



Vascular and Interventional Radiology

Percutaneous extrahepatic splenomeso-caval shunt creation in a patient with portal vein thrombosis after Whipple procedure

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ARTICLE INFO

Keywords:
Transsplenic
Portocaval shunt
Ascites

ABSTRACT

A 72-year-old male presented with refractory ascites secondary to portal vein occlusion with cavernomatous transformation following pancreaticoduodenectomy (Whipple procedure). Due to the unfavorable anatomy, transjugular intrahepatic portosystemic shunt was not an option. However, given patency of the spleno-mesenteric confluence and absence of the pancreatic head after the Whipple procedure, a splenomeso-caval shunt was successfully created using a transjugular–transsplenic rendezvous technique.

1. Introduction

Ascites is a common complication of portal hypertension and is usually managed with diuretics. Patients with refractory ascites may be managed by repeat paracentesis or self-drainage via indwelling tunneled peritoneal drain [1,2]. Alternatively, they may seek definitive therapy with portosystemic shunt creation [3]. The transjugular intrahepatic portosystemic shunt (TIPS) was first described by Rosch et al. in 1969 [4]. The effectiveness of TIPS for treating ascites has been well-described [5]. Creating a shunt between the intrahepatic portal vein and hepatic vein improves portal outflow and reduces the hepatic venous pressure gradient, which in turn decreases hydrostatic pressure in the portal system. Portal vein occlusion is a relatively common complication of portal hypertension and is a relative contraindication to TIPS. Transsplenic portal vein recanalization and TIPS placement have been shown to be an effective technique for portosystemic shunt creation [6,7]. The direct intrahepatic portosystemic shunt (DIPS) in which a shunt is made from the IVC, through the caudate lobe of the liver, into the right portal vein is also a viable alternative to conventional TIPS in patients with unfavorable anatomy [8]. In patients who have undergone the Whipple procedure, the resection of the pancreatic head enables a direct path between the IVC and portal system. Herein, we describe a technique using a combined transjugular-transsplenic approach to establish an extrahepatic splenomeso-caval shunt in a post-Whipple procedure patient with refractory ascites and cavernous transformation of the portal vein without initial portal vein recanalization or IVUS assistance.



Fig. 1. Coronal CT of the abdomen and pelvis demonstrates cavernous transformation of the portal vein (white circle) and ascites (arrows).

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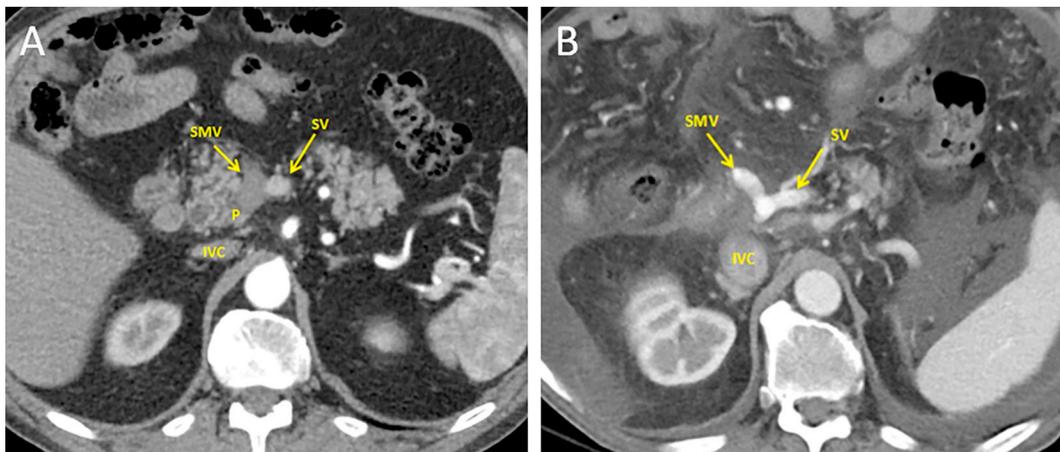


Fig. 2. Axial CT images of the abdomen (A) before and (B) after Whipple procedure demonstrating the future tract of the splenomeso-caval shunt. With the resection of the pancreatic head (P) and body, there is a direct path between the IVC and superior mesenteric vein (SMV) and splenic vein (SV) confluence.



Fig. 3. (A) Fluoroscopic portal venogram from a transsplenic approach demonstrates patency of the spleno-mesenteric confluence and extensive surrounding collateral vessels. A modified TIPS set (B) was placed into the IVC and a loop snare was opened at the confluence of the splenic and superior mesenteric veins. Using the snare as a target (C), a needle pass was made from the TIPS cannula into the spleno-mesenteric vein confluence and a guidewire was snared. Two overlapping Atrium stents (D) were placed across the portocaval tract and a venogram demonstrated substantial improvement in collateral vessels.

2. Case report

A 72-year-old male presented with refractory ascites secondary to portal vein occlusion following a pancreaticoduodenectomy (Whipple) procedure for ampullary adenocarcinoma six months earlier. The patient was managed with diuretics and repeated large volume paracentesis. He had a symptomatic right inguinal hernia exacerbated by ascites that he desired to have repaired. However, he could not undergo the operation because of the potential for persistent ascites leakage from the wounds.

He had no history of chronic liver disease. His model for end-stage liver disease (MELD) score was 10. Contrast-enhanced computed

tomography (CT) demonstrated cavernous transformation of the portal vein and ascites (Fig. 1). The confluence of the splenic and superior mesenteric veins was patent. Conventional TIPS was not an option due to the extensive cavernous transformation. However, the lack of a pancreatic head and body after the Whipple procedure allowed for an unobstructed path between the inferior vena cava (IVC) and spleno-mesenteric confluence (Fig. 2). Thus, a percutaneous portacaval shunt using a transjugular-transsplenic rendezvous was attempted (Fig. 3).

From the transsplenic approach, the portal venous system was catheterized. Venogram confirmed occlusion of the portal vein and patency of the spleno-mesenteric confluence. Next, the right internal jugular vein was accessed. A loop snare was opened at the confluence of

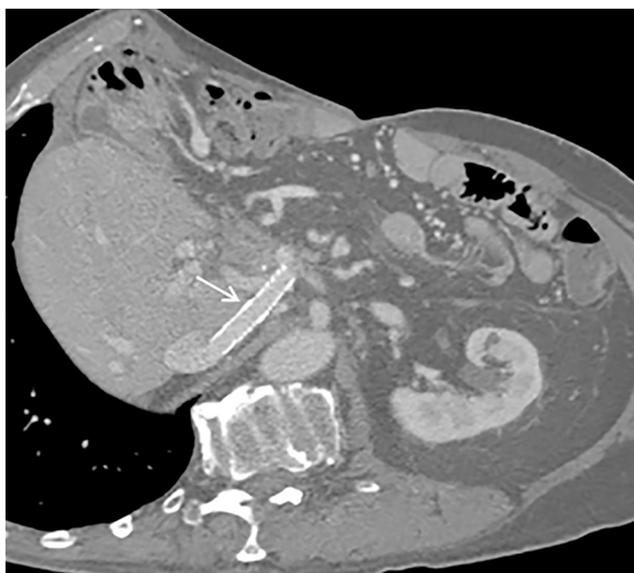


Fig. 4. Double-oblique axial CT image obtained 15 months after intervention confirms durability of the portocaval shunt with widely patent stents (arrow), decreased portal venous collateral vessels, and resolution of ascites.

the splenic and superior mesenteric veins and using this for a target, a needle pass was made from the IVC into the loop snare using a modified TIPS set comprised of the 10 Fr sheath from the Rosch-Uchida access set (Cook, Bloomington, IN) and a 65.5 cm 22G needle (Cook) in place of the 5 Fr catheter and sharp stylet. The modified TIPS set was exchanged for a guidewire, which was passed through the tract and snared. The tract was dilated and two overlapping 10 × 38 mm Atrium stents (Atrium Medical, Hudson, NH) were deployed. Final venogram showed a patent shunt with excellent flow. The patient tolerated the procedure well without complication. He was admitted overnight for observation and discharged the next day. The patient did not require any further paracentesis after the procedure and his diuretics were discontinued 2 months after intervention. The symptoms from the hernia improved and surgery was not necessary. Follow-up CT scans obtained up to 15 months later (Fig. 4) demonstrated portacaval shunt patency and resolution of ascites.

3. Discussion

An adequate target vein is crucial for portosystemic shunt creation. The TIPS procedure is dependent on a patent intrahepatic portal vein, classically the right portal vein, to serve as the target. When portal veins are thrombosed, they often become unsuitable for establishing the shunt [9]. Prior studies have shown that TIPS and direct intrahepatic portocaval shunt (DIPS) are effective and safe in patients with portal vein occlusion with or without cavernous transformation [3,10]. Among patients with chronic cavernomatous portal vein occlusion, the reported rates of successful TIPS creation are between 40% and 98% [7,11]. The DIPS may be a reasonable alternative to TIPS in patients with unfavorable anatomy, such as thrombosis, inadequacy, or calcification of the intrahepatic portal vein, as long as the main portal vein remains patent [12]. Our case demonstrated that even with main portal vein occlusion, a portosystemic shunt can be placed in the post-Whipple procedure setting where the pancreatic head and body are absent and the spleno-mesenteric confluence remains patent. It should be noted that this technique does have a higher potential risk of bleeding compared to TIPS and DIPS procedures because of the extrahepatic nature of the stented tract.

The present case also demonstrated that successful splenomeso-caval shunt creation can be safely performed without IVUS. Although DIPS creation has been described with the “gun-sight” approach, the

use of IVUS from the transfemoral vein approach to guide the transjugular needle into the portal system is often utilized [13]. In our experience, this latter technique requires more preprocedural setup time and is restricted by the limited “steerability” of the TIPS access needle once it is deployed beyond the sheath. Furthermore, IVUS has limited penetration depth and may not adequately visualize the splenomesenteric confluence from the IVC. Therefore, the transsplenic technique may be an effective alternative for portocaval shunt creation in patients with unfavorable hepatic venous anatomy and when IVUS is unavailable or cannot visualize the target vessel.

Duplex ultrasound is often used to screen for stenosis because it is readily available, noninvasive and relatively inexpensive [14]. Studies have suggested duplex ultrasound may be limited in predicting shunt malfunction with one study reporting that duplex ultrasound predicted shunt patency in about two-thirds of shunts that were proven to be either stenotic or occluded at catheter venography [14,15]. Shunt evaluation can also be performed with CT, as was done in the present case. A study by Fanelli et al. demonstrated that CT had superior sensitivity and specificity for the detection of TIPS malfunction compared to ultrasound [16].

In conclusion, we describe an extrahepatic technique for creating a durable splenomeso-caval shunt in a patient with Whipple procedure and cavernous transformation of the portal vein using a transjugular-transsplenic rendezvous technique without recanalization of the main portal vein. This may be a viable alternative to TIPS and DIPS in patients who have unfavorable portal venous anatomy or when IVUS is unavailable.

Conflict of interest

None.

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