Effects of Juvenile Liver Transplantation and Transmesenteric Portal Vein Recanalization

Williams Gwion*

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Introduction

Based on data from the Organ Procurement and Transplantation Network, the 5 year patient survival rate a er Portal vein stenosis and thrombosis a er 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. e introduction of innovative surgical techniques, the development of immunosuppressive therapy, and improvements in preoperative patient care have Percutaneous transhepatic angioplasty (PTA) is the rst line of treatment for portal vein stenosis and has been extremely e ective. 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 di cult in patients with persistent (> one month) portal vein thrombosis (PVT), excluding venoplasty [2]. e 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 Srio Libanês 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]. ese procedures were carried out from August 2008 to December 2014, with July 2016 serving as a follow-up. e 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 rst 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. e study was approved by the institutional review boards of both hospitals, and the children's relatives gave their informed consent [4].

Method

e 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 di culties during vascular reconstruction. Direct anastomosis between the donor's le portal vein and the recipient's portal vein trunk or the creation of an interposition vascular gra from the recipient's superior mesenteric-splenic vein con uence to the le

***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 rst 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. e children were fully heparinized (50-100 IU/kg) a er a 7 French introducer was inserted and xed with a cotton suture. In all instances, the portal vein obstruction was con rmed 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. rough the catheter and mesenteric introducer, simultaneous angiography was performed following recanalization, allowing for the measurement of the portal vein obstruction's length [7]. e portal vein was balloon predilated, and a graduated pigtail catheter was used to con rm 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. e nal angiography revealed no opaci cation of the gastroesophageal varices, su cient hepatopetal ow, 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

roughout the procedure, the portal ow was reestablished through the portal system and documented. During follow-up, the presence of normal portal venous ow 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]. A er the procedure, US surveillance was carried out on day one, at months 1, 3, 6, and 12, and every year therea er. In cases of abnormal US ndings (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. e median and range were used to express quantitative data. e cumulative patency rate of the stented portal vein, which included all successful recanalization procedures (the nal event was the de nitive occlusion of the portal vein), was analyzed using the Kaplan-Meier method. e risk of the stent thrombosis or stenosis was also assessed using Kaplan-Meier curves. Ten months a er receiving a liver transplant using a deceased donor iliac artery interposition gra , a 1.7-year-old boy underwent a procedure called portal vein recanalization.

- Mesenteric approach angiography demonstrating collateral lling of intrahepatic portal branches and con rming portal vein obstruction
- Angiography with contrast injection simultaneously through the mesenteric access and intrahepatic portal vein, highlighting the lesion's expansion.
- e deployment of a balloon stent (Palmaz Genesis®, 9 39 mm).
- Final angiography reveals no opaci cation of the gastroesophageal varices, su cient hepatopetal ow, or residual stenosis. Coils were used to embolize a large coronary vein and a mesenteric vein (arrow).

at 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). e children (n = 26) either underwent split-liver transplantation or received le 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. e gra -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 gra s 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 a er US examination. 26 patients were diagnosed with PVT and two with stenosis following CT angiography/MRI; ere was not a single patient with a patent portal vein. In all instances, PVT was con rmed 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. ree patients were diagnosed with PVT within the rst 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 ve years, and four patients a er ve years. Vein gra s 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 a er six months.

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