

Transjugular intrahepatic portosystemic shunt reduction for refractory hepatic encephalitis

Published on 20.02.2014

DOI: 10.1594/EURORAD/CASE.11452

ISSN: 1563-4086

Section: Interventional radiology

Area of Interest: Liver Portal system / Hepatic veins
Interventional vascular

Procedure: Shunts

Procedure: Stents

Procedure: Technical aspects

Imaging Technique: Fluoroscopy

Imaging Technique: CT-Angiography

Imaging Technique: Catheter venography

Special Focus: Cirrhosis Haemodynamics / Flow dynamics
Varices Grafts Case Type: Clinical Cases

Authors: Daniel Childers, Wolf Heberlein

Patient: 63 years, female

Clinical History:

A 63-year-old female patient presented with refractory hepatic encephalopathy due to progressive hepatitis C cirrhosis 23 months after Transjugular Intrahepatic Portosystemic Shunt (TIPS) placement. The initial TIPS had been performed for massive variceal bleeding with reduction of the portosystemic gradient from 22 mmHg to 8 mmHg.

Imaging Findings:

A decision for TIPS revision was made. Initial angiography demonstrated a patent 10 x 90 mm VIATORR stent (Gore, Flagstaff, Arizona) cranially extended to the IVC with a 10 x 40 mm FLUENCY (Bard, Tempe, Arizona) stent. On contrast injection, limited filling of the main portal branches and absence of varices (Fig. 1) was seen, corresponding to the measured 8 mmHg gradient. To reduce the lumen of the TIPS stent, a 10 x 39 mm iCAST (Atrium, Hudson, New Hampshire) stent was inserted into the VIATORR stent, but the delivery balloon was only partially (4 mm) inflated. This resulted in a flow-restricting hourglass configuration (Fig. 2). The diameter was gradually increased from 4 to 6 mm, resulting in a final gradient of 14 mmHg. Post-reduction imaging reflects the increased TIPS resistance with contrast filling of segmental intrahepatic portal vein branches and visualisation of some gastric varices (Fig. 3).

Discussion:

A. Background

Hepatic encephalopathy results from diversion of portal blood from the liver which prevents nitrogenous compounds from being metabolized. The neurotropic factors leading to hepatic encephalopathy include cytokines, oxidative stress, and altered levels of serotonin, ammonia, histamine, and GABA [1]. After creation of a TIPS, hepatic encephalopathy can occur in 17 to 46 per cent of patients [2]. The majority of patients can be controlled medically with only 3 to 7 per cent being refractory to medical treatment [3]. Medical treatment includes the disaccharide Lactulose and the antibiotic Rifaximin. Both approaches aim to reduce the amount of intestinal bacteria producing

neurotoxins [1].

B. Clinical Perspective

Refractory hepatic encephalopathy poses a treatment dilemma between increasing the portosystemic shunt resistance to increase liver perfusion and blood “detoxification” while keeping the gradient low enough to prevent the recurrence of variceal haemorrhage. A gradient greater than 8 mm Hg typically has a low likelihood of the patient developing encephalopathy [4].

C. Imaging Perspective

Routine surveillance for TIPS dysfunction consists of Doppler Ultrasound evaluation every six months with acceptable flow velocities ranging from 90 to 200 cm/s [5]. Significant changes should prompt an angiographic evaluation. Since hepatic encephalopathy is a clinical diagnosis, it is important to follow patients in a dedicated clinical setting.

The balloon-mounted iCAST stent is anchored by the initial opening of both ends, followed by a gradual opening of the mid-part which allows precise lumen control. Occasionally, subsequent addition of an oversized, self-expanding stent inside of the iCast is needed to assure its stability inside of the TIPS-stent.

Other methods to reduce a TIPS include [2]: Insertion of two adjacent stents and stent grafts - allowing up- and down regulation of the shunt, suturing the midsection of a stent prior to delivery - bearing the risk of a predetermined diameter and possible suture failure, and complete coil occlusion of the shunt as the most extreme form.

D. Outcome

In small studies, the majority of patients undergoing TIPS reduction for hepatic encephalopathy can experience a decrease in symptoms within 72 hours [6]. Our patient demonstrated significant clinical improvement without a recurrent episode of bleeding varices. However, the overall prognosis remains severely limited due to the underlying impaired liver function with liver transplant as the only curative option.

E. Take Home Message, Teaching Points:

For intractable hepatic encephalopathy after TIPS placement, a reduction may be indicated to improve the quality of life, while avoiding recurrent episodes of variceal bleeding.

Differential Diagnosis List: Refractory hepatic encephalopathy successfully treated with TIPS reduction., Hepatic encephalopathy due to: metabolic abnormalities, Infection, Non-compliance to medication, Progression of liver disease

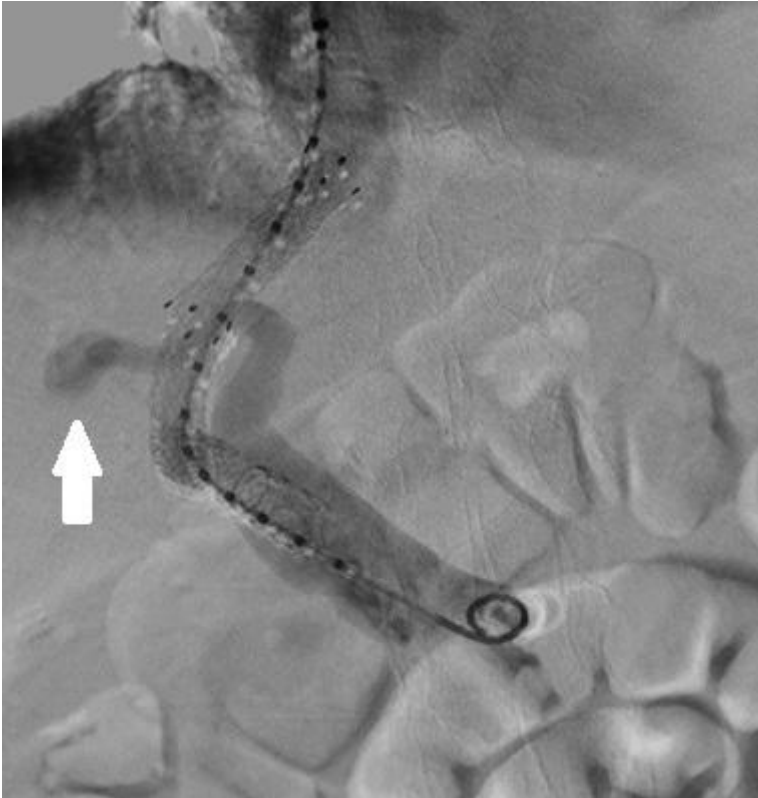
Final Diagnosis: Refractory hepatic encephalopathy successfully treated with TIPS reduction.

References:

- Munoz S (2008) Hepatic encephalopathy. *Med Clin North Am* 92(4):795-812 (PMID: [18570943](#))
- Saket R, Sze D, Razavi M, Kee S, Frisoli J, Semba C, Dake M (2004) TIPS reduction with use of stents or stent-grafts. *JVIR* 15(7):745-51 (PMID: [15231889](#))
- Madoff D, Perez-Young I, Wallace M, Skolkin M, Toombs B (2003) Management of tips-related refractory hepatic encephalopathy with reduced wallgraft endoprostheses. *JVIR* 14(3):369-74 (PMID: [12631643](#))
- Riggio O, Ridola L, Angeloni S, Cerini F, Pasquale C, Attili A, Fannelli F, Merli M, Salvatori FM (2010) Clinical efficacy of transjugular intrahepatic portosystemic shunt created with covered stents with different diameters: Results of a randomized controlled trial. *J Hepatol* 53(2):267-72 (PMID: [20537753](#))
- Engstrom B, Horvath J, Suhocki P, Smith A, Hertzberg B, Smith T, Kim C (2013) Covered transjugular intrahepatic portosystemic shunts: accuracy of ultrasound in detecting shunt malfunction. *AJR* 200(4):904-08 (PMID: [23521468](#))
- Jacquier A, Vidal V, Monnet O, Varoquaux A, Gaubert J, Champsaur P, Gerolami R, Bartoli JM, Moulin G (2006) A modified procedure for transjugular intrahepatic portosystemic shunt flow reduction. *JVIR* 17(8):1359-63 (PMID: [16923985](#))

Figure 1

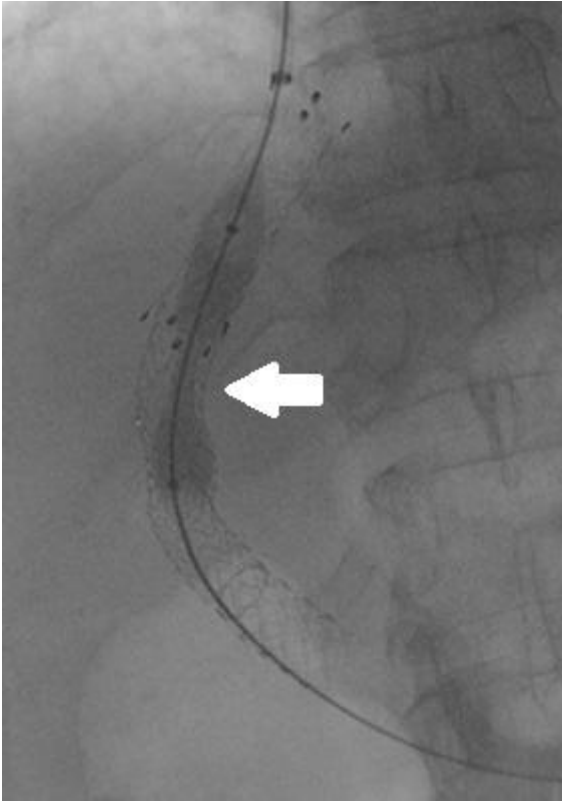
a



Description: DSA of the TIPS demonstrates large patency and brisk flow. Note the decreased flow through the portal vein, demonstrated by contrast filling of only the main portal branches (arrow). A gradient of 8 mmHg was measured **Origin:** Heberlein W, Department of Radiology, University of Arkansas for Medical Sciences, Arkansas, USA

Figure 2

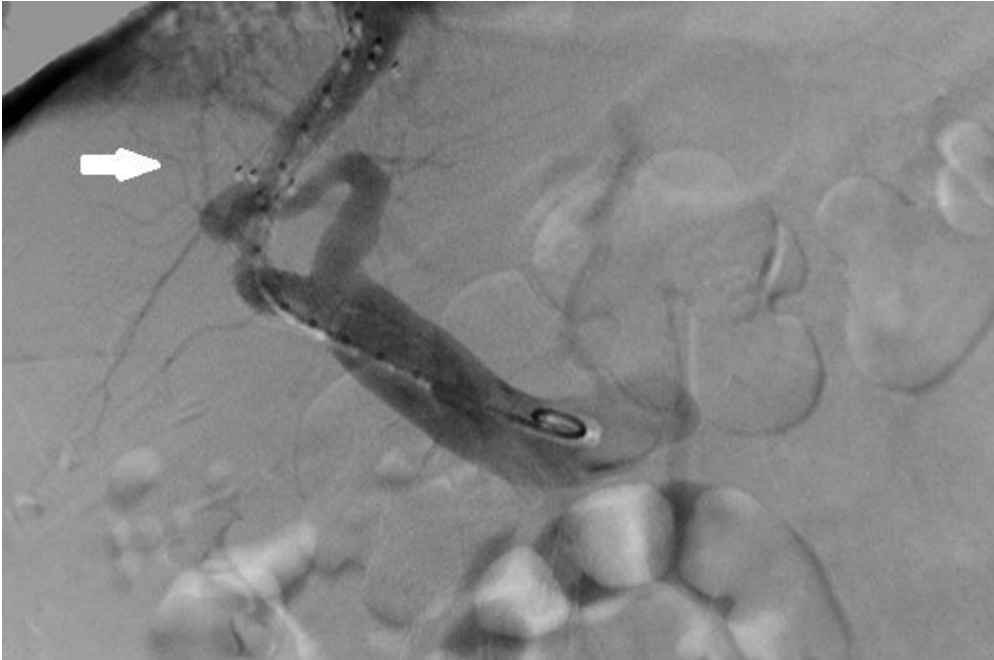
a



Description: Fluoroscopic image shows placement of the reduction stent. Note the hourglass shape of the iCAST (BARD, Tempe, AZ) stent when only partially deployed (arrow). **Origin:** Heberlein W, Department of Radiology, University of Arkansas for Medical Sciences, Arkansas, USA

Figure 3

a



Description: TIPS reduction to a 6 mm diameter. Note increased flow through the segmental branches of the portal vein (arrow) and filling of some gastric varices. A portosystemic pressure gradient of 14 mm Hg was measured. **Origin:** Heberlein W, Department of Radiology, University of Arkansas for Medical Sciences, Arkansas, USAI