



Effects of Juvenile Liver Transplantation and Transmesenteric Portal Vein Recanalization

Williams Gwion*

Liver Transplantation Unit, Hospital Sirio Libanes, Brazil

Abstract

After a liver transplant, portal vein thrombosis (PVT) can occur at any time. In cases of thrombosis following liver transplantation, we discuss our experience with portal vein recanalization. Twenty-eight children, or 5% of the 566 recipients of a liver transplant, underwent transmesenteric portal vein recanalization. All of the children had left hepatic segments, developed PVT, and displayed portal hypertension symptoms or signs. In all instances, the transmesenteric route was used for portal vein recanalization. Twenty-two patients (78.6%) had their recanalization and stent placement performed successfully. After the procedure, they received oral anticoagulants, and their clinical symptoms subsided. In seven patients, portal vein restenosis or thrombosis caused symptoms to return. The proposed treatment had a success rate of 60.7% on an intention-to-treat basis. At the conclusion of the study period, only 17 out of 28 children with posttransplant chronic PVT maintained primary and assisted stent patency. The transmesenteric approach via minilaparotomy is technically possible with favorable clinical and hemodynamic outcomes in cases of portal vein obstruction. It is an alternative procedure that can be performed in some cases to reestablish portal flow to the liver graft. It is also a therapeutic addition to other treatments for chronic PVT.

Keywords: Clinical Research/Practice; Complication; Surgical technical; Liver transplantation.

Introduction

Based on data from the Organ Procurement and Transplantation Network, the 5 year patient survival rate after Portal vein stenosis and thrombosis after liver transplantation may be asymptomatic or associated with a variety of clinical manifestations, such as ascites, variceal bleeding, splenomegaly [1], changes in liver function tests, and low platelet count. The introduction of innovative surgical techniques, the development of immunosuppressive therapy, and improvements in preoperative patient care have Percutaneous transhepatic angioplasty (PTA) is the first line of treatment for portal vein stenosis and has been extremely effective. However, stent placement has been an option to reduce the risk of recurrent stenosis, which can occur in 28%-50% of these patients. Recanalization of the portal vein via the peripheral transhepatic approach is difficult in patients with persistent (> one month) portal vein thrombosis (PVT), excluding venoplasty [2]. The failure rate in these patients can be as high as 75%. Sclerotherapy, surgical bypass, and retransplantation are all options for treatment when percutaneous venous angioplasty fails.

Transmesenteric portal vein recanalization (PVR) with stent placement for chronic PVT in children undergoing liver transplantation was the goal of this retrospective evaluation. At Sirio Libanes Hospital and A. C. Camargo Cancer Center in So Paulo, Brazil, 566 children underwent liver transplants from November 2002 to December 2013. 28 recipients (4.9%) who developed chronic PVT and underwent PVR with stent placement using a transmesenteric approach following a minilaparotomy are the subjects of this study [3]. These procedures were carried out from August 2008 to December 2014, with July 2016 serving as a follow-up. The same transplant team's transplant surgeons, pediatric hepatologists, and interventional radiologists cared for the patients and determined the procedure's purpose and timing. GI bleeding (GIB), hypersplenism with a low platelet count (100,000/mm³), ascites, and/or endoscopic esophageal varices on a triphasic upper abdominal computed tomography (CT) scan with evidence of chronic PVT were all considered indications. As a first step in diagnosing chronic PVT, all patients underwent abdominal Doppler

ultrasound (US) imaging prior to abdominal CT. In one instance, magnetic resonance imaging (MRI) was utilized. From the medical records, demographic, clinical, and imaging data were gathered. The study was approved by the institutional review boards of both hospitals, and the children's relatives gave their informed consent [4].

Method

The number of pediatric liver transplants has increased across all age groups. However, there has also been a slight increase in the number of vascular complications in transplant recipients following anastomoses involving small structures. Additionally, portal vein sclerosis and biliary atresia, the most common reason for transplantation in children, may exacerbate difficulties during vascular reconstruction. Direct anastomosis between the donor's left portal vein and the recipient's portal vein trunk or the creation of an interposition vascular graft from the recipient's superior mesenteric-splenic vein confluence to the left was used for portal vein reconstruction. portal vein of the transplanted liver. The inferior mesenteric vein of the living donor [5], the internal jugular vein of the recipient, and the iliac artery or veins of the newly deceased donor were the options for vascular grafts. The selections of donors and surgical techniques have already been covered in detail.

To identify the intrahepatic portal vein, the superior mesenteric vein, and the splenic vein, triphasic upper abdominal CT scanning was performed on each patient with a suspicion of PVT. The children underwent angiography with a portable angiography system in the operating room while under general anesthesia. With or without prior

***Corresponding author:** Williams Gwion, Liver Transplantation Unit, Hospital Sirio Libanes, Brazil, E-mail: William@gmail.com

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percutaneous transhepatic access, PVR was always carried out via the transmesenteric route. At the start of our series (up until patient number 13), the first method described in the literature for gaining access to the portal vein was the percutaneous transhepatic approach, which was utilized prior to the minilaparotomy [6]. However, the percutaneous transhepatic techniques were abandoned due to the high failure rate of PVR attempts, and the transmesenteric route was used exclusively for the remaining participants. To gain access to an upper/lower mesenteric vein or one of its tributaries, we performed a minilaparotomy using the transmesenteric approach. The children were fully heparinized (50-100 IU/kg) after a 7 French introducer was inserted and fixed with a cotton suture. In all instances, the portal vein obstruction was confirmed by mesentery angiography. A 0.035-inch hydrophilic guide wire and a 5-French diagnostic catheter were inserted through the mesenteric access to recanalize the portal vein. Through the catheter and mesenteric introducer, simultaneous angiography was performed following recanalization, allowing for the measurement of the portal vein obstruction's length [7]. The portal vein was balloon predilated, and a graduated pigtail catheter was used to confirm that the lesion had grown. A balloon-expandable metallic stent was used in all cases for a portal vein angioplasty. 514 mm metallic coils were used to embolize large coronary and/or mesenteric veins in nine children. The final angiography revealed no opacification of the gastroesophageal varices, sufficient hepatopetal flow, or residual stenosis, and adequate stent positioning. At the end of the procedure, the tributary mesenteric vein that was used to get to the portal vein was ligated.

Result

Throughout the procedure, the portal flow was reestablished through the portal system and documented. During follow-up, the presence of normal portal venous flow on serial Doppler US studies, normalization of laboratory parameters (increase in platelet count), and the cessation of clinical signs and symptoms (reduction in spleen size, cessation of upper digestive bleeding, and disappearance of preprocedure ascites) were taken into consideration. Following maintenance of the children on low-molecular-weight heparin (2 mg/kg), oral anticoagulation with warfarin was administered to keep the international normalized ratio between two and three times the levels of the control for at least three months [8]. After the procedure, US surveillance was carried out on day one, at months 1, 3, 6, and 12, and every year thereafter. In cases of abnormal US findings (such as an increase in systolic peak velocity in the portal anastomosis and the presence of poststenotic dilatation of the portal vein), CT angiography was recommended. When needed, direct portography was used. SPSS, version 23.0, was used to analyze the data. Frequency and percentage were used to represent qualitative data. The median and range were used to express quantitative data. The cumulative patency rate of the stented portal vein, which included all successful recanalization procedures (the final event was the definitive occlusion of the portal vein), was analyzed using the Kaplan-Meier method. The risk of the stent thrombosis or stenosis was also assessed using Kaplan-Meier curves. Ten months after receiving a liver transplant using a deceased donor iliac artery interposition graft, a 1.7-year-old boy underwent a procedure called portal vein recanalization.

- Mesenteric approach angiography demonstrating collateral filling of intrahepatic portal branches and confirming portal vein obstruction
- Angiography with contrast injection simultaneously through the mesenteric access and intrahepatic portal vein, highlighting the lesion's expansion.

- The deployment of a balloon stent (Palmaz Genesis®, 9 39 mm).
- Final angiography reveals no opacification of the gastroesophageal varices, sufficient hepatopetal flow, or residual stenosis. Coils were used to embolize a large coronary vein and a mesenteric vein (arrow).

That patient weight ranged from 5.0 to 11.9 kg (median, 6.7 kg) and age ranged from 5.9 months to 3.4 years at transplantation (median, 8.6 months).

Discussion

Biliary atresia and choledochal cyst were the two conditions that necessitated a liver transplant (n = 27). The children (n = 26) either underwent split-liver transplantation or received left lateral segments from living donors. According to the median portal vein diameter was 4 mm, with a range of 3.0 mm to 5.6 mm. The graft-to-recipient weight ratio was 4.4%, with a range of 2.1 to 69%. Depicts the various types of portal vein reconstruction and fresh vascular grafts utilized. In the clinical manifestations of chronic PVT, GIB occurred in 10 patients (34.6%), hypersplenism (splenomegaly and plate count below 100,000/mm³) occurred in 21 patients (61.5%), ascites occurred in 8 patients (26.9%), and esophageal varices occurred in 11 patients (39.5%) (Table 1). 13 patients had a patent portal vein, two had stenosis, and 13 had PVT after US examination. 26 patients were diagnosed with PVT and two with stenosis following CT angiography/MRI; There was not a single patient with a patent portal vein. In all instances, PVT was confirmed by direct portography (Table 1). In 46.4% of cases, Doppler US made the right diagnosis, while CT/MRI made the right diagnosis in 92.8% of cases.

Conclusion

Between the diagnosis of PVT and the transplantation of a living donor's liver, the median time was 17.3 months, with a range of 1.3 to 91 months. Three patients were diagnosed with PVT within the first six months, four patients between six months and one year, eleven patients between one year and two years, three patients between two and three years, three patients between three and five years, and four patients after five years. Vein grafts were used in 15 patients (11 of whom had deceased donor iliac arteries), and direct portal vein anastomosis was done in 10 of the 25 cases of PVT that occurred after six months.

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