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## Case Report

# TIPS to the rescue: Preoperative Transjugular Intrahepatic Portosystemic Shunt (TIPS) placement in a patient with caput medusae and colon cancer<sup>☆</sup>

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## ABSTRACT

Abdominal surgery in patients with cirrhosis and portal hypertension remains a challenge due to higher risk of morbidity and mortality. Preoperative elective transjugular intrahepatic portosystemic shunt (TIPS) is increasingly being used in these patient population. Herein, we report a case of 65-year-old male with biopsy-proven ascending colon cancer and cirrhosis. As a sequelae of portal hypertension, patient also had large caput medusae which posed significant challenge to the surgical approach for resection of the colon cancer. The patient was managed initially with placement of TIPS to decompress the portal pressures and caput medusae and allow safe surgical field for curative resection of the colon cancer. Following this, the patient underwent uneventful laparoscopic right hemicolectomy.

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## Background

Caput medusa is a well-known complication of portal hypertension, characterized by dilated, tortuous periumbilical veins due to portosystemic connections. Due to portal hypertension, these venous collaterals are at higher venous pressures and at risk of significant bleeding with minimal trauma. Herein, we report a case of a patient with early-stage colon cancer and large caput medusae, who underwent Transjugular Intrahepatic Portosystemic Shunt (TIPS) in order to decompress the

periumbilical veins to allow for surgical resection of the colon cancer. Written informed consent was obtained from the patient for publication of this case report, including accompanying images.

## Case presentation

A 65-year-old male with a history of hepatitis C virus cirrhosis with Model for End-Stage Liver Disease score of 12

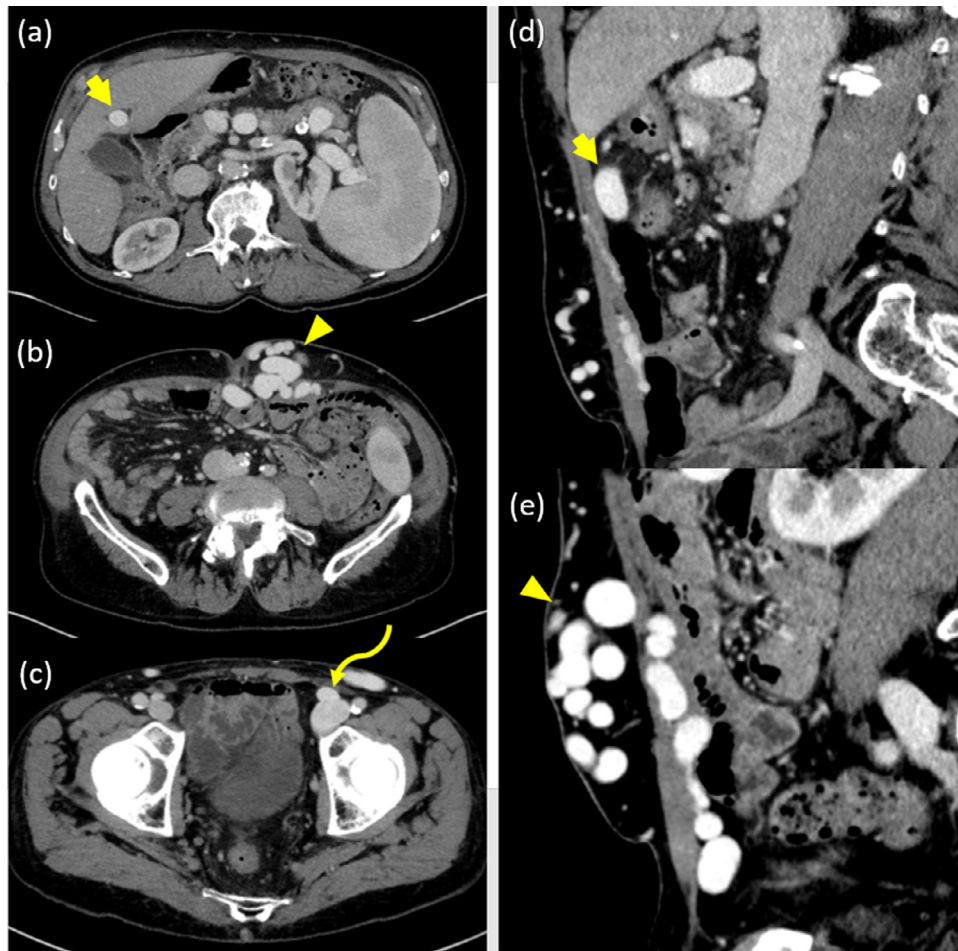
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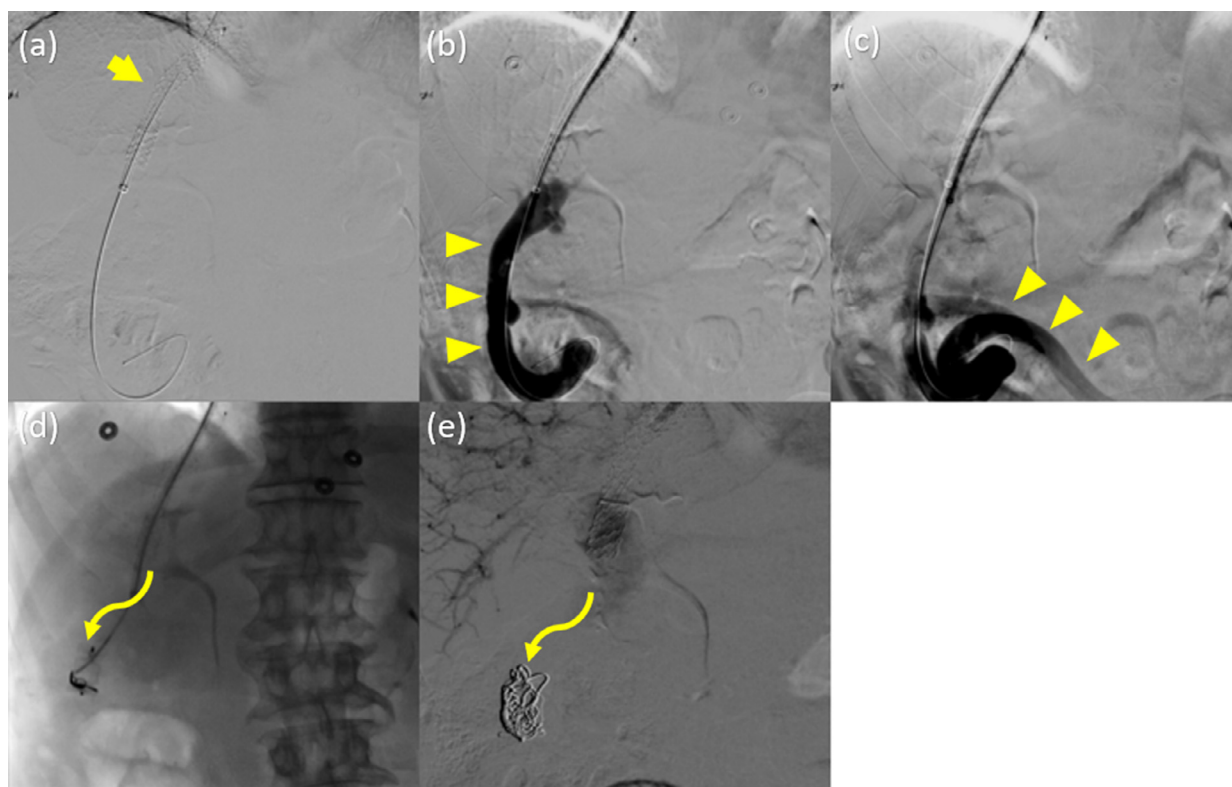


**Fig. 1** – Axial contrast-enhanced images of the abdomen and pelvis (a-c) show a recanalized umbilical vein (arrow) with extensive, dilated, and tortuous periumbilical and anterior abdominal wall venous collaterals (arrowhead) draining into the left inferior epigastric vein (curved arrow). Sagittal contrast-enhanced CT images (d and e) show a large recanalized umbilical vein (arrow) and periumbilical and abdominal wall venous collaterals (arrowhead).

presented to colorectal surgery for the management of a 1.5 cm right colon mass noted on screening colonoscopy. The biopsy of the colon mass was consistent with adenocarcinoma. The patient also had a large caput-medusae secondary to portal hypertension which posed a significant challenge to the surgical approach, both laparoscopically as well as open surgery (Fig. 1). Initially, open surgical approach was chosen for more direct control in case of bleeding. The patient was discussed in multi-disciplinary meeting and decision was made to consult interventional radiology to evaluate portal venous pressures and consider TIPS procedure if pressures are elevated, in an attempt to decompress the periumbilical varices to minimize the risk of catastrophic bleeding during surgery.

Initial transjugular intrahepatic pressure measurements showed a hepatic venous pressure gradient of 11 mm Hg. Based on the patient's clinical presentation and need for

surgical resection of the colon mass, we proceeded with performing elective TIPS. The patient underwent successful placement of TIPS between the right hepatic vein and the right portal vein. This was followed by the embolization of large portosystemic collateral that appeared to feed the collateral veins over the anterior abdominal wall. This was achieved through the existing TIPS shunt and embolized using a combination of 16 mm Amplatzer plug and multiple coils (Fig. 2). A follow-up CT was performed 2-months later showed complete interval resolution of the periumbilical varices (Fig. 3). However, a nonocclusive thrombus was noted in the portal vein, which was managed by oral anticoagulation. Approximately 2 months after the initial TIPS the patient successfully underwent laparoscopic right hemicolectomy with ileocolic anastomosis. After an uneventful postoperative course, the patient was discharged without any complications.



**Fig. 2** – Intraprocedure angiographic images (a-e) show successful deployment of TIPS between the right hepatic vein (RHV) and right portal vein (RPV) (arrow). Trans-TIPS venogram (b and c) shows enlarged and tortuous recanalized umbilical vein (arrowheads). Final images (d and e) show successful placement of Amplatzer plug and coils (curved arrows) within the umbilical vein.

## Discussion

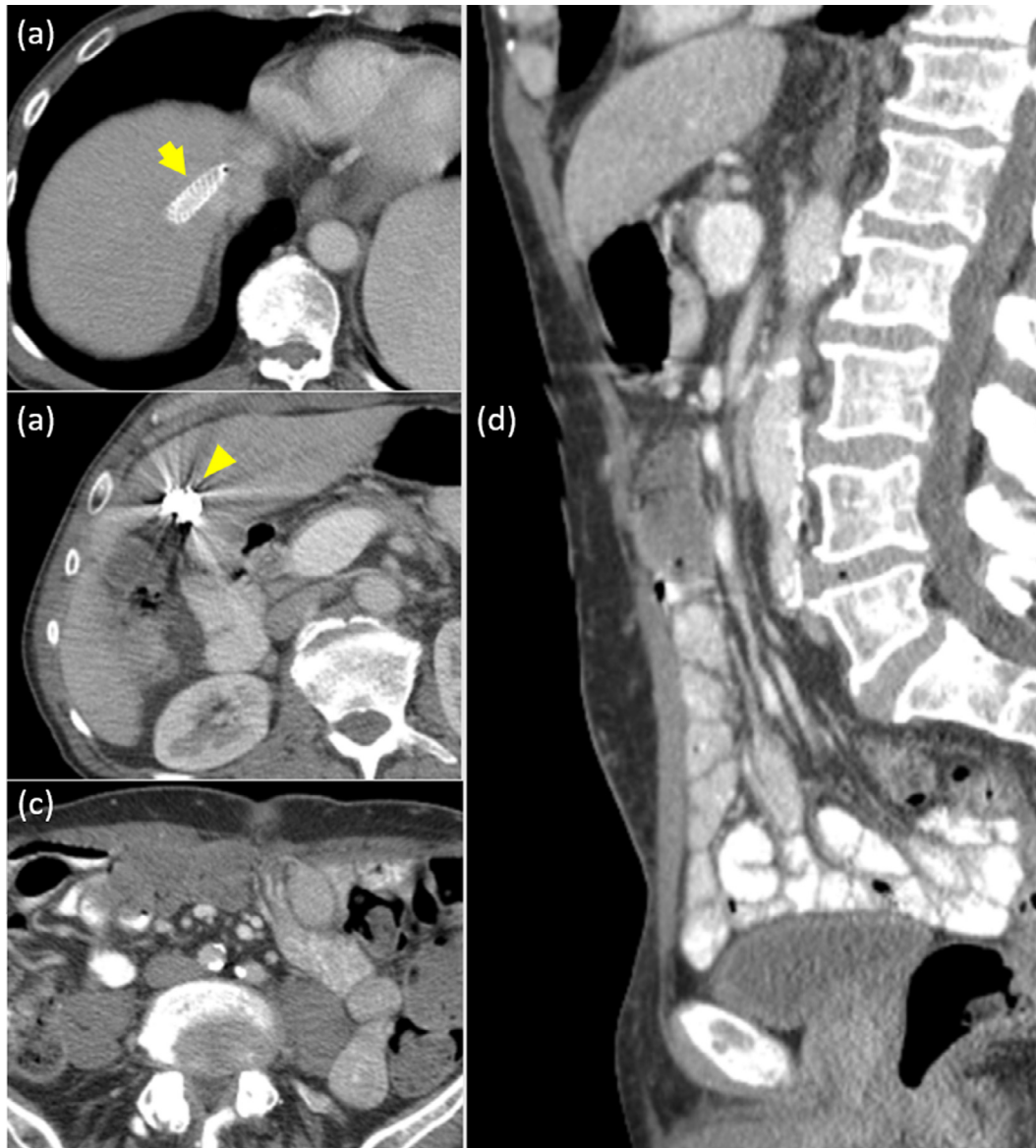
Portal hypertension is the initial and most serious complication of cirrhosis. Clinically significant portal hypertension is defined by hepatic venous pressure gradient of  $\geq 10$  mm Hg [1]. Clinically significant portal hypertension manifests as variceal hemorrhage, ascites, hepatic encephalopathy, and hepatorenal syndrome [2,3]. It is also associated with increased risk of postsurgical decompensation [4] and hepatocellular carcinoma [5].

The majority of varices in the setting of portal hypertension are formed at the gastroesophageal region. However, ectopic sites for varices are not uncommon and can potentially form at any point of communication between the portal and systemic venous systems in an attempt to decompress the portal system [6]. Caput medusae refers to periumbilical portosystemic connection and is a well-recognized site for the formation of varices. The afferent (inflow) vein is formed by the left portal vein via recanalized umbilical vein, while the efferent (draining) veins are formed by anterior abdominal wall veins which subsequently drain into the iliofemoral veins via inferior epigastric veins [7].

Our patient had early-stage colon cancer; however, the presence of large caput medusae in the surgical field neces-

sitated definitive management of these periumbilical varices to allow surgical access as well as minimize the risk of potentially life-threatening bleeding in these coagulopathic patients. TIPS is considered the cornerstone of endovascular treatment for bleeding varices. For umbilical variceal bleeding other endovascular options include embolization of the feeding (afferent) vein of varix [7] and percutaneous embolization with sclerotherapy [8,9]. In our case, we performed TIPS to create a low-resistant channel between the portosystemic veins, followed by embolization of the afferent vein to the caput medusae using a combination of vascular plug and coils. Follow-up CT imaging showed significant interval resolution of the periumbilical varices, which allowed a successful laparoscopic approach for the resection of the colon cancer.

In the setting of portal hypertension, preoperative elective TIPS has shown to make extrahepatic abdominal surgery safer by decreasing the risk of bleeding and improving the control of ascites [10,11]. In addition, as demonstrated in our case, in cirrhotic patients with large caput medusae, TIPS placement facilitates curative surgery by providing safer operative field and significantly reducing the risk of bleeding. Moreover, the risk of TIPS-related complications is minor when compared to the risk of undertreating or delayed-treatment of patients who could benefit from curative oncologic procedure [12].



**Fig. 3 – At 2-month follow-up, axial contrast-enhanced CT images (a and b) show changes of TIPS (arrow) and streak artifact from umbilical vein Amplatzer plug and coils (arrowhead). Axial (c) and sagittal (d) CT images at the level of umbilicus show interval complete resolution of the varices.**

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