CAIR Case of the Month

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CAIR
Canadian Association for Interventional Radiology
Association canadienne pour la radiologie d'intervention

Objectives

- Demonstrate a case of **complete portal vein thrombosis** managed with **pharmacomechanical thrombolysis** and Transjugular Intrahepatic Portosystemic Shunt (**TIPS**) insertion
- Discuss the role of **TIPS** in the treatment of **portal vein thrombosis**

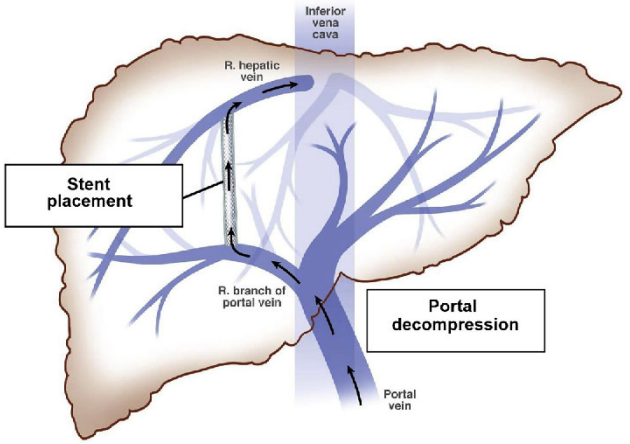
Pathophysiology and Role of TIPS

Portal hypertension

- Increased pressure in the portal circulation leads to hepatofugal flow, development of varices, and ascites

Aim of TIPS

- Decompress the portal system
- Create a shunt from portal circulation to systemic circulation
- Reduce the likelihood of variceal rupture and relieves ascites



Bhogal et al. (Clinical Liver Disease 2012)

Indications for TIPS

Established indications

- Acute variceal hemorrhage unresponsive to medical therapy
- Recurrent variceal hemorrhage unresponsive to medical therapy
- Refractory ascites due to cirrhosis
- Refractory hepatic hydrothorax
- Budd-Chiari syndrome (hepatic venous occlusion)

Promising indications

- Portal hypertensive gastropathy
- Hepatorenal syndrome
- Initial treatment for variceal hemorrhage
- Initial treatment for ascites

Patient Presentation

ID: 34-year-old man presents with **acute completely thrombosed portal vein**

- **Past Medical History:**
  - Autoimmune hepatitis (ANA positive) with cirrhosis and primary sclerosing cholangitis
    - Child-Pugh A
    - Mild portal hypertensive gastropathy and history of ascites
    - No history of esophageal varices, encephalopathy, upper or lower GI bleed
  - Crohn's Disease with dysplasia, scheduled for colectomy
- **Medications**
  - Prednisone, Pantoprazole, Ursodiol, Mirtazapine, and Fragmin

Patient Presentation

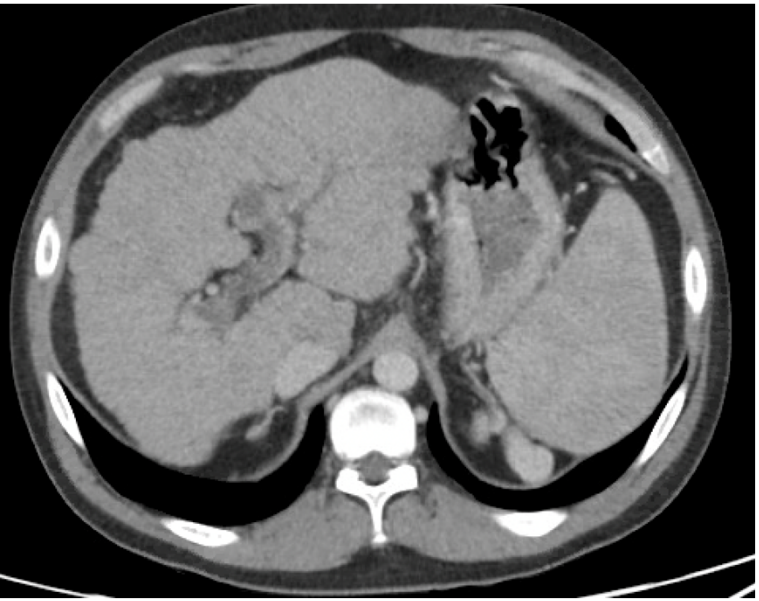
- During workup for a scheduled colectomy for colonic dysplasia (secondary to Crohn's Disease), **imaging showed a completely thrombosed portal vein**
- It was deemed **unsafe for the patient to undergo scheduled colectomy** given the large portal vein thrombus on a background of cirrhosis and portal hypertension
- Was **initially started on dalteparin** 12,500 units b.i.d.; however, **repeat scan demonstrated portal vein thrombus progression**

Thrombus within the main portal vein

Interventional Radiology Consultation

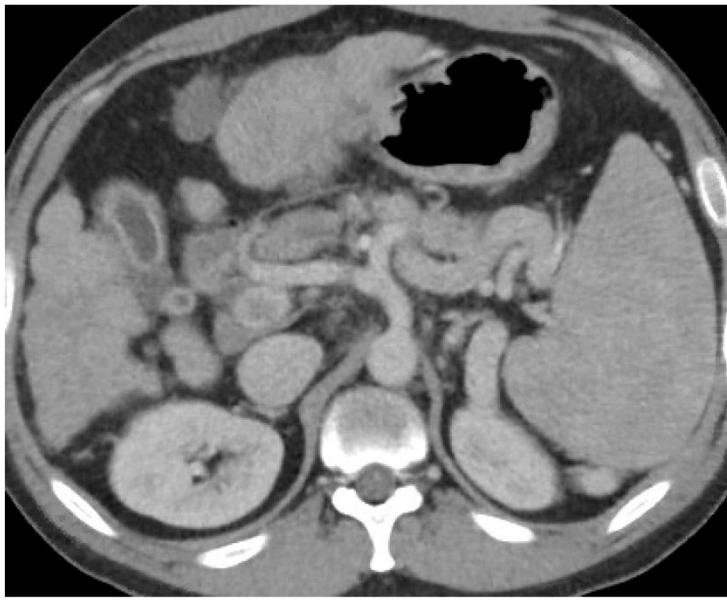
- **Interventional radiology** was consulted for definitive treatment of the portal vein thrombus
- **Patient anatomy** was deemed suitable for TIPS insertion
- **TIPS insertion +/- pharmacomechanical thrombolysis +/- overnight thrombolysis**, was discussed with the patient, including the risks of encephalopathy, infection, bleeding, damage to surrounding structures, small risk of liver failure, small risk of death, and the need for additional procedures for TIPS revision related to patency
- **Anticoagulation** therapy was **stopped** 24 hours before the procedure

Pre-procedural Imaging



Thrombus extending into the central left and right portal veins

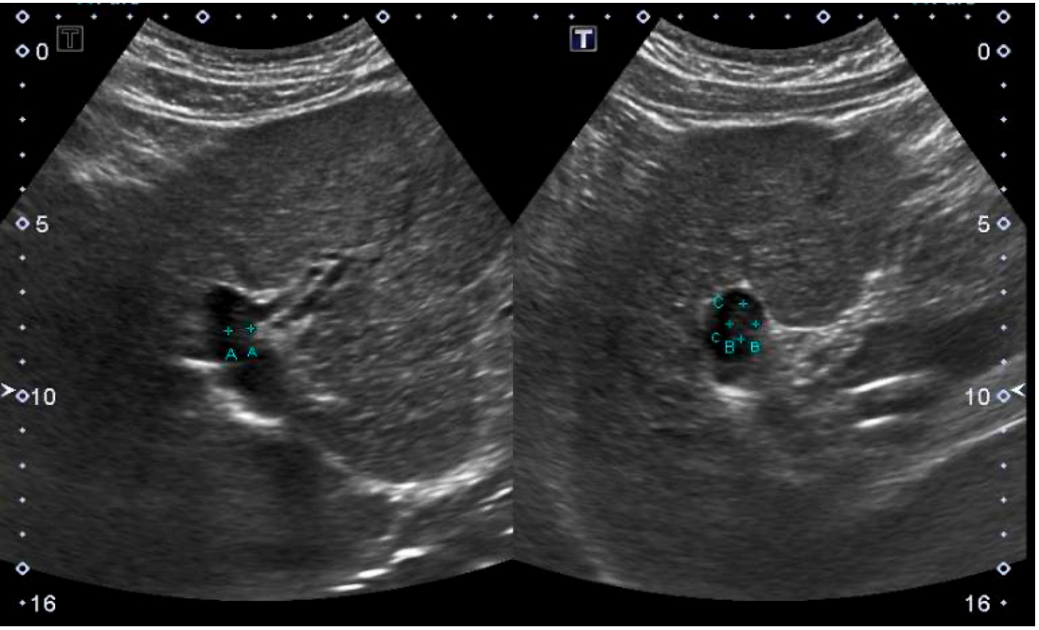
Thrombus within the main portal vein



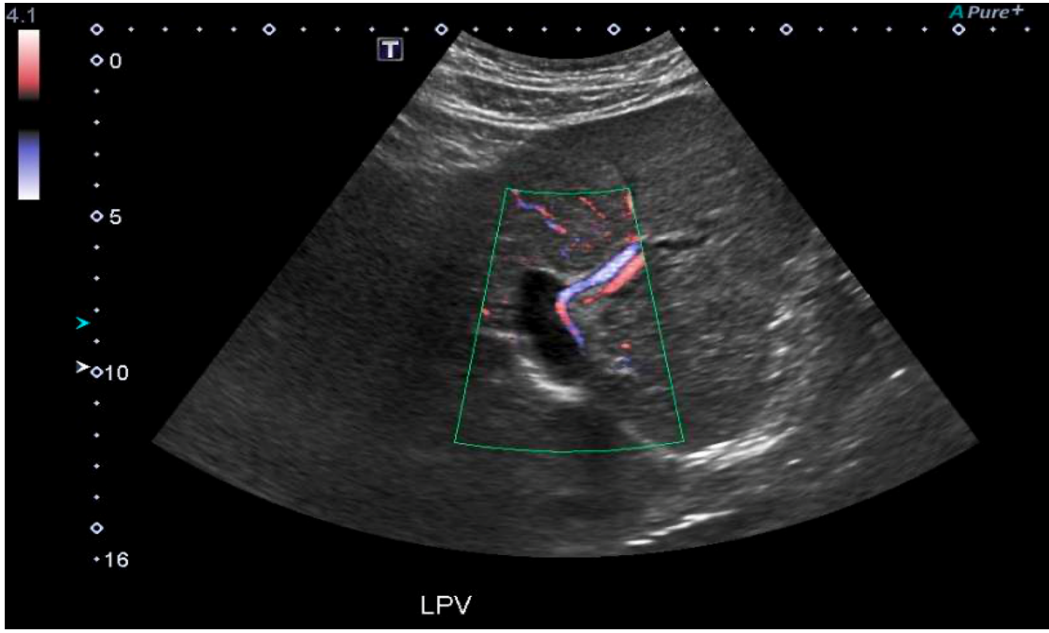
Thrombus within the main portal vein and para-umbilical vein

Pre-procedural Imaging

Left portal vein thrombus



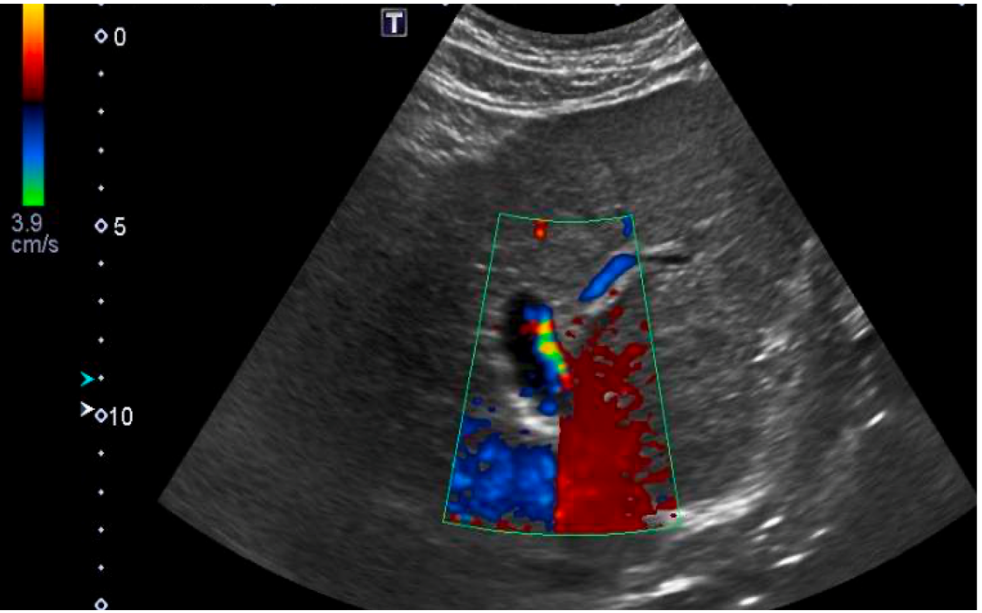
Right portal vein thrombus



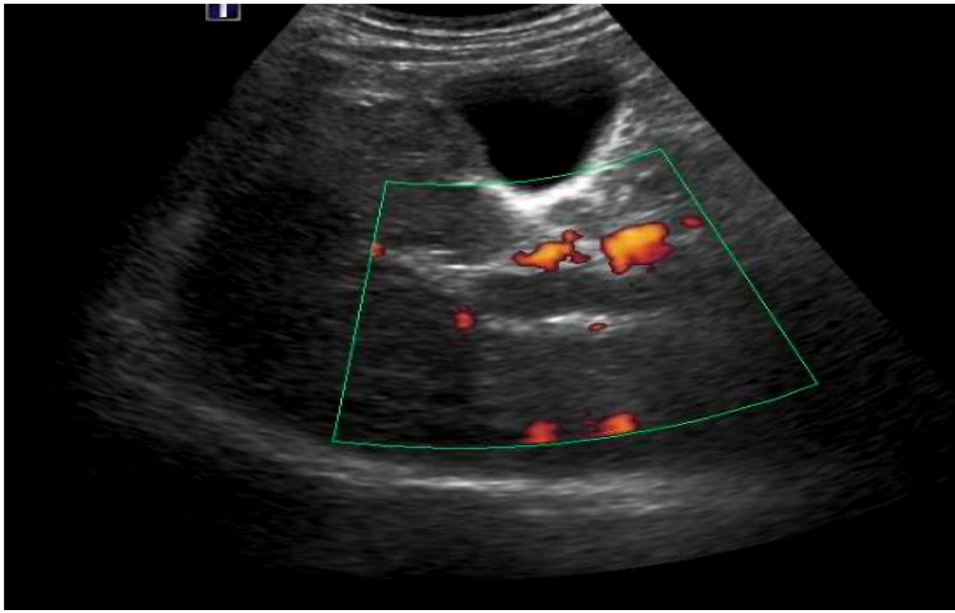
Hepatic ultrasound: no flow is visualised within the intra- or extra-hepatic portal veins

Pre-procedural Imaging

Para-umbilical vein



Main portal vein

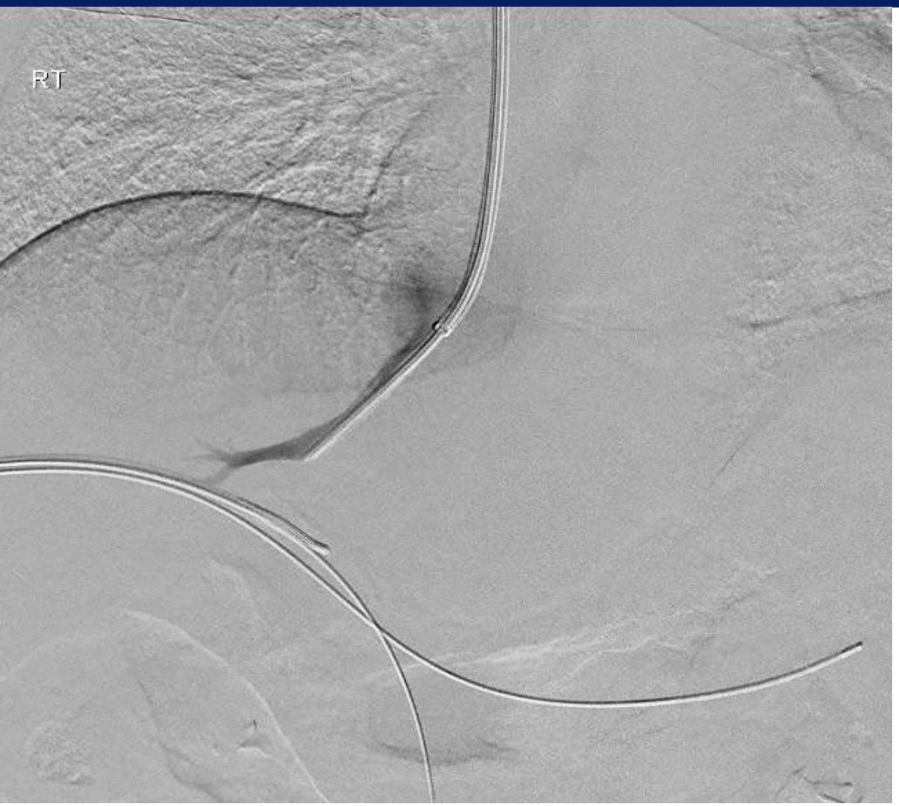


Extensive thrombosis throughout the portal venous system, extending into the paraumbilical porto-systemic collaterals

Procedure

Pharmacomechanical portal vein thrombectomy
+
Transjugular intrahepatic portosystemic shunt

Obtaining Access



Opacified right hepatic vein

- Using ultrasound guidance, access was obtained via right side of the upper abdomen and right internal jugular venous approach
- Percutaneous access of the right portal vein was performed using a 21 G Accustick
- A 0.018 in x 201 cm Hi-Torque Command Wire was navigated into the SMV. The needle was exchanged for a 8Fr sheath over the wire

Pharmacomechanical Thrombectomy

Completely thrombosed right portal vein

1. Thrombolysis
using ZelanteDVT™ Catheter, 10 mg of tPA over 30 minutes

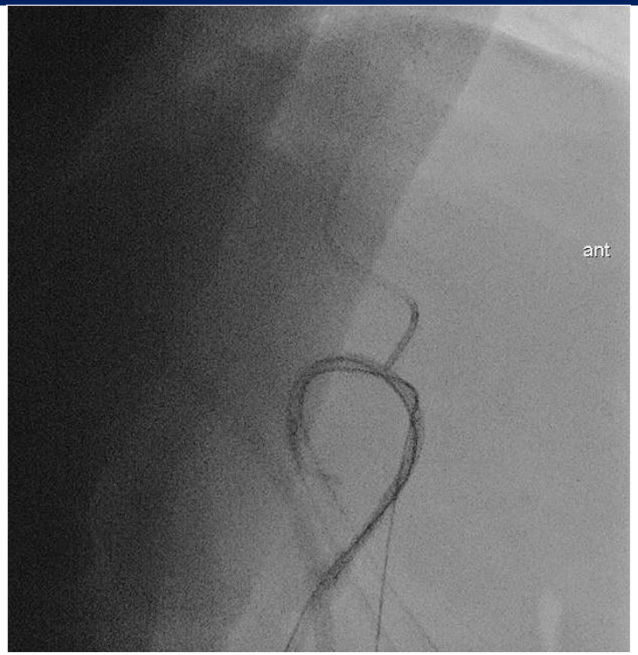
2. Thrombectomy
using a peripheral thrombectomy device and 3000 IU of heparin

Double wire technique
was used to allow for intrahepatic clearance of thrombus using thrombectomy device

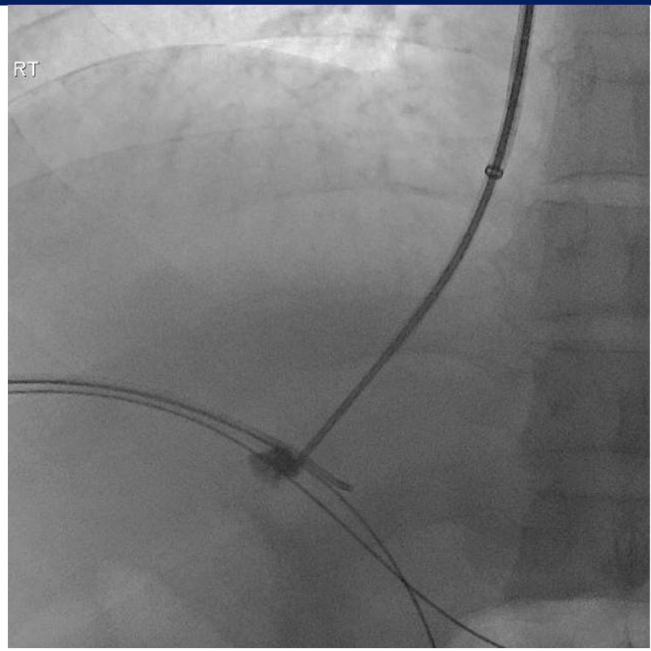
Resolution of portal vein thrombus; left and right portal veins are patent

Obtaining Access

Contrast injection shows opacification of the right hepatic vein

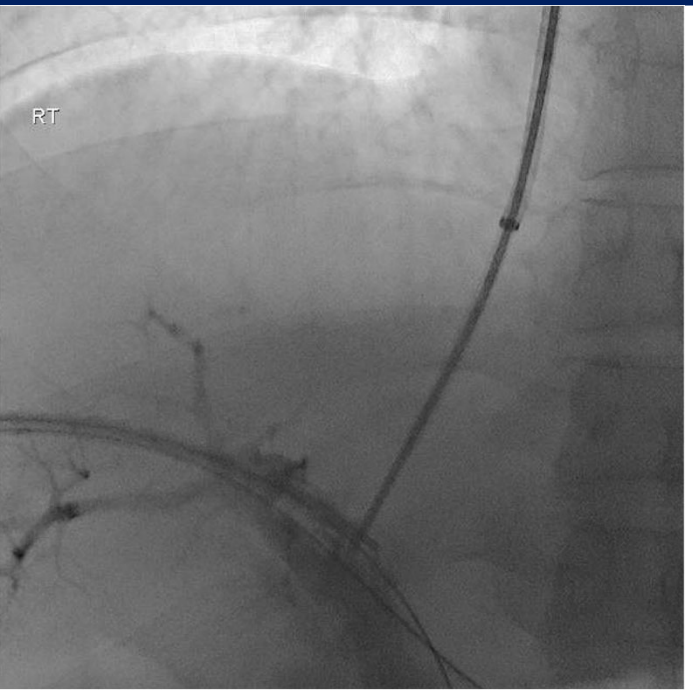


Lateral view demonstrates attempt at cannulating the right portal vein from the right hepatic vein

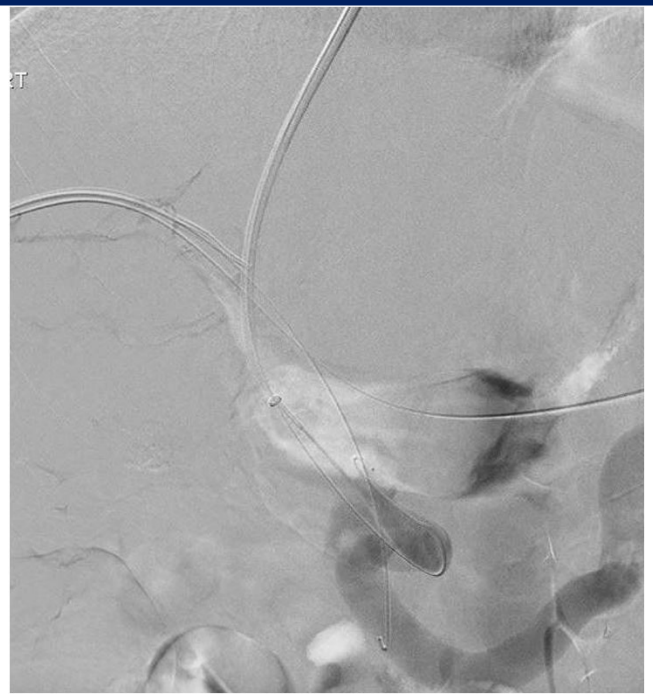


Initial attempt to gain access to the portal vein

Obtaining Access



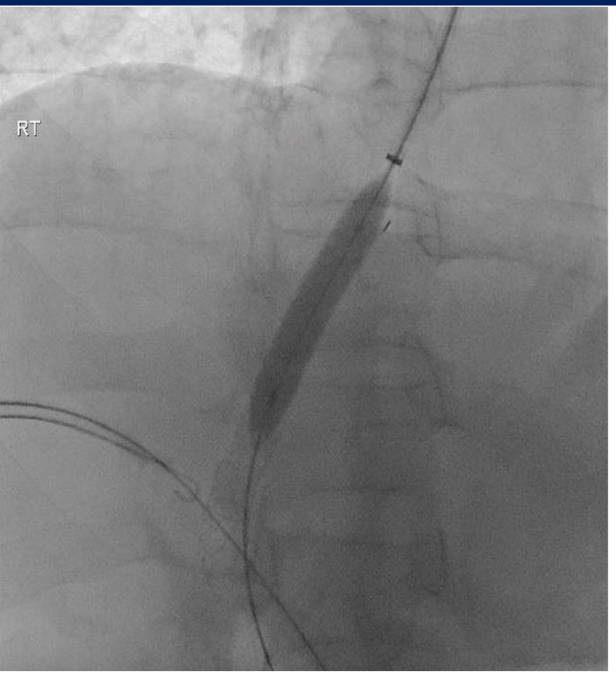
Successfully in the portal vein



Opacified umbilical vein

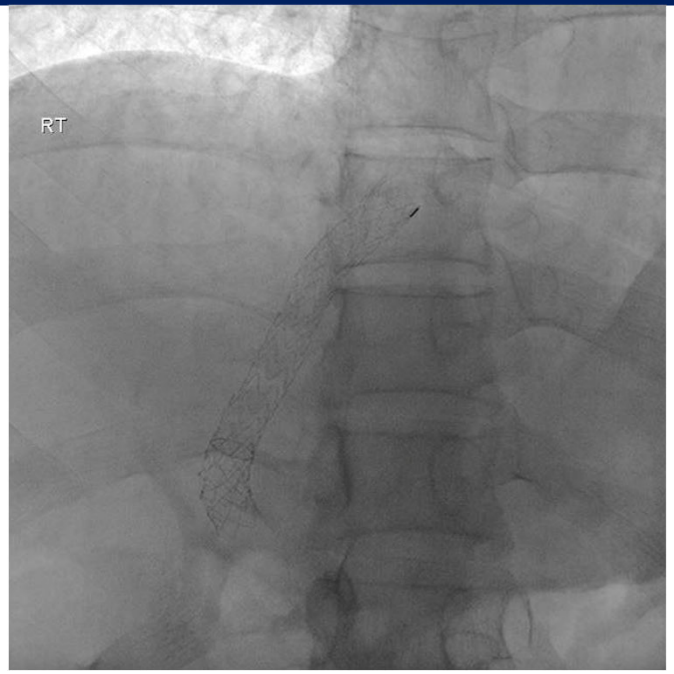
Confirmation of placement within portal vein

TIPS



Stent and 6 mm balloon dilator

7 cm Viatorr stent in place with a blush of contrast

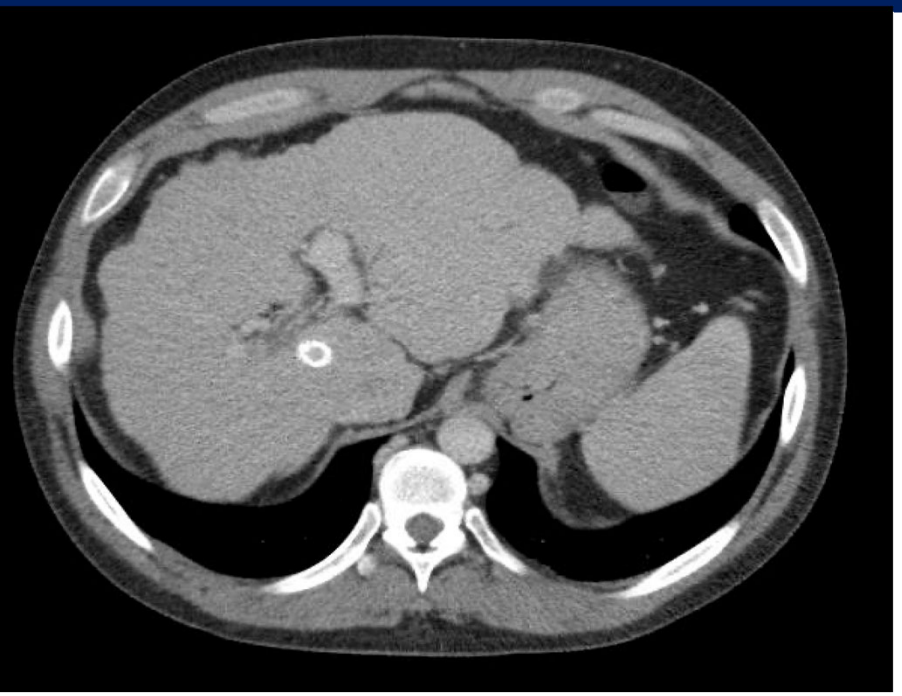


TIPS insertion from right portal vein to right hepatocaval junction. Reduction of PSG from 17 to 9 mmHg

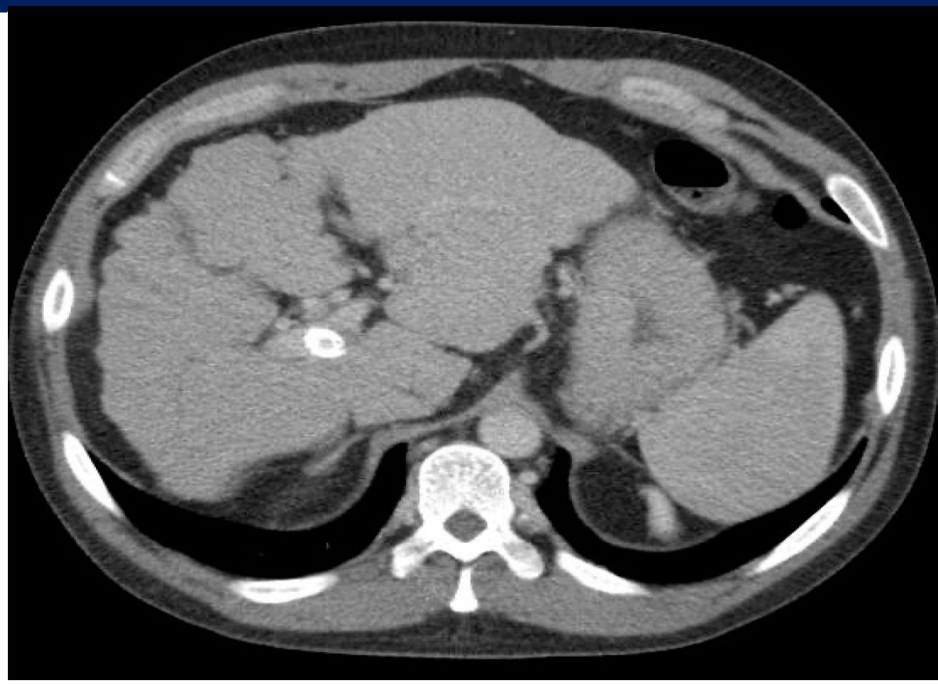
Follow-up Imaging

Widely patent TIPS with antegrade flow seen on CT at 1-month follow-up

Follow-up Imaging

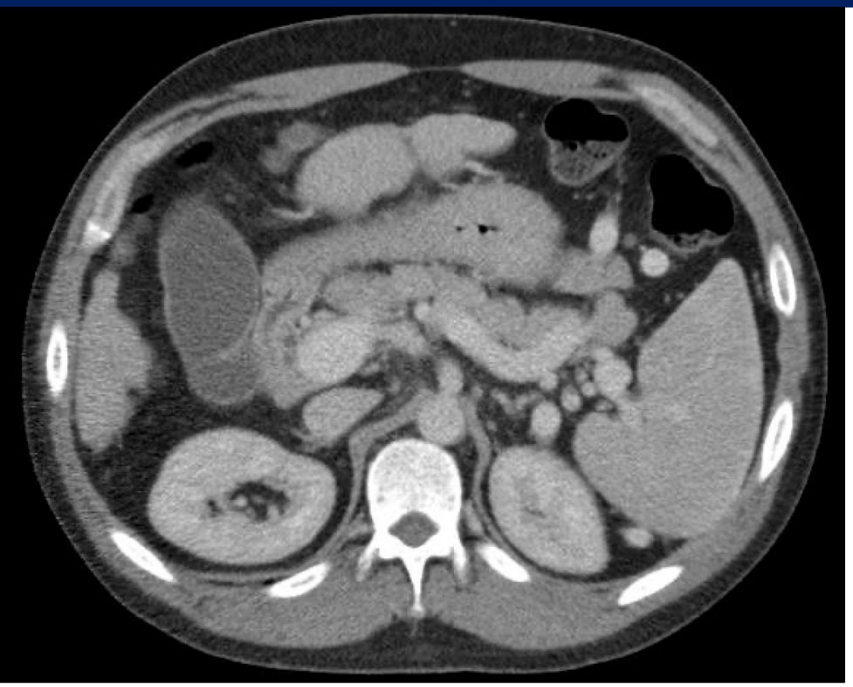


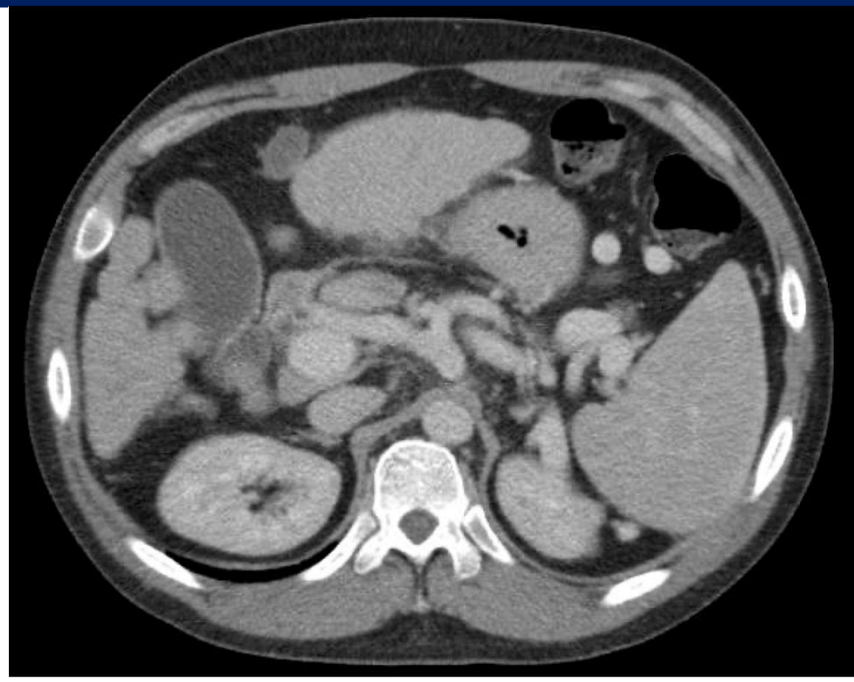
Previously seen extensive portal vein thrombosis has resolved



Visualized segments of the left and middle hepatic veins on the portal venous phase appear patent

Follow-up Imaging





CT at 1-month follow-up: axial image through the upper abdomen demonstrate interval opacification of the main portal vein with persistent occlusion of the paraumbilical vein

Evidence

Retrospective study (2009-2015) to assess safety and efficacy of portal vein (PV) recanalization and TIPS in patients with chronic PV thrombosis in need of transplant, n=61

- Technically successful in 60/61 patients (98%)
- PV patency was maintained in 55 patients (92%) at a median follow-up of 19.2 months (range, 0–105.9 months)
- Recurrent PV/TIPS thrombosis occurred in 5 patients (8%)
- Most common adverse events were TIPS stenosis in 13 patients (22%) and transient encephalopathy in 11 patients (18%)

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Clinical Study

Pretransplantation Portal Vein Recanalization and Transjugular Intrahepatic Portosystemic Shunt Creation for Chronic Portal Vein Thrombosis: Final Analysis of a 61-Patient Cohort

Thornburg et al. (JVIR 2017)

Evidence

Retrospective study to assess efficacy of transjugular local thrombolysis with or without TIPS in patients with acute non-cirrhotic, non-malignant portal vein thrombosis, n=17

- Recanalization was successful in 16/17 patient (94%)
- One- and two-year secondary PV patency rates were 88.2%
- Major complications (n=3) resolved spontaneously in all but one patient (heparin induced thrombocytopenia type 2 with intestinal infarction)

Klinger et al. (Digestive and Liver Disease 2017)

Conclusion

Take home message

- Pharmacomechanical thrombectomy and TIPS can be a safe and effective approach for the treatment of portal vein thrombosis refractory to medical treatment

Next steps

- Comparative studies between pharmacomechanical thrombectomy +/- TIPS versus medical therapy and/or surgical management
- Robust long-term data is needed regarding outcome measures such as re-stenosis and need for TIPS revision

References

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2. Thornburg, Bartley, et al. "Pretransplantation portal vein recanalization and transjugular intrahepatic portosystemic shunt creation for chronic portal vein thrombosis: final analysis of a 61-patient cohort." *Journal of Vascular and Interventional Radiology* 28.12 (2017): 1714-1721.
3. Klinger, Christoph, et al. "Transjugular local thrombolysis with/without TIPS in patients with acute non-cirrhotic, non-malignant portal vein thrombosis." *Digestive and liver disease*49.12 (2017): 1345-1352.
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5. Intagliata, Nicolas M., Stephen H. Caldwell, and Armando Tripodi. "Diagnosis, development, and treatment of portal vein thrombosis in patients with and without cirrhosis." *Gastroenterology* 156.6 (2019): 1582-1599.
6. Ganger, Daniel R., et al. "Transjugular intrahepatic portosystemic shunt (TIPS) for Budd-Chiari syndrome or portal vein thrombosis: review of indications and problems." *The American journal of gastroenterology* 94.3 (1999): 603-608.