: Mehmet Hadin Karadag, MD. Department of General Surgery, Inonu University Faculty of Medicine, Malatya, Türkiye
E-mail: karadagmehmethadin@gmail.com

Submitted Date: 21.12.2025 **Revised Date:** 06.01.2026 **Accepted Date:** 06.01.2026 **Available Online Date:** 14.01.2026
Journal of Inonu Liver Transplantation Institute - Available online at www.jilti.org

Case Report

A 68-year-old Middle Anatolian female patient presented with clinical features consistent with chronic liver disease. She reported abdominal distension, fatigue, and weakness. Her MELD-Na score was calculated as 16. Preoperative dynamic liver CT demonstrated PVT with minimal residual flow. The patient underwent right-lobe living donor liver transplantation for cryptogenic liver failure and Yerdel type 3 PVT (Fig. 1).

This original has been confirmed and approved in writing by the legal guardian/relative of the person(s) included.

Surgical Technique

The recipient hepatectomy was performed using standard surgical procedures. Prior to graft implantation, thromboendovenectomy was attempted. However, during the procedure, a bleeding occurred at the portal vein confluence. Hemostasis was achieved by inflating a Foley catheter balloon at the confluence, and a cadaveric vein graft was anastomosed outfluence of SMV-Splenic vein for extension[15] (Fig. 2).

Figure 1. Preoperative imaging of Yerdel type 3 portal vein thrombosis.

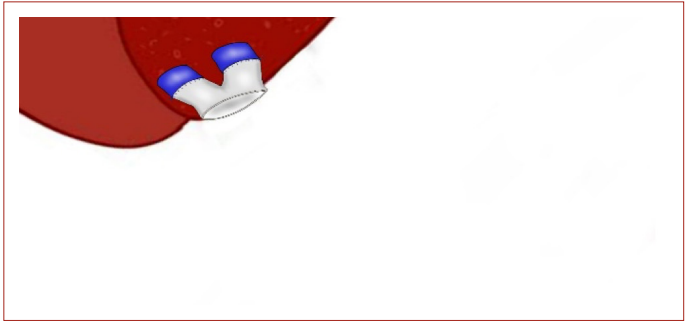

Figure 2. Back-table Y-graft reconstruction of double portal veins.

After clamping the vena cava, the right-lobe graft was implanted. The donor graft had anomalous portal venous branching (APVB); therefore, a homolog portal Y-graft interposition was performed on the back table (Fig. 3). The reconstructed right-lobe portal vein was then anastomosed to the recipient's extension graft (Fig. 4), ensuring continuous and physiological portal flow and successful graft perfusion.

The patient was discharged after routine intensive care and ward monitoring following the postoperative period. They are currently continuing with outpatient follow-up appointments (Figs. 3-5).

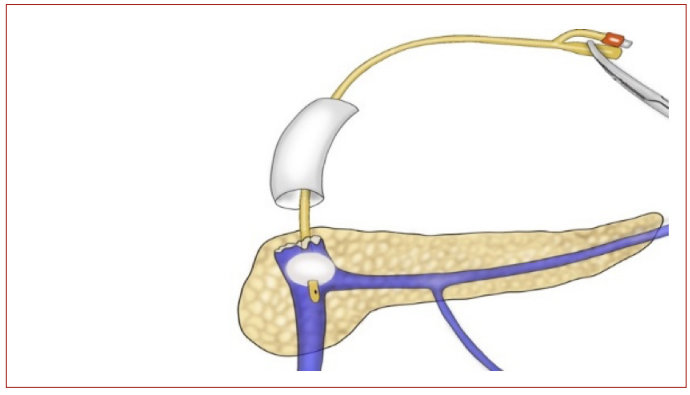

Figure 3. Extension graft anastomosis facilitated by Foley catheter inflation at the confluence.

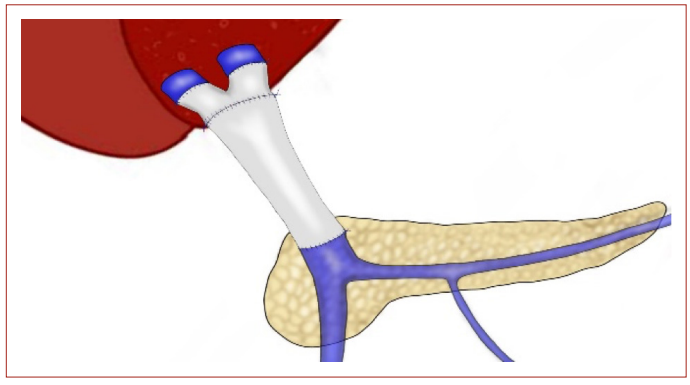

Figure 4. Graft-to-graft portal vein anastomosis.

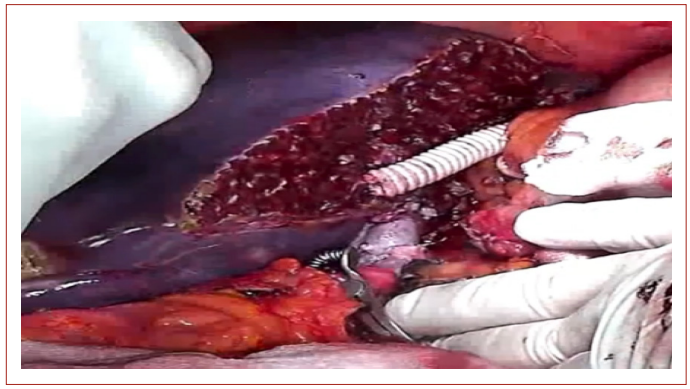

Figure 5. Intraoperative image of graft-to-graft anastomosis.

Discussion

Physiological reconstructions of the portal vein are associated with better postoperative outcomes. Physiological reconstruction techniques include primary anastomotic thrombectomy, interposition vein grafting, SMV jump grafting, and collateral vein interposition grafting. For non-physiological portal vein reconstructions, methods such as cavoportal hemitransposition, renoportal anastomosis, portal vein arterialization, and multiple organ transplantation have been described.

Various solutions for PVT have been described in the literature. Magistri et al. proposed an extra-anatomic jump graft from the right colic vein using an iliac vein graft.[7] Hwang et al. used a PTFE jump graft from the IMV to the portal vein in patients with portomesenteric thrombosis.[8] Mori et al. reported that when the SMV is patent but the thrombus extends to the confluence, iliac or jugular vein grafts can be used as a jump graft between the SMV and graft portal vein.[9] Ozdemir et al. emphasized that renoportal anastomosis can provide adequate portal inflow even in patients with prior proximal splenorenal shunt and splenectomy.[10]

Portal system reconstructions may also be required due to donor-related anatomical variations. In APVB, direct anastomosis may not be feasible, necessitating reconstruction. Several techniques have been described, including portal Y-graft interposition, which has demonstrated good long-term outcomes.[11] Yoo and Hwang later developed the conjoined unification venoplasty (CUV) technique to prevent stenosis sometimes seen with Y-grafts.[12]

Yilmaz S. et al. described a large-series technique known as the Malatya Approach, which combines APVB into a single outflow using a saphenous vein conduit, significantly reducing postoperative PVT and improving survival.[13]

Attempts to create a single portal vein orifice during donor surgery for APVB may also lead to complications, including stenosis and thrombosis of the remnant portal vein,[14] further emphasizing the importance of reconstruction.

Complex cases requiring combined portal vein reconstruction pose significant challenges in living donor transplantation. In our case, a right-lobe graft with APVB was transplanted into a recipient with PVT.

Although multiple reconstruction techniques have been described,[7–9] the goal remains achieving the most physiological flow with minimal anastomotic complexity. In this case, the right lobe graft APVB was reconstructed using a Y-graft, while an extension graft was used for recipient PVT. A graft-to-graft anastomosis was successfully performed.

Two major technical problems were encountered:

1. Restoring portal flow after thromboendovenectomy:

Endothelial injury at the confluence prevented direct anastomosis. When bleeding occurred during clamped anastomosis, the previously described balloon tamponade technique from our center[15] was used to safely complete the extension graft anastomosis.

2. Reconstruction of right lobe APVB:

Cadaveric iliac Y-grafts were used to solve the APVB. This allowed the graft-to-graft anastomosis to be performed safely.

The patient continues to be followed without any vascular complications (Figs. 6, 7). No similar graft-to-graft anastomosis technique was found in the literature.

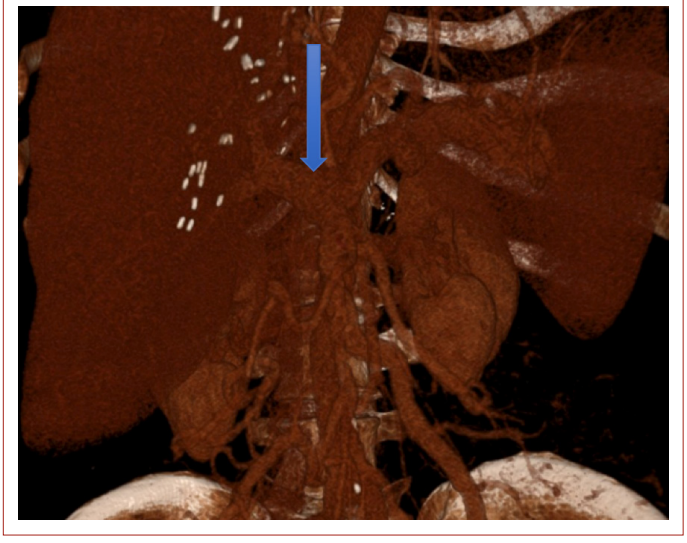

Figure 6. Dynamic CT (portal phase) performed 11 months post-transplant showing patent portal reconstruction.

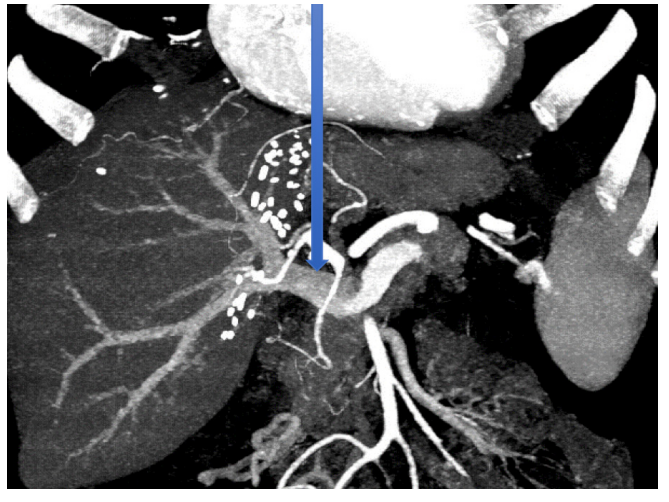

Figure 7. Dynamic CT (portal phase) performed 11 months post-transplant showing patent portal reconstruction.

Conclusion

In right-lobe living donor liver transplantation with APVB, successful outcomes can be achieved using appropriate surgical techniques. This case demonstrates that in living donor liver transplantation with PVT, a combined portal Y-graft and extension graft, completed with graft-to-graft anastomosis, can be safely used for portal vein reconstruction.

Disclosures

Informed consent: Written, informed consent was obtained from the patient's family for the publication of thís case report and the accompanying images.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – M.H.K.; Design – M.H.K.; Supervision – S.U.; Materials – M.H.K.; Data collection &/or processing – M.H.K.; Analysis and/or interpretation – M.H.K.; Literature search – M.H.K.; Writing – M.H.K.; Critical review – S.U.

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