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Case Report

TIPS performed in a patient with complete portal vein thrombosis

Ashwani Kumar Sharma MD^{a,*}, David Charles Kaufman MD^b

^a Interventional Radiology, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, NY 14642, USA

^b Surgery, Medicine, Anesthesia, Urology and Medical Humanities and Bioethics, University of Rochester Medical Center, Rochester, NY, USA

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ABSTRACT

Portal vein thrombosis is common in cirrhotic patients and results in increased morbidity and mortality. Transjugular intrahepatic portosystemic shunt (TIPS) creation is a well-established therapy for refractory variceal bleeding and refractory ascites in patients who do not tolerate repeated large volume paracentesis. Experience and technical improvements have led to improved TIPS outcomes that have encouraged an expanded application. Complete portal vein thrombosis has come a long way from being a contraindication to an indication for TIPS procedure. As experience and technology have evolved, the ultrasound guidance transvenous access of portal vein from the hepatic vein help in overall higher success rate of performing the TIPS procedure and reducing the procedure-related complications.

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Introduction

Complete portal vein thrombosis (PVT) has come a long way from being a contraindication to an indication for Transjugular intrahepatic portosystemic shunt (TIPS) procedure. At an experienced center, with the help of different techniques and modalities, however, it can still be technically challenging. TIPS is commonly performed for refractory ascites, refractory variceal bleeding, hepatic hydrothorax, and Budd-Chiari syndrome. The prevalence of PVT in cirrhotic patients is quite variable depending on the diagnostic modality used. According to Italian Venous Thrombotic Events Registry (PRO-LIVER) prospective

multicenter study, which included consecutive cirrhotic patients undergoing Doppler ultrasound examination of the portal area over a 2-year, prevalence of ultrasound-detected PVT was 17% [1]. Although PVT no longer is considered a contraindication for TIPS procedure, complete thrombosis still presents a technical challenge for the procedure.

Case report

A 66-year-old man with hepatitis C-induced cirrhosis presented with massive hematemesis. Endoscopy revealed 4

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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* Corresponding author.

E-mail address: ashwani_sharma@urmc.rochester.edu (A.K. Sharma).

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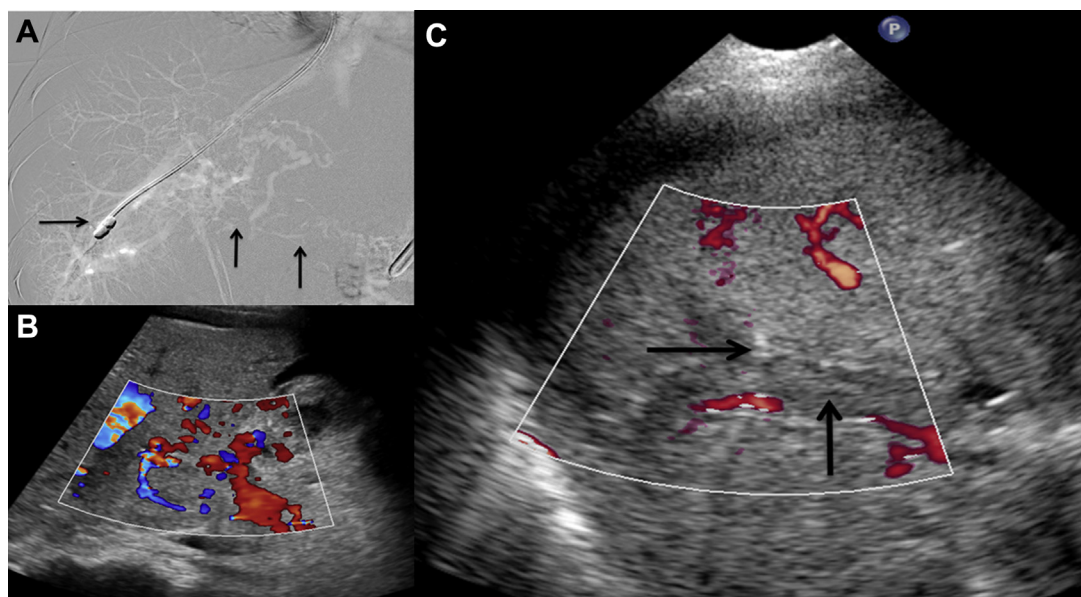


Fig. 1 – (A) CO₂ portovenogram through balloon catheter (horizontal arrow) in the right hepatic vein demonstrates nonvisualization of the portal vein and multiple collaterals in the region of portal vein (vertical arrows). (B) Doppler ultrasound of the liver demonstrates no flow in the portal vein with multiple collaterals around it suggesting cavernous transformation. (C) Demonstrates advancement of the Colapinto needle (horizontal arrow) under ultrasound guidance into the thrombosed right branch of portal vein (vertical arrow).

large bleeding esophageal varices and ultrasound revealed complete thrombosis of the portal vein. Hemorrhage was controlled with a Minnesota tube (C. R. Bard) and intravenous octreotide and he was transferred to a referral center.

A CO₂ portovenogram demonstrated complete thrombosis of the portal vein with cavernous transformation (Fig. 1A), confirmed by ultrasound (Fig. 1B). Successful advancement of the Colapinto needle from the right hepatic vein to the thrombosed right branch of portal vein was made under ultrasound guidance (Fig. 1C). A 0.035-inch glide wire was advanced into the portal vein under ultrasound guidance making sure we were not dissecting into the liver parenchyma and a flush catheter was placed. Portovenogram was performed which confirmed complete thrombosis of the portal vein with cavernous transformation and resultant enlargement of gastroesophageal varices (Fig. 2A). A 10-mm Viatorr TIPS stent was placed from the hepatic vein to the portal vein and bleeding varices were embolized with N-butyl cyanoacrylate (Fig. 2B). The portal vein mechanical thrombectomy was performed with trerotola device (Arrow-Trerotola PTD; Teleflex, Reading, Pennsylvania) and the whole vein was dilated with 10 mm balloon. Good flow was noted through the TIPS stent with establishment of hepatopetal flow and away from the variceal collaterals (Fig. 2C); however, still small residual filling defect was noted. The stent was not extended deeper in the portal vein as it was thought it would make transplant difficult at a later stage. The patient tolerated the procedure well and the Minnesota tube (C. R. Bard, Covington, GA) was taken out the next day.

The patient was stable for a day, but again developed hematemesis and was brought to the angiographic room and

portal vein was accessed which showed occlusion of the portal vein. The portal vein was dilated with 10 mm balloon and VIATORR stent (W.L. Gore & Associates, Flagstaff, AZ) was extended toward the portal side with the covered fluency stent (Bard Incorporated, Karlsruhe, Germany) establishing good flow (Fig. 3). Repeat ultrasound showed patent TIPS shunt with completely thrombosed right and left branches of portal veins. Arterial flow was noted in the portal vein thrombus suggesting tumor thrombus. The patient and his wife were made aware of these findings and the lack of any therapeutic options. Together they decided to forego any further interventions and he was discharged to home hospice.

Discussion

Studies have shown that technical success for creation of TIPS decreases with complete thrombosis of portal vein, which further decreases with cavernous transformation. Predictors of complete recanalization of portal vein after TIPS procedure were a less severe and extensive PVT, de novo diagnosis of PVT, and absence of gastroesophageal varices. Because of the technically challenging procedure and critically ill patients with severe comorbidities, the risk of procedural complications and mortality can be substantial [2].

The puncture creating the transvenous access from the hepatic vein to the portal vein is the most challenging step in the creation of the TIPS procedure. Various techniques have been described to localize the portal vein to minimize the number and extrahepatic punctures during TIPS creation. Transjugular wedge hepatic carbon dioxide

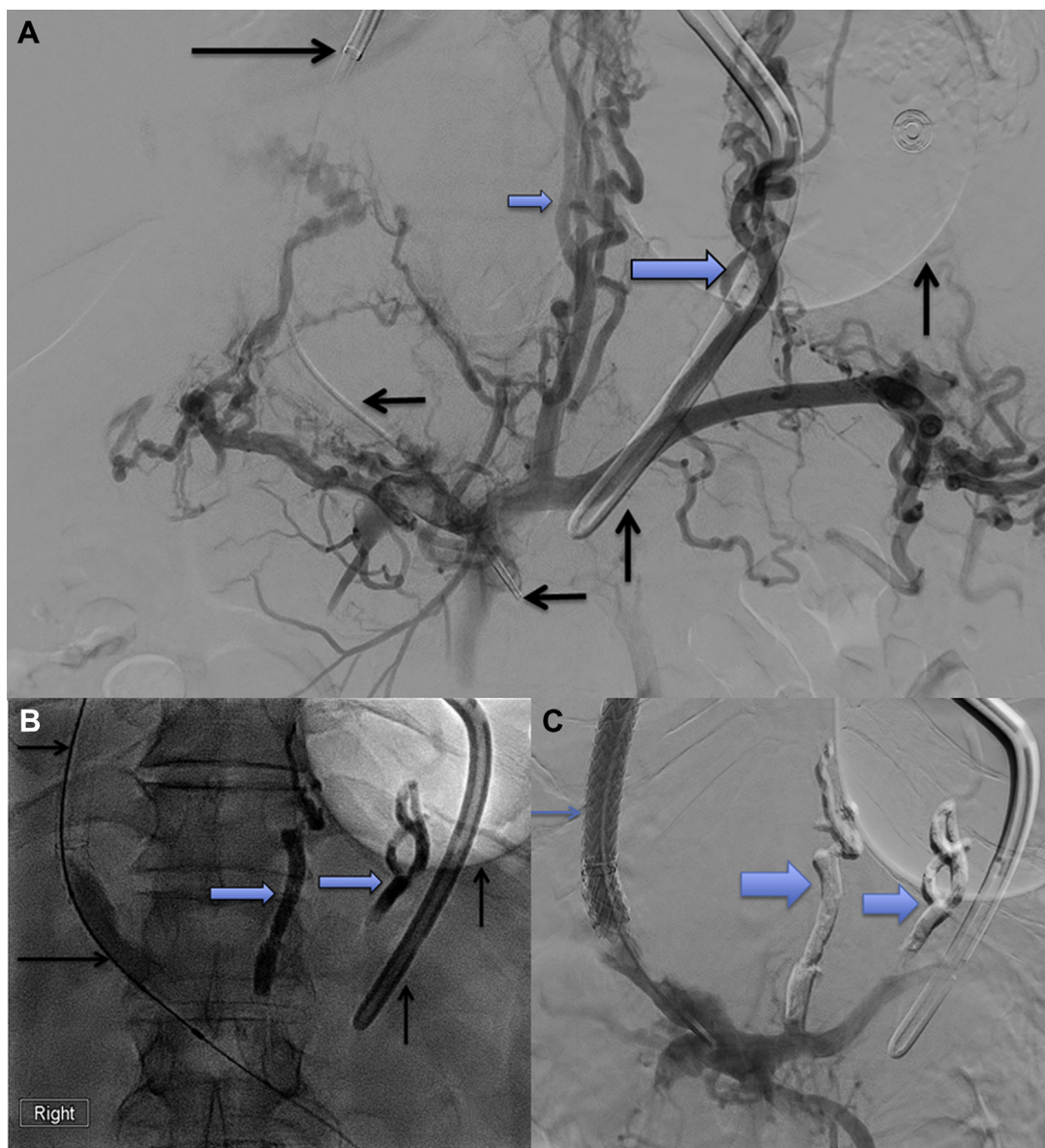


Fig. 2 – (A) Portovenogram through the flush catheter (horizontal arrows) demonstrates complete occlusion of the portal vein with prominent gastroesophageal varices (solid horizontal arrows) and inflated Minnesota tube (vertical arrows). **(B)** Fluoroscopic image demonstrates dilatation of the portal vein with 10 mm Conquest balloon (long horizontal arrow) placed through the Viatorr stent (short horizontal arrow). Embolized gastroesophageal varices (solid horizontal arrows) are noted along with inflated Minnesota tube (vertical arrows). **(C)** Portovenogram demonstrates establishment of flow through the portal vein into the TIPS shunt (horizontal arrows) with nonvisualization of the gastric and perisplenic collaterals. N-BCA glue is noted in the embolized gastroesophageal varices.

portography, direct transhepatic puncture and opacification of portal vein, indirect arterial portography during the portal venous phase from an angiogram of the superior mesenteric artery, catheterization of the paraumbilical vein and access to the portal vein [3], or splenoportography may not be very helpful to localize portal vein when portal vein is completely thrombosed. However, placement of guidewire in the right hepatic artery at the porta hepatis via celiac artery approach [4], transhepatic computed tomography (CT)/ultrasound (USG) guided placement of fiducial

markers in the thrombus can assist in targeting portal vein via hepatic vein [5,6]. Percutaneous transhepatic CT/USG guided puncture of hepatic vein through the portal vein, and subsequent snaring of the wire through the transjugular route has been described [5,7]. USG/magnetic resonance imaging can also be used to guide the needle trajectory from the hepatic vein to the portal vein [8,9]. Transsplenic access and portal vein recanalization and TIPS procedure have been described with high technical success in cases with complete PVT [10].



Fig. 3 – Portovenogram demonstrates patent TIPS shunt and the main portal vein with nonvisualization of the right and left portal vein branches.

Increasing experience with the use of widely available imaging guidance has made it possible to manage the patient undergoing TIPS with complete PVT.

Conclusion

Complete PVT is no longer a contraindication for TIPS procedure.

USG/CT/magnetic resonance imaging can be used to guide the creation of shunt from hepatic veins to the portal vein, which is the most challenging step in the creation of the TIPS procedure.

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