Chronic Portal Vein Thrombosis with Percutaneous Main Portal Vein Reconstruction and Coil Embolization of a Massive Coronary Vein: A Case Report

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Patient: Male, 31-year-old
Final Diagnosis: Portal vein thrombosis
Symptoms: Ascites • hemoptysis • hepatomegaly
Medication: —
Clinical Procedure: —
Specialty: Radiology

Objective: Unusual clinical course

Background: Portal vein thrombosis (PVT) is a well-recognized complication in patients with cirrhosis and frequently requires a nuanced approach to treatment. There is a paucity of existing literature and evidence-based recommendations regarding the optimal treatment approach to chronically occluded portal veins. Management options range from observation to anticoagulation and interventional therapies such as transjugular intrahepatic portosystemic shunts (TIPS), thrombolysis, or surgical thrombectomy. For select patients with little success from traditional medical therapies and previously failed TIPS procedures, a direct transhepatic approach to restoring blood flow and resolving variceal bleeding may be appropriate.

Case Report: A 31-year-old man with a past medical history of portal hypertension, refractory ascites, gastroesophageal varices, and decompensated cirrhosis secondary to alcohol abuse had previously undergone an unsuccessful TIPS placement. Preprocedural imaging demonstrated a cirrhotic liver, splenomegaly, and gastroesophageal varices compatible with portal hypertension. Also noted were focal calcifications in the region of the diminutive main portal vein, medial splenic vein, and superior mesenteric vein, compatible with sequelae of chronic thrombosis. Restoration of flow through the occluded segment of the main portal vein and cessation of variceal bleeding was successfully resolved through the combination of portal vein reconstruction and massive volume embolization of the large coronary vein using a direct, percutaneous approach.

Conclusions: A direct, percutaneous approach to main portal vein reconstruction and massive volume embolization after a previously failed TIPS may be a potential alternative approach for select patients.

Keywords: Portal Vein • Cavernous Transformation of Portal Vein • Portasystemic Shunt, Transjugular Intrahepatic • Venous Thrombosis

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Background

Portal vein thrombosis (PVT) is a well-recognized complication in patients with cirrhosis and frequently requires a nuanced approach to treatment [1,2]. There is a paucity of existing literature and evidence-based recommendations regarding the optimal treatment approach to chronically occluded portal veins. Management options range from observation to anticoagulation and interventional therapies, such as transjugular intrahepatic portosystemic shunts (TIPS), thrombolysis, and surgical thrombectomy [3]. We report a case of chronic PVT and main portal vein reconstruction in the presence of a massive coronary vein and actively bleeding gastroesophageal varices. This case report fulfilled the institutional criteria for exemption from institutional review board approval.

Case Report

A 31-year-old man with decompensated cirrhosis (model for end-stage liver disease of 17) secondary to alcohol abuse was referred to interventional radiology for TIPS placement. The patient had a history of portal hypertension, refractory ascites, gastroesophageal varices, and a previously unsuccessful TIPS placement. Upon review of preprocedural imaging, abdominal computed tomography (CT) demonstrated a cirrhotic liver, splenomegaly, and gastroesophageal varices compatible with portal hypertension. Also noted were focal calcifications in the region of the diminutive main portal vein, medial splenic vein, and superior mesenteric vein, compatible with sequelae of chronic thrombosis (Figure 1). We recanalized the main portal vein and coiled off the massive coronary vein that was supplying a mass network of gastroesophageal varices.

Using a percutaneous transhepatic approach, a 22-gauge Chiba needle (Cook Medical, Bloomington, IN, USA) was advanced into the right lobe of the liver under ultrasound guidance. A diminutive intrahepatic portal venous branch was accessed, and a 0.046-cm wire was advanced through the Chiba needle. A dermatotomy incision was made and the needle was exchanged for a Greb set (Teleflex). The inner portion of the Greb set and the wire were removed and an Amplatz wire was advanced into the main portal vein. A 6-French vascular sheath was advanced over the Amplatz wire. Hand-injection digital subtraction venography demonstrated chronic long-segment occlusion of the main portal vein with cavernous transformation (Figure 2). The occluded segment of the main portal vein was successfully crossed using a 5-French Kumpe catheter and Glidewire. The Kumpe catheter was advanced into the superior mesenteric vein and hand-injection digital subtraction venography was performed, demonstrating wide patency of the superior mesenteric vein and inferior mesenteric vein. Chronic occlusion of the main portal vein was again noted and a massive coronary vein supplying a network of gastroesophageal varices was identified (Figure 3). An Amplatz wire was advanced into the superior mesenteric vein. Angioplasty was performed on the occluded segment of the main portal vein using 6-mm and 8-mm balloons. Following this, overlapping balloon-expandable bare metal stents (Boston Scientific Express), measuring 10×37 mm and 8×37 mm, were placed across the portal segment occlusion. Flow through the main portal vein was achieved. A 5-French JB1 catheter was then used...

Figure 1. Axial abdominal computed tomography scan of liver demonstrates the patient's nodular, cirrhotic liver with chronically occluded main portal vein (arrows) with cavernous transformation.

Figure 2. Portal venogram showing advancement of 5-French catheter through occluded segment (solid arrow) and cavernous transformation of the main portal vein (dotted arrows).
to cannulate the coronary vein. A microcatheter was advanced distally. The coronary vein was embolized using a series of coils: 0.35" 20 mm×20 cm Nester (Cook Medical, Bloomington, IN, USA), 0.35" 20 mm×39 cm Azur (Terumo Medical Corporation, Somerset, NJ, USA), and 28 mm×60 cm and 32 mm×60 cm standard Ruby (Penumbra Inc., Alameda, CA, USA). The 0.35" coils were placed through the 5-French JB1 catheter and the Ruby coils were placed through the microcatheter. Repeat hand-injection digital subtraction venography was performed through the superior mesenteric vein and demonstrated occlusion of the coronary vein with hepatopedal flow through the native main portal vein status after stenting (Figure 4). The sheath and catheter were then removed, and the Amplatzer Vascular Plug IV (AMP IV) was deployed into the hepatic puncture site to achieve hemostasis. The patient was transported to the

Figure 3. Portal venogram demonstrating a massive coronary vein (star).

Figure 4. (A) After balloon dilation and stenting of the main portal vein (solid arrow), blood flow was restored (dotted arrow) and (B) flow through the tortuous venous channels were diminished. (C) Main portal vein stent and coil embolization of the coronary vein resulted in restored flow through main portal vein and cessation of flow through massive coronary vein (solid arrow).
Post-Anesthesia Care Unit in stable condition and was released the next day, without any complications.

Discussion

PVT has a prevalence of 5% to 25% in the cirrhotic patient population, with a higher prevalence observed in patients with decompensated cirrhosis [4,5]. Despite PVT being a common phenomenon in this patient population, the literature does not provide a standardized approach to management. Over the last 2 decades, TIPS has emerged as an effective means of portal decompression in patients with complications related to portal hypertension. However, in the setting of chronic PVT, TIPS procedures pose a greater challenge. Chronic PVT often results in fibrosis and narrowing of the main portal vein, restricting portal vein access via the transjugular route and passage through the occluded segment [6].

In the present case, the patient previously experienced an unsuccessful TIPS attempt due to the inability to pass a wire into the main portal vein via the transjugular route. Thus, an alternative approach to treatment was warranted. Direct transhepatic and transsplenic approaches have been well documented in the literature as a response to technical difficulties with TIPS. In the present case, we selected to use a direct transhepatic approach using real-time ultrasound guidance. A direct transhepatic approach allows for direct access to the main portal vein along the long-axis and easier access to the peripheral intrahepatic portal branches [7]. A major concern with this approach is an increased risk of bleeding. There are many factors that contribute to an increased bleeding risk, but insufficient closure of the percutaneous intrahepatic tract is the most significant contributing factor [7]. To mitigate the risk of bleeding, we used an AMP IV to achieve hemostasis of the transhepatic access.

Bleeding gastric varices occur less frequently than esophageal varices but are associated with higher rates of morbidity and mortality. The incidence of gastric varices in patients with cirrhosis ranges between 2% and 20% with a bleeding risk of 44% at year 3 of follow-up among patients without a history of bleeding [8]. Current management strategies of gastric varices are aimed at primary prophylaxis, acute events, and secondary prophylaxis. To prevent the first bleeding event, the use of nonselective beta-blockers (NSBBs) has been recommended. Emerging evidence has shown the superiority of endoscopic ultrasound-guided placement of cyanoacrylate and cyanoacrylate combined with vascular coils over NSBBs. However, recommendations around cyanoacrylate injections for primary prophylaxis have not been set forth due to the paucity of research. In the case of an acute variceal hemorrhage and secondary prophylaxis, several management options exist. Endoscopic band ligation is a well-established intervention, but endoscopic ultrasound-guided therapies have proven successful and shown higher rates of initial hemostasis and lower rates of rebleeding [9]. When secondary prophylaxis fails – most commonly, NSBBs combined with endoscopic treatments – more aggressive interventions, such as TIPS, are indicated. In our patient with decompensated cirrhosis and an impressive coronary vein, TIPS followed by coil embolization was most appropriate. This case illustrates one extreme of a variceal embolization: a massive coronary vein requiring complex large volume coil embolization to achieve hemostasis.

Conclusions

We report a unique case of a patient with chronic portal vein thrombosis with cavernous transformations who developed a massive coronary vein feeding a large network of gastroesophageal varices. This case is significant because it identifies a potential approach to treatment in patients with rebleeding after traditional management and a previously failed TIPS procedure.

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