World Journal of Transplantation

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World J Transplant 2022 July 18; 12(7): 204-210

DOI: 10.5500/wjt.v12.i7.204

ISSN 2220-3230 (online)

CASE REPORT

Portal vein-variceal anastomosis for portal vein inflow reconstruction in orthotopic liver transplantation: A case report and review of literature

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Specialty type: Transplantation

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C, C
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Singh N, United States; Soresi M, Italy
A-Editor: Liu X, China

Received: December 12, 2021
Peer-review started: December 12, 2021
First decision: February 15, 2022
Revised: April 6, 2022
Accepted: June 13, 2022
Article in press: June 13, 2022
Published online: July 18, 2022

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Abstract

BACKGROUND

Portal vein thrombosis (PVT) is a frequent complication occurring in 5% to 26% of cirrhotic patients candidates for liver transplantation (LT). In cases of extensive portal and or mesenteric vein thrombosis, complex vascular reconstruction of the portal inflow may become necessary for a successful orthotopic LT (OLT).

CASE SUMMARY

A 54-year-old male with history of cirrhosis secondary to schistosomiasis complicated with extensive portal and mesenteric vein thrombosis and severe portal hypertension who underwent OLT with portal vein-left gastric vein anastomosis.

CONCLUSION

We review the various types of PVT, the portal venous inflow reconstruction techniques.

Key Words: Portal vein thrombosis; Portal inflow reconstruction; Orthotopic liver transplantation; Splanchnic varices; Left gastric varix; Case report

Core Tip: The portal vein-variceal anastomosis is a challenging physiological non-anatomical technique of portal vein inflow reconstruction used and described rarely. Herein we review the various types of portal vein thrombosis, the portal venous inflow reconstruction techniques and describe an extraordinary case of portal vein-left gastric vein anastomosis for the portal inflow reconstruction during orthotopic liver transplantation.

Citation: Gravetz A. Portal vein-variceal anastomosis for portal vein inflow reconstruction in orthotopic liver transplantation: A case report and review of literature. *World J Transplant* 2022; 12(7): 204-210
URL: https://www.wjgnet.com/2220-3230/full/v12/i7/204.htm
DOI: https://dx.doi.org/10.5500/wjt.v12.i7.204

INTRODUCTION

Portal vein thrombosis (PVT) is a frequent and serious complication in patients with cirrhosis, with a prevalence ranging from 5% to 26%[1-4]. Patients with PV and/or mesenteric vein thrombosis while awaiting liver transplantation (LT) pose a significant surgical challenge for the reconstruction of the liver portal inflow, an essential step for successful orthotopic LT (OLT)[5-6]. While an end-to-end donor to recipient portal vein anastomosis is fashioned in the majority of liver transplant recipients, approximately 2% of recipients will require a complex vascular reconstruction due to inadequate recipient portal vein inflow[7,8].

The portal vein-variceal anastomosis is a challenging physiological non-anatomical technique of portal vein inflow reconstruction used and described rarely. Herein we review the various types of PVT, the portal venous inflow reconstruction techniques and describe an extraordinary case of portal vein-left gastric vein (LGV) anastomosis for the portal inflow reconstruction during OLT.

CASE PRESENTATION

Chief complaints

A 54-year-old male of Ethiopian origin who presented back in 1993 with variceal bleeding leading to a subsequent diagnosis of non-cirrhotic portal hypertension with splenomegaly and PVT with cavernous transformation.

History of present illness

The presence of granulomas and periportal fibrosis with preserved hepatic architecture on liver biopsy, together with positive serologic tests for antischistosomal antibodies and the patient origin suggested the diagnosis of hepatosplenic schistosomiasis. Further work up revealed protein C deficiency. Whether the patient received anthelmintic therapy upon diagnosis is unclear, however, prior to transplant no specific prophylactic treatment was administered as there was no evidence of active hepatic or systemic disease.

History of past illness

The patient in 1993 with variceal bleeding leading to a subsequent diagnosis of non-cirrhotic portal hypertension with splenomegaly and PVT with cavernous transformation.

Personal and family history

The patient has none personal and family history.

Physical examination

Medical management of portal hypertension complications included diuretics, beta-blockers and periodic upper endoscopy with sclerotherapy and esophageal varices ligation. The patient eventually presented with severe decompensation and model for end-stage liver disease score of 25 necessitating LT.

Laboratory examinations

His physical examination revealed signs of cachexia, jaundice, abdominal distention, umbilical hernia, caput medusa and impression of moderate to large volume ascites. Laboratory results showed total white blood cell count of 2.67 × 10^9/L, hemoglobin levels of 8 g/dL, platelet count of 33 × 10^9/L, international normalized ratio 2.43, total bilirubin of 7.5 mg/dL (and direct bilirubin of 3.6 mg/dL), serum

sodium 140 mEq/L, serum creatinine 1.1 mg/dL and albumin levels of 2.5 gr/dL.

Imaging examinations

Preoperative esophagogastroduodenoscopy showed grade III esophageal varices and portal hypertensive gastropathy. Imaging revealed liver cirrhosis, extensive portal and mesenteric vein thrombosis with cavernous transformation, splenomegaly, with the spleen measuring 20 cm in diameter, and splanchnic varices comprising a large left gastric varix (Figure 1).

FINAL DIAGNOSIS

Over the years the patient gradually developed compensated liver fibrosis and cirrhosis as seen on various imaging modalities and worsening liver synthetic function.

TREATMENT

The patient underwent OLT on April 2021 with piggyback venous outflow reconstruction and a portal vein-left gastric varix anastomosis for portal inflow. During the procedure the LGV was carefully dissected cephalad at the level of the mid lesser curvature of the stomach. Adequate venous flow was confirmed prior to creation of end-to-side porto-LGV anastomosis performed using polypropylene 5-0 suture (Figure 2A). Postoperative Doppler sonography documented patent anastomosis with adequate flow (Figure 2B), a finding which was confirmed by a contrast abdominal computed tomography performed on postoperative day 16 (Figure 2C).

OUTCOME AND FOLLOW-UP

The patient had a relatively benign postoperative course characterized by mild to moderate ascites, as anticipated, controlled initially with drainage and medical treatment and eventually resolved prior to discharge. Ten months post-operatively the patient is doing well with excellent liver function.

DISCUSSION

Schistosomiasis (bilharzia) is a chronic parasitic entero-pathogenic disease caused by a genus of trematodes commonly known as blood flukes[1]. Hepatic schistosomiasis represents the best known form of chronic disease and represents the most important cause of non-cirrhotic portal hypertension in Latin America, Africa, and Asia[2]. The pathogenesis of schistosomiasis is related to the host cellular immune response. This leads to granuloma formation and neo-angiogenesis with subsequent irreversible periportal fibrosis and, consequently, severe portal hypertension manifesting with splenomegaly and esophageal varices[3,4]. Traditionally the diagnosis of Schistosoma infection is based upon demonstration of parasite eggs in patient secretions or tissues. However, in the case of liver disease, detection of ova often fails and the diagnosis is established using serologic tests along with DNA amplification techniques and characteristic liver biopsy findings[5-7]. Praziquantel is the drug of choice to treat laboratory-proven Schistosoma infection[8]. The effect of antischistosomal treatment on disease manifestations varies by stage. Early liver involvement is known to resolve after anthelmintic therapy, but late manifestations, such as fibrosis, do not change and treatment is focused on tempering portal hypertension manifestations[9]. LT represents a curative option for patients who develop severe hepatic fibrosis and portal hypertension secondary to hepatic schistosomiasis[10], and no specific treatment is indicated for the recipients[11].

PVT is a frequent and serious complication in patients with cirrhosis, with a prevalence ranging from 5% to 26%[12-17]. Patients with cirrhosis presenting with or developing PV and/or superior mesenteric vein (SMV) thrombosis while awaiting LT pose a significant surgical challenge for the reconstruction of the liver portal inflow, an essential step for successful OLT[18,19]. Although PVT has long been considered an absolute contraindication to OLT, it is currently regarded as a relative contraindication, depending on the patient clinical status, type of PVT and collateral venous flow, and the surgeon's experience[20,21]. While an end-to-end donor to recipient portal vein anastomosis is fashioned in the majority of liver transplant recipients, approximately 2% of recipients will require a complex vascular reconstruction due to inadequate recipient portal vein inflow[22,23].

The type of PVT is classified according to the nature of the occlusion (complete *vs* partial) and the extension in the portal vein, the venous confluence and its contributories - the SMV and the splenic vein (SV). Various classification systems of PVT have been proposed with the Yerdel classification being

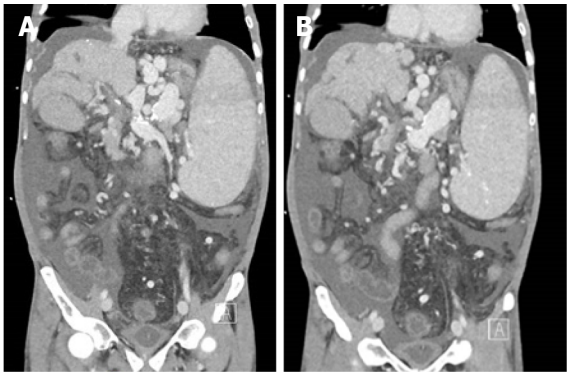

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Figure 1 Preoperative abdominal computed tomography. A: Extensive portal vein thrombosis; B: Superior mesenteric vein thrombosis.

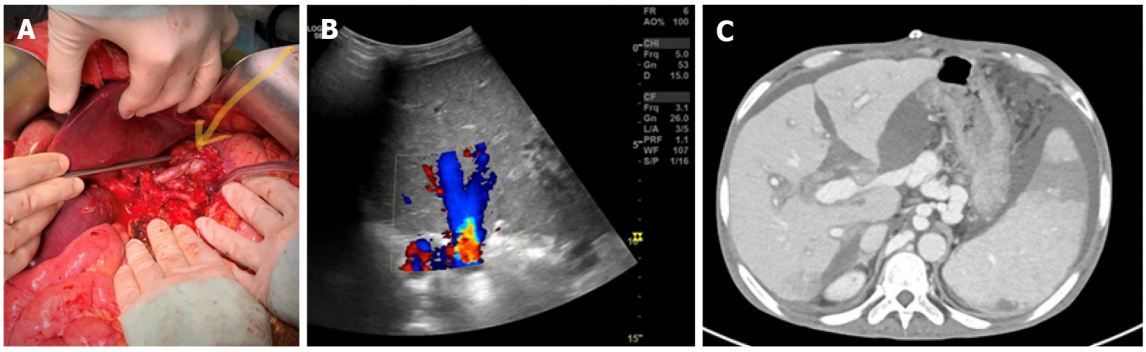

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Figure 2 Treatment imaging. A: End-to-side portal vein-left gastric vein anastomosis upon completion; B: Postoperative Doppler sonography documenting patent anastomosis with adequate flow; C: Abdominal computed tomography showing patent portal vein-left gastric vein anastomosis.

widely used because it correlates thrombus extent and surgical management[24-28]. Yerdel's classification defines grade I as partial PVT (< 50% of the lumen) with or without minimal extension into the SMV, grade II as partial PVT (> 50% of the lumen), grade III - complete thrombosis of both PV and proximal SMV and grade IV with complete PV and both proximal and distal SMV.

For the reconstruction of the liver portal inflow in the presence of PV-SMV thrombosis there are 3 main strategies: Anatomical (and physiological), physiological (non-anatomical) and non-physiological [19,29]. For Yerdel grades I to III, an anatomical reconstruction may be achieved; operative techniques include thrombectomy, whether the thrombus is removed *en-bloc* with the liver or through an intraoperative PV/SMV thrombectomy, followed by direct porto-portal anastomosis or indirect using an interposition venous graft.

For more complex cases of complete occlusion or proximal extension of the thrombus, such as in Yerdel's grade IV and some grade III cases, alternative approaches should be used to redirect the portal venous flow into the graft[29,30]. Some of those extraordinary cases of extensive thrombosis may be considered as a contraindication to transplant. However, when evaluated by highly experienced transplant centers, a complex vascular reconstruction may be attempted or else, a multivisceral transplant may be considered. That is, for Yerdel's grade IV and some grade III cases, a physiological (non-anatomical) or non-physiological (inflow achieved by reno-portal anastomosis, cavo-portal hemitransposition or portal vein arterialization), approach may be used.

The portal vein-variceal anastomosis is a challenging physiological non-anatomical technique of portal vein inflow reconstruction used and described rarely. In those procedures, enlarged splanchnic varices[31-34], LGV[35-38], or pericholedochal varix[39,40] is used. Use of a splanchnic varix such as a dilated LGV necessitates a meticulous and very careful dissection in a hostile surrounding of other dilated fragile varices. Furthermore, length of the donor's liver portal vein should be sufficient or else an interposition venous graft may be used for the anastomosis. From the functional standpoint, adequate portal flow should be assessed, using direct (needle- transducer) or indirect (ultrasound Doppler) method. In the occurrence of slow venous flow, proximal ligation of the varix may be considered in order to divert splanchnic venous drainage towards the neo-liver and to avoid the siphon effect of the peri-gastric varices and SV. In cases of extensive SMV thrombosis there is also a concern for inadequate venous intestinal drainage, despite a successful and functional anastomosis, and a as result refractory ascites.

Although challenging, good outcomes are possible in patients with extensive PV/SMV thrombosis undergoing LT. Meticulous patient selection, preoperative imaging planning and highly experienced surgical team are crucial for a successful transplantation and reconstruction of the portal inflow in those complex clinical scenarios. This case shows the feasibility of this unusual approach, using a dilated left gastric varix for the reconstruction of the liver portal inflow, giving a patient in an extreme condition access to life-saving LT.

CONCLUSION

Although challenging, good outcomes are possible in patients with extensive PV/SMV thrombosis undergoing LT. Meticulous patient selection, preoperative imaging planning and highly experienced surgical team are crucial for a successful transplantation and reconstruction of the portal inflow in those complex clinical scenarios. This case shows the feasibility of this unusual approach, using a dilated left gastric varix for the reconstruction of the liver portal inflow, giving a patient in an extreme condition access to life-saving LT.

FOOTNOTES

Author contributions: Gravetz A contributed to the manuscript drating.

Informed consent statement: All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

Conflict-of-interest statement: The author reports no relevant conflicts of interest for this article.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Country/Territory of origin: Israel

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S-Editor: Wang JJ
L-Editor: A
P-Editor: Wang JJ

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