

## Splenic Embolization for Recalcitrant Post-TIPS Encephalopathy

Premal Travedi, Michael Kriss, Scott Biggins and Thor Johnson\*

Radiology-Interventional, University of Colorado Hospital, USA

\***Corresponding author:** Thor Johnson, Radiology-Interventional, University of Colorado Hospital, 12605 E. 16<sup>th</sup> Ave Aurora, CO 80045, USA, Tel: 7208484479; Email: [thor.johnson@ucdenver.edu](mailto:thor.johnson@ucdenver.edu)

### Abstract

Encephalopathy in the setting of transjugular portosystemic shunts (TIPS) is a difficult clinical problem. Shunt reduction often improves encephalopathy but increases the risk of portal hypertension related complications. In this case we describe the use of partial splenic artery embolization in a 60-year-old female who presented with both TIPS dysfunction and refractory encephalopathy. Prior to treatment the patient had an elevated TIPS gradient, visible varices by endoscopy, and encephalopathy that was severe and refractory enough to be considered for hospice. Following 60% splenic volume embolization, encephalopathy resolved, varices decompressed, and patient was able to be discharged home. This demonstrates that splenic embolization may be considered as a potential alternative to TIPS reduction in the setting of TIPS dysfunction and encephalopathy.

**Keywords:** *Transjugular intrahepatic portosystemic shunt; Splenic embolization; Hepatic encephalopathy*

**Received Date:** July 12, 2018; **Accepted Date:** August 17, 2018; **Published Date:** August 24, 2018

### Introduction

Worsening encephalopathy complicates transjugular intrahepatic portosystemic shunt (TIPS) placement in some patients, which is often addressed by TIPS reduction. When there is TIPS dysfunction this is often not a viable solution and interventions such as partial splenic embolization may be useful in management of both the TIPS dysfunction and the encephalopathy.

### Case Report

A 60-year-old woman was transferred to our institution with recurrent stage 3 hepatic encephalopathy (HE) in the setting of long-standing primary biliary cirrhosis, end-stage liver disease, and episodes of variceal hemorrhage for which she had a TIPS placed in 2006. She initially tolerated this well with no recurrent bleeding, but over the year prior to her presentation, developed recurrent Stage 3/4 HE requiring frequent hospitalizations leading to physical deconditioning and malnourishment that precluded her from being considered a liver transplant candidate. Her Model for End-Stage Liver Disease (MELD) score was 13. A computed tomography scan performed at time of admission was notable for moderate sized gastric varices, splenomegaly and a splenorenal shunt (Figure 1). Colonic

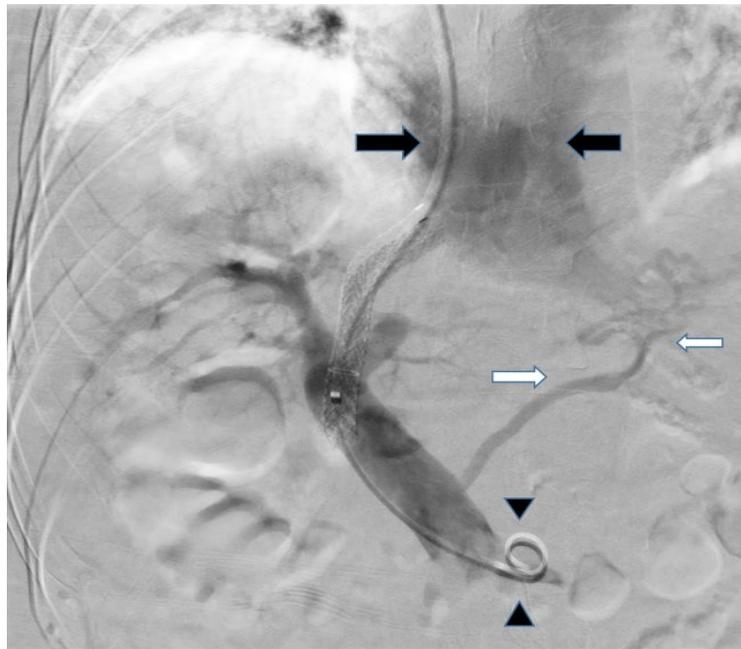
**Citation:** Premal Travedi, Splenic Embolization for Recalcitrant Post-TIPS Encephalopathy. J Clin Cases Rep 1(3): 122-125. DOI: <https://doi.org/10.46619/joccr.2018.1-1025>

pneumatosis was incidentally seen and in context of a benign abdominal exam. This was felt to be related to administration of lactulose every 1-2 hours by the patient's family, in effort to resolve refractory encephalopathy. Endoscopy was performed and demonstrated esophageal and gastric varices but no active sites of bleeding. Persistent encephalopathy persisted despite maximized inpatient medical management. On the third day of admission, a TIPS evaluation was performed, which demonstrated hepatopetal flow in the non-TIPS portal vein and coronary vein varices (Figure 2). Portosystemic gradient was elevated at 12 mmHg. Because both TIPS downsizing and splenorenal shunt embolization would further increase portal hypertension and in turn risk of variceal bleeding, partial splenic embolization was instead performed. The right common femoral artery was accessed and a catheter was used to select the celiac artery, through which a microcatheter was advanced into the splenic artery. An inferior splenic artery branch was sub-selected with the microcatheter and embolization was performed with 500-700  $\mu$  Embospheres (Merit Medical-Salt Lake City, UT). Approximately 50-60% of the spleen was embolized by fluoroscopic analysis. Portosystemic gradient was measured post embolization and was decreased to 8 mmHg immediately post embolization.



**Figure 1:** Computed tomography of the abdomen and pelvis with intravenous contrast performed on day of admission demonstrates: (A) a patent TIPS stent (arrows), (B) right colonic pneumatosis better visualized in lung window, (C) splenomegaly and (D) enlarged gastric varices (arrows), inset picture is the varices visible by endoscopy.

There was also decrease in hepatopetal flow. Her HE resolved completely the following day and she was discharged home two days later. During the subsequent 8 months of clinical follow up, there was no recurrence of encephalopathy. The patient remained on rifaximin and lactulose, though with significant dose reduction of the latter. The patient's functional and nutritional status improved significantly. Consequently, she qualified for and received a living donor liver transplant.



**Figure 2:** A static fluoroscopic image obtained following injection of iodinated contrast through a pigtail catheter (arrowheads) positioned through the TIPS stent into the main portal vein demonstrates hepatopetal flow, with hepatopetal flow of the intrahepatic portal venous branches and subsequently the right atrium (black arrows). A dilated coronary vein is present (white arrows), supplying gastric varices seen on prior day CT exam.

## Discussion

Partial splenic embolization has been used to treat thrombocytopenia in the setting of hypersplenism [1] however in the setting of encephalopathy is not often included as a potential therapy, particularly in the setting of prior TIPS placement. In this case, we demonstrated the effectiveness of partial splenic embolization to treat severe post-TIPS encephalopathy in the setting of TIPS dysfunction. The partial splenic embolization reduced her need for lactulose significantly and led to resolution of her colonic pneumatosis on subsequent imaging. In patients with cirrhosis, chronic HE occurs with significant mesenteric venous blood is shunted into systemic circulation via portosystemic collaterals, TIPS, or both [2]. Cirrhotic patients with HE refractory to medical management have limited treatment options. Obliteration of portosystemic collaterals can be performed to reduce venous shunting in patients with spontaneous portosystemic shunts (SPSS). TIPS reduction or occlusion accomplishes the same goal. However, both interventions increase portal pressure and in patients with a history of variceal hemorrhage, an increased risk of gastrointestinal bleeding may outweigh the benefit with respect to reduced HE. Splenic embolization can in this circumstance, improve both encephalopathy as well as TIPS dysfunction. To date, not reported as an adjunctive therapy for refractory HE post-TIPS.

Clinical experience with splenic embolization now spans more than three decades. Despite clear efficacy, adoption of splenic embolization clinically was initially limited by a high rate of complications which included post-embolization syndrome, splenic abscess, and death. These complications, however, were related to poor technique which has evolved significantly since its inception in the early 1990s. With improvements in peri-procedural care, embolization of less than 50-70% of splenic parenchyma, and adequate antibiotic prophylaxis, complication rates have dramatically declined over the past decade [3].

Splenic embolization results in decreased splenic venous return, which allows for proportionally greater superior mesenteric flow into the portal system and a compensatory increase in hepatic artery perfusion through the hepatic artery buffer response. Hepatic artery perfusion is in large part controlled by vascular tone at level of the hepatic arteriols through washout of vasoactive substances by the portal venules [4]. This relationship is maintained even post-transplantation. When a TIPS is placed the reversal of flow of all of the non-TIPS vessels results in a large increase in hepatic arterial flow, however progressive dysfunction of the TIPS results in increasing hepatopedal portal vein flow which reverses these changes and can affect liver function and hence encephalopathy. Splenic vein blood is relatively deoxygenated and substrate-poor relative to mesenteric flow due to nutrient absorption and relatively poor oxygen extraction in the bowel [5]. With increasing splenosis and TIPS dysfunction, less hepatic artery flow and increasing splenic contribution to hepatopedal portal flow result in sinusoidal blood that poorly supports liver function. This can be treated with direct splenic intervention as in this case. Splenic artery embolization properly performed can be safe and effective in the management of encephalopathy and offers another therapeutic option in the setting of TIPS dysfunction, precluding TIPS downsizing.

### **Conflict of Interest**

On behalf of all authors, the corresponding author states that there is no conflict of interest.

### **References**

1. Hadduck TA, McWilliams JP (2014) Partial splenic artery embolization in cirrhotic patients. *World Journal of Radiology* 6(5): 160-168.
2. Takashi M, Igarashi M, Hino S, et al. (1985) Portal hemodynamics in chronic portal-systemic encephalopathy: angiographic study in seven cases. *Journal of Hepatology* 1(5): 467-476.
3. Koconis KG, Singh H, Soares G (2007) Partial splenic embolization in the treatment of patients with portal hypertension: a review of the english language literature. *Journal of Vascular and Interventional Radiology* 18(4): 463-481.
4. Eipel C, Abshagen K, Vollmar B (2010) Regulation of hepatic blood flow: the hepatic arterial buffer response revisited. *World Journal of Gastroenterology* 16(48): 6046.
5. Tygstrup N, Winkler K, Mellempgaard K, et al. (1962) Determination of the hepatic arterial blood flow and oxygen supply in man by clamping the hepatic artery during surgery. *The Journal of Clinical Investigation* 41(3): 447-454.