Signature: © Pol J Radiol, 2014; 79: 39-41
DOI: 10.12659/PJR.889841

Polish Journal of Radiology
www.PolRadiol.com
CASE REPORT

Received: 2013.09.30
Accepted: 2013.11.12
Published: 2014.02.27

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

CT-assisted transfemoral intrahepatic portosystemic shunt in a long duration follow-up: A case report

Bartosz Żabicki[1BDEF], Jens Ricke[2ABCDF], Oliver Dudeck[2DE], Maciej Pech[2ABCDEF]

[1] Department of Radiology, Poznan University of Medical Sciences, Poznań, Poland
[2] Department of Radiology and Nuclear Medicine, University of Magdeburg, Magdeburg, Germany

Author's address: Bartosz Żabicki, Department of Radiology, Poznań University of Medical Sciences, Poznań, Poland, e-mail: bzabicki@gmail.com

Summary

Background: Transjugular intrahepatic portosystemic shunt (TIPS) in patients with portal hypertension may be considered as a rescue therapy in case of recurrent variceal bleeding or failure of endoscopic management.

Case Reports: We present a case of a patient with massive gastroesophageal variceal bleeding refractory to numerous endoscopic treatments in which TIPS was considered in an attempt to decrease the risk of potentially fatal rebleeding. Standard TIPS procedure was not feasible due to altered anatomy of the liver resulting from right hemidiaphragmatic paresis. Computed Tomography (CT) fluoroscopic guidance was utilized for direct percutaneous puncture of the left hepatic and left portal vein with subsequent guidewire snaring to perform portosystemic shunting via femoral access. Since the procedure, no recurrent variceal bleeding was reported and the shunt remained patent at a 3-year follow-up. Although stent fracture with fragment migration was observed.

Conclusions: Significant variation in liver anatomy does not preclude the creation of nonsurgical portosystemic shunt. In these cases, combined percutaneous and endovascular technique may be utilized.

MeSH Keywords: Liver Cirrhosis • Hemidiaphragmatic Paresis • Portasystemic Shunt, Transjugular Intrahepatic • CT guidance

PDF file: http://www.polradiol.com/download/index/idArt/889841

Background

Portal hypertension is related to liver cirrhosis in 90% of cases and is defined as a portosystemic gradient higher than 6mmHg. Clinical complications occur when pressure gradients exceed 10–12 mmHg [1]. Common clinical problems of portal hypertension include refractory ascites and gastroesophageal varices. The latter is a major cause of mortality associated with liver cirrhosis [2,3]. Therapeutic options for bleeding varices include medical treatment (vasoactive, vasoconstrictive drugs) and endoscopic treatment (sclerotherapy, ligation). Endoscopic ligation is usually the treatment of choice for variceal bleeding. In case of treatment failure or with recurrent bleeding, TIPS may be considered as a rescue therapy with success rate of up to 90% [2,4]. TIPS significantly reduces the risk of rebleeding, but it is associated with higher prevalence of hepatic encephalopathy in comparison to medical or endoscopic treatment [4,5].

Standard operating procedure for TIPS usually includes right jugular vascular access and subsequent creation of an artificial intrahepatic tract between the right or middle hepatic vein and a branch of the right portal vein [2,4]. Ultrasound assistance is frequently utilized to guide the procedure. We present a case in which hepatic vascular anatomy was significantly altered due to right hemidiaphragmatic paresis with subsequent cephalad liver luxation in which the TIPS procedure was successfully performed using an atypical left hepatic CT-guided approach.

Case Report

A 73-y old patient was admitted to the department of gastroenterology due to recurrent massive esophageal variceal bleeding. The patient presented with Child-Pugh class A liver cirrhosis (6 points) and MELD (Model of End-Stage Liver Disease) score of 13. Additionally, he suffered from diabetes and arterial hypertension. Comprehensive coagulation

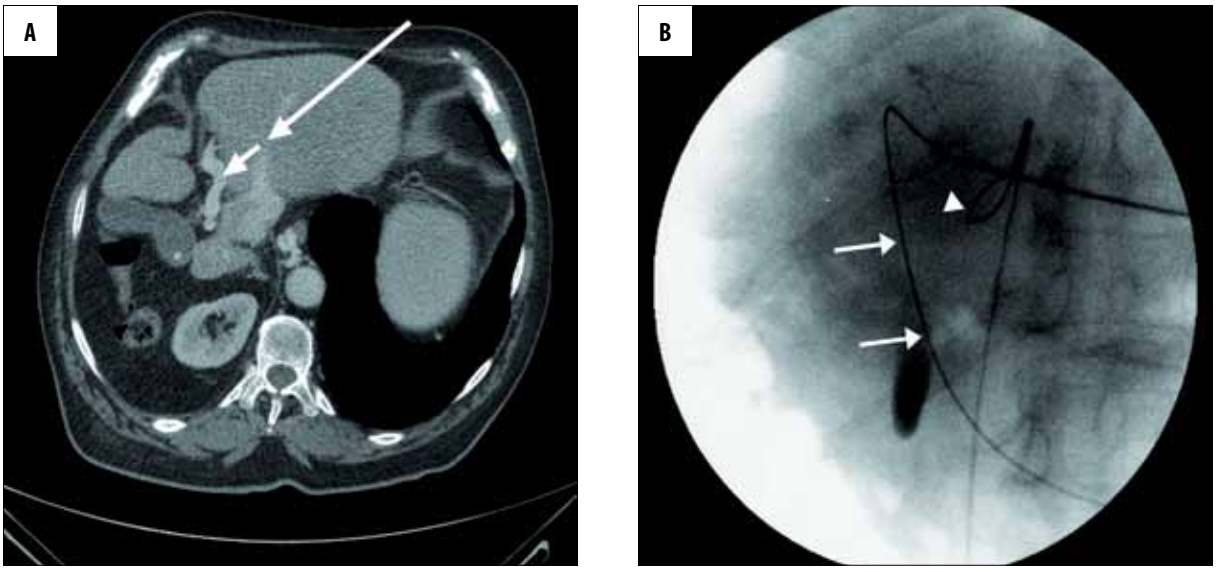


Figure 1. (**A**) Axial CT image shows the relation of the left hepatic vein (LHV) (long arrow) and the left portal vein (LPV) (short arrow) in one plane, which was used for percutaneous puncture (the percutaneous puncture tract is marked with white arrows). (**B**) X-ray image demonstrates transhepatic-portal guidewire snaring. A guidewire is advanced in the portal circulation (arrows) after simultaneous CT-guided puncture of the LPV through an open snare loop located in the LHV (arrow head).

studies revealed factor XII deficiency. Abdominal ultrasound revealed rough liver surface, slightly inhomogeneous parenchyma, moderate splenomegaly and no ascites. Contrast enhanced CT imaging confirmed typical features of portal hypertension such as splenomegaly, prominent esophageal and fundal varices and enlarged venous shunts between the spleen and the left kidney. Coronal reconstruction revealed an essential elevation of the right phrenic dome as a result of ipsilateral hemidiaphragmatic paresis.

Previous bleeding events had been successfully managed with endoscopic ligation. TIPS procedure was recommended for the patient in an effort to prevent future recurrent bleeding events. Standard vascular access for TIPS was unfeasible because of an excessively cephalad position of the liver and its subsequent alteration in its vessel anatomy. Therefore, creation of a tract between the left hepatic vein and the left portal branch resulting in a portosystemic shunt was proposed (Figure 1A).

Two imaging modalities were utilized for the procedure: CT equipped with Fluoro-CT kit (Aquilion16-MDCT, Toshiba, Shimoishigami, Japan) and a fluoroscopy C-arm (Siemens Siremobil Comact L, Erlangen, Germany). The right femoral vein was punctured and a 6F sheath (Radifocus, Terumo, Leuven, Belgium) was advanced. Subsequently, a snare (Amplatz Goose Neck Snare Kit, EV3, Plymouth, USA) with loop diameter of 1 cm was placed into the left hepatic vein and left open within the lumen. A direct percutaneous CT-guided puncture was performed from the abdominal wall through the snare loop into the left portal vein. Subsequently, a 0.035″ guidewire (Radifocus, Terumo, Leuven, Belgium) was advanced through the 18G puncture needle all the way to the portal vein and then to the splenic vein. After gently retracting the puncture needle, guidewire was pulled back to the femoral access by retracting the snare. As a result, guidewire formed a direct access from the right femoral vein through the left hepatic vein into the left portal tract and the splenic vein (Figure 1B). A 5F Cobra catheter (TempoAqua, Cordis, Miami Lakes, USA) was advanced over the wire to perform direct portography.

Further steps were similar to a standard TIPS procedure and were performed with fluoroscopic guidance. At first, the intrahepatic tract was dilated with an 8×40 mm balloon catheter (Wanda, Boston Scientific, Galway, Ireland). The shunt was secured with a 10×80 mm self-expanding stent graft (Fluency, Bard, Karlsruhe, Germany) and further elongated to the hepatic vein with a bare metal nitinol 10×80 mm stent (ELuminexx, Bard, Karlsruhe, Germany). Postdilatation with an 8 mm balloon catheter was performed and a porto-caval gradient value of 11 cm H_2O was obtained. Follow-up TIPS angiography assured a patent intrahepatic shunt. Both, the guidewire and the vascular access sheath were removed and substituted with a Sheldon catheter. Percutaneous access sheath was removed and the puncture tract was occluded with gelfoam torpedoes. A prophylactic dose of heparin infused over 24 hours was indicated. A 24-hour stay at the intensive care unit was free of complications. An additional post-interventional CT scan revealed no technical failures (Figure 2).

Follow-up was performed at 1, 3, 6, 9 and 12 months after the procedure and then continued annually. Six months after the procedure, no clinical deterioration due to the shunt was observed and no bleeding events were reported. However, an ultrasound revealed a fracture of the bare metal stent, while flow through the TIPS remained undisturbed. Fragments were located in the proximal inferior vena cava, as well as in the right atrium and the right ventricle (Figure 3). C-ray fluoroscopy and CT confirmed of these 3 stent fragments to be fixed. Following an interdisciplinary consultation with the department of cardiac surgery and cardiology, conservative treatment was recommended. The patient was prescribed ASA (acetylosalicylic acid) 100 mg per day and an ultrasound follow-up in 3 months. The

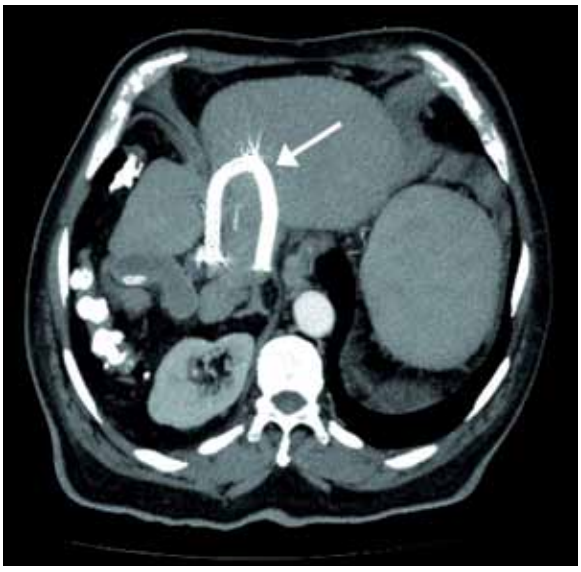


Figure 2. CT scan of a portosystemic shunt tract that was created by introducing a self-expanding stent graft (Fluency, Bard, Karlsruhe, Germany) and a self-expanding stent (ELuminexx, Bard, Karlsruhe, Germany) (arrow).

patient remains in good clinical status to this day and all follow-up examinations demonstrate the shunt to be patent with no further migration of the fragments.

Discussion

The standard operating procedure for TIPS is possible if one of the hepatic veins (right or middle) and the right portal vein can be aligned along a straight imaginary intrahepatic tract within the liver parenchyma. In some individuals, the liver may be distorted and the porta hepatis located more cranially than usual. These anatomic conditions are sometimes seen in patients with a small, shrunken cirrhotic liver and in transplant recipients or, as in this case, with right hemidiaphragmatic paresis [6]. There are a few techniques that help overcome the challenging anatomy. The portal vein and the hepatic vein or inferior vena cava may be punctured from the common percutaneous access site under ultrasound guidance. Subsequent guidewire snaring to the transjugular access site forms a typical porto-caval tract for TIPS [6]. Direct transcaval access to the portal vein branch, as in the treatment of Budd-Chiari syndrome, is another technical refinement [7]. Furthermore, a surgical side-to-side porto-caval shunt or

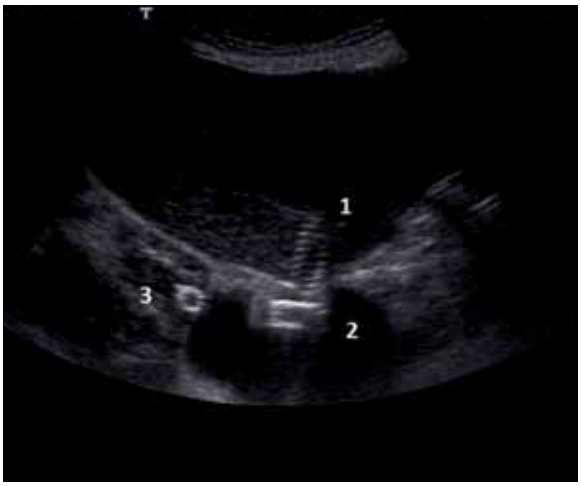


Figure 3. Stent fragments in follow-up ultrasound examination. The numbers clearly point to fragments in the vena cava inferior (1), the right atrium (2) and the right ventricle (3).

small-diameter prosthetic H-graft porto-caval shunt (HGPCS) may have been considered as an alternative [8]. In our case, none of the interventional approaches were feasible due to the anatomical requirements. As a result, the described technique was attempted prior to surgical approach.

Stent migration during venous procedures is a rare complication (up to 3%). Stent fracture in the venous circulation occurs even less frequently (reported in single case reports) [9] and there are no reports on Nitinol stent fractures in TIPS patients. Nevertheless, an atypically angulated TIPS tract, continuous strain due to respiratory movements and stent protrusion into the inferior vena cava, all have predisposed the stent to fracture.

The incidence of fatal procedural complications (intraperitoneal hemorrhage, laceration of the hepatic artery or portal vein and right heart failure) in a typical transjugular procedure is 1.7% (range 0.6–4.3%) and it is related to the experience of performing physician [1,4]. Modifications of standard TIPS are utilized occasionally. It is therefore difficult to evaluate the rate of possible fatal complications, but there certainly is a risk of vascular damage and intraperitoneal bleeding during percutaneous puncture of the liver. Risk of the most important clinical complications (deterioration of liver function and hepatic encephalopathy) is similar to standard TIPS.

References:

1 Krajina A, Hulek P, Fejfar T et al: Quality Improvement Guidelines for Transjugular Intrahepatic Portosystemic Shunt (TIPS). Cardiovasc Intervent Radiol, 2012; 35(6): 1295–300

2 Ochs A: Transjugular Intrahepatic Portosystemic Shunt. Dig Dis, 2005; 23(1): 56–64

3 García-Pagán JC, Caca K, Bureau C et al: Early use of TIPS in patients with cirrhosis and variceal bleeding. N Engl J Med, 2010; 362(25): 2370–79

4 Owen AR, Stanley AJ, Vijayananthan A et al: The transjugular intrahepatic portosystemic shunt (TIPS). Clin Radiol, 2009; 64(7): 664–74

5 Corbett C, Mangat K, Olliff S et al: The role of Transjugular Intrahepatic Portosystemic Shunt (TIPSS) in management of visceral hemorrage. Liver Int, 2012; 32(10): 1493–504

6 Liang HL, Liu WC, Huang JS et al: TIPS in patients with cranial porta hepatis: ultrasound-guided transhepatic portohepatic-portocaval puncture in single needle pass. Am J Roentgenol, 2011; 196(4): 914–18

7 Quateen A, Pech M, Berg T et al: Percutaneous transjugular direct porto-caval shunt in patients with Budd-Chiari syndrome. Cardiovasc Intervent Radiol, 2006; 29(4): 565–70

8 Orloff MJ, Vaida F, Haynes KS et al: Randomized controlled trial of emergency transjugular intrahepatic portosystemic shunt versus emergency porto-caval shunt treatment of acute bleeding esophageal varices in cirrhosis. J Gastrointest Surg, 2012; 16(11): 2094–111

9 Bani-Hani S, Showkat A, Wall BM et al: Endovascular stent migration to the right ventricle causing myocardial injury. Semin Dial, 2012; 25(5): 562–64