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CASE REPORT

Transjugular Intrahepatic Porto-Systemic Shunt Placement in a Patient with Left-Lateral Split-Liver Transplant and Mesenterico-Left Portal Vein by Pass Placement

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Abstract This is a report of a successful placement of a transjugular intrahepatic porto-systemic shunt in a young patient with previous left-lateral, split-liver transplant and mesenterico-left portal vein by pass placement after post-transplant extrahepatic portal vein thrombosis.

Keywords Bleeding · Portal hypertension · Interventional radiology

Introduction

Transjugular intrahepatic portosystemic shunt (TIPS) creation has become an effective treatment for the complications of portal hypertension. Hits feasibility in a liver transplant recipient with complications of recurrent sinusoidal portal hypertension has been reported with various clinical effectiveness rates reported according to the indication for the procedure [1–3]. TIPS placement in a liver transplant recipient can be rendered more difficult by the altered anatomy after transplantation and by the reduced graft volume in recipients of partial livers. Furthermore, patients who undergo chronic immunosuppression are at higher risk of infection. The role of TIPS in liver transplant recipients is still largely undefined.

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In this report, we describe the TIPS placement in an 18-year-old patient with left-lateral segments transplant and mesenterico-left portal vein by pass (meso-Rex shunt) placement after extrahepatic portal vein thrombosis, which occurred 1 year after transplant. To the best of our knowledge, TIPS placement has never been reported in a left-lateral segment liver transplant recipient with meso-Rex shunt.

Case report

An 18-year-old patient underwent partial liver transplantation with Roux-en-Y biliary reconstruction, using left-lateral segments, at the age of 3 years for biliary atresia. One year later, occlusion of portal vein anastomosis occurred and a mesenterico-left portal vein shunt was successfully performed by using a left internal jugular vein autograft as a conduit to bypass the obstructed extrahepatic portal circulation and bring blood from the superior mesenteric vein to the patent Rex segment of the portal vein. At age 12 years, a liver biopsy showed signs of vanishing bile duct syndrome due to chronic rejection. During follow-up, some episodes of moderate melena occurred without requiring blood transfusion. Doppler ultrasound showed widely patent meso-Rex shunt. Multiple esophagogastroduodenoscopies and colonoscopies showed no etiology for the bleeding with evidence of F1 gastric varices without blood signs.

The patient was finally admitted for massive melena, which required blood transfusion. Endoscopy was performed and showed F1 gastric varices without blood signs. The presence of ectopic varices was suspected and confirmed by single-balloon enteroscopy at the edge of the biliary-enteric anastomosis where a varix with a large

amount of fresh blood was found and treated in emergency by clips and cyanoacrylate sclerotherapy. The bleeding was stopped, and the patient stabilized. Doppler ultrasound and a computed tomography showed widely patent meso-Rex shunt with an aneurysmatic dilatation of the Rex segment distal to shunt anastomosis performed 14 years before (Fig. 1).

Sinusoidal portal hypertension, due to biliary cirrhosis secondary to chronic rejection, was responsible for the bleeding from ectopic varices and the presence of F1 gastric varices. Because of severe portal hypertension and poor clinical conditions, the patient was added to the waiting list for a second liver transplant. To reduce the risks of bleeding during the waiting time for the transplant, a TIPS placement was proposed.

The procedure was performed 3 days after the bleeding in an angiographic suite with the patient under general anesthesia. The right internal jugular vein was punctured under ultrasound-guidance. The standard Ring Transjugular Intrahepatic Access Set (Cook, Bloomington, IN) was used. The coaxial system was advanced, under fluoroscopic guidance, in the hepatic vein. A thin intrahepatic portal vein branch, at the confluence to the Rex, was punctured, advancing the Colapinto needle under real-time sonography guidance. A single Colapinto pass was performed. A hydrophilic guidewire was used to negotiate entrance into the meso-Rex shunt and a 5F angiographic catheter was placed in superior mesenteric vein. A porto-systemic gradient of 15 mmHg was measured. A portogram confirmed a widely patent meso-Rex shunt and an aneurysmatic dilatation of the Rex segment distal to shunt anastomosis (Fig. 2).

Dilatation of the intrahepatic tract was performed with a 6-mm Blue Max balloon catheter (Boston Scientific, Natick, MA). Subsequently, an e-PTFE covered stents (Viatorr®; W.L.GORE & Associates, Inc. Flagstaff, Arizona) of 8 mm of diameter was placed. The stent was deployed to ensure that the distal end would not compromise future surgical procedures, such as liver transplantation. The stent was dilated with a 6-mm balloon catheter. The gradient reduced to 7.5 mmHg. Because of the good porto-systemic gradient obtained with 6-mm diameter dilatation, to reduce the risk of post-TIPS encephalopathy, the stent was not dilated with an 8-mm balloon catheter. A final portogram showed good flow in the stent (Fig. 3). Procedure fluoroscopy time was 8.1 min (dose–area product 7895 cGy cm^2), procedure time was 75 min, and total anesthesia time was 100 min.

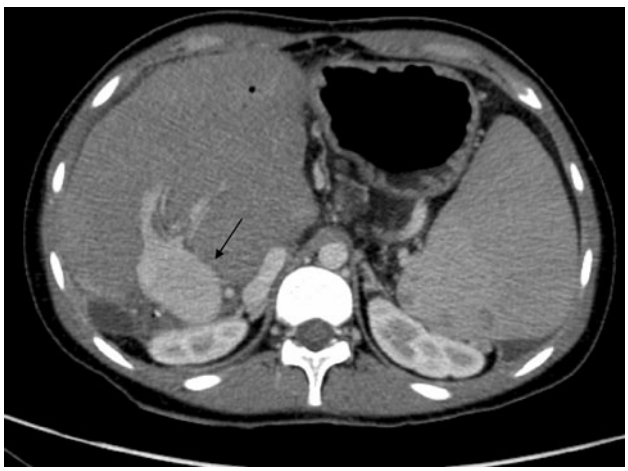

Fig. 1 Multidetector computed tomography; axial image obtained in portal-venous phase showed aneurysmatic dilatation of the Rex segment (*arrow*). Of note, thin intrahepatic portal branches

Fig. 2 Transhepatic portogram confirmed a widely patent meso-rex shunt with a porto-systemic gradient of 15 mmHg for severe sinusoidal portal hypertension secondary to biliary cirrhosis. Of note, aneurysmatic dilatation of the Rex segment distal to shunt anastomosis (*arrow*)

After 12 months of follow-up, the patient is in good general condition, has had no episodes of bleeding, no evidence of encephalopathy, and good flow in the stent at Doppler ultrasound. An endoscopy showed disappearance of gastric varices. Because of the improved clinical condition, the patient has been removed from the waiting list and flowed in the outpatient clinic.

Discussion

Portal hypertension can occur after liver transplantation and is a relevant clinical problem. The cause of an elevated

Fig. 3 Transhepatic portogram, performed after covered stent was deployed, showed good flow in the stent; the porto-systemic gradient reduced to 7.5 mmHg

porto-systemic pressure gradient is multifactorial in many patients. Different stages of liver fibrosis or nodular regenerative hyperplasia associated with severe cholestasis are the prevalent findings during the early postliver transplant period, whereas liver cirrhosis associated with cholestasis is the prevalent finding during the late postliver transplant period as in our patient.

The presence of portal hypertension is a significant risk factor for graft loss. Extrahepatic portal vein obstruction is a possible complication of liver transplantation due to occlusion of portal vein anastomosis. Morbidity is caused by variceal bleeding, symptomatic portal biliopathy with obstructive jaundice due to compression from the cavernoma collaterals to bile ducts, sequelae of hypersplenism, and possible growth retardation. Surgical shunting can provide a sufficient decompression of the portal system and is indicated for patients who fail endoscopic therapy, have significant growth retardation, symptomatic portal biliopathy, and symptomatic hypersplenism. The only surgical procedure with the potential to restore a physiologic hepatopetal flow is the meso-Rex shunt, which restores the physiologic intrahepatic portal vein perfusion and thus avoids the consequences of long-term porto-systemic shunting, especially encephalopathy [4]. Meso-Rex shunt has been successfully performed in transplanted children with portal vein occlusion [5]. In our patient, meso-Rex shunt was widely patent 14 years after surgery and portal hypertension was due to biliary cirrhosis secondary to chronic rejection.

Ectopic varices are an unusual cause of gastrointestinal bleeding. TIPS procedures with or without focal variceal embolization have been previously reported for the treatment of cirrhotic patients with bleeding from ectopic varices [6, 7].

The TIPS placement was technically feasible in our patient despite the left-lateral segment liver transplant and the aneurysmatic dilatation of the Rex segment distal to shunt anastomosis. As previously reported [2], TIPS placement in recipients of partial liver requires accurate previous cross-sectional imaging, combined with a review of surgical techniques used.

To minimize the number of needle passes required to enter the intrahepatic portal venous system, a variety of techniques to visualize the portal venous anatomy has been described, including direct transhepatic catheterization of the portal vein, direct puncture of the recanalized paraumbilical vein, superior mesenteric artery angiography, real-time sonographic guidance, placement of a metallic marker, hepatic artery guidewire targeting, and refluxing contrast medium or carbon dioxide into the portal vein with wedged hepatic venography [8–10]. We found real-time sonographic guidance essential to guide the puncture from the hepatic vein to a thin intrahepatic portal branch avoiding direct puncture of the aneurysmatic dilatation of the Rex and avoiding capsule perforation. The single pass ultrasound-guided Colapinto puncture also contributed to a low fluoroscopy time and consequent low radiation dose; this, in our opinion, is an extremely relevant issue, especially for young patients.

In conclusion, in patients with left-lateral segment partial liver transplantation, sonographically guided puncture of the portal vein facilitates porto-systemic shunt creation, reducing radiation dose; the presence of a patent meso-Rex shunt is not a contraindication for the TIPS placement.

Conflict of interest All authors declare no conflict of interest.

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