CIRA Case of the Week
May 2017

Case courtesy of Drs. Rosemary Regan, Ben Mussari and Alexandre Menard
Queen's University

Case History

- 79 male
- Surgical history
  - Sigmoid resection (2009)
  - Extended right hepatectomy (2013)
- Hepatectomy resulted in portal hypertension and malignant ascites

Case History

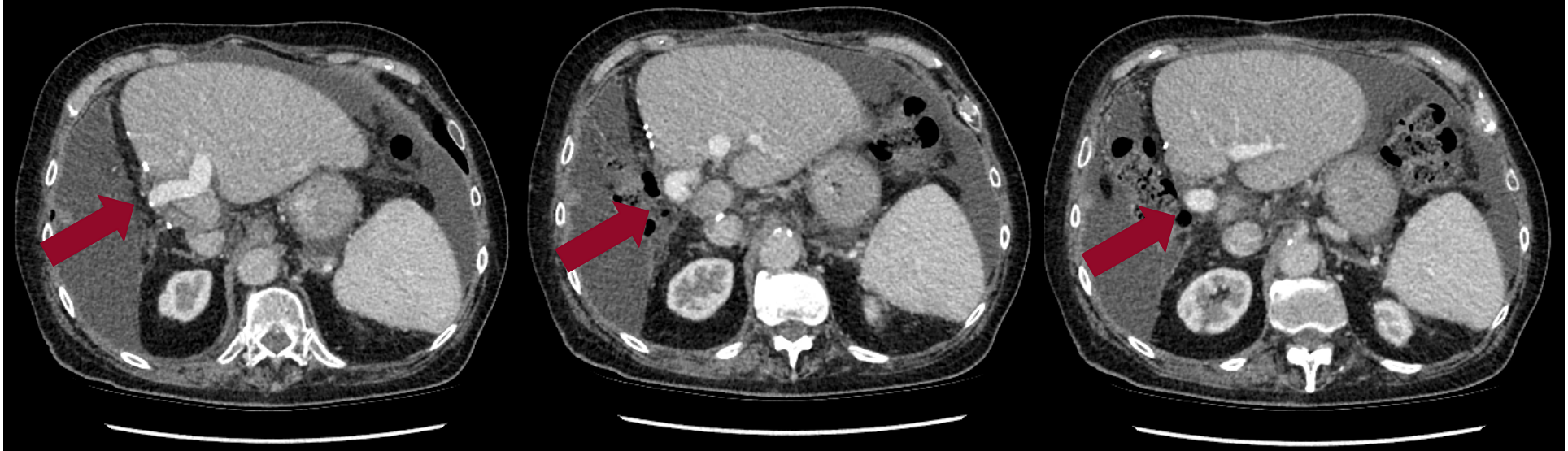
- Management:
  - Diuretics
  - Numerous paracenteses (2014)
  - Tunneled paracentesis drain (2014)

Case History

January 2016

- Persistent Ascites
  - Ventral hernia
  - Skin breakdown that would weep ascites
- Admitted to general surgery
  - Wound management
  - Ascites drainage and culture

Post Surgical Portal Anatomy



Post Surgical Portal Anatomy

Post Surgical Portal Anatomy

- Single left hepatic vein is widely patent with no evidence of veno-occlusive disease

- Consideration of portocaval bypass to relieve the ascites

- Challenge of tortuous post surgical portal venous anatomy and single left hepatic vein that requires preservation

Plan and approach?

- Use cone beam CT and needle guidance system

  – Fuse Cone Beam CT (CBCT) to prior enhanced CT

  –3D needle guidance system to mark target area of portal vein
    - 4 Fr flush catheter in portal vein also used as target

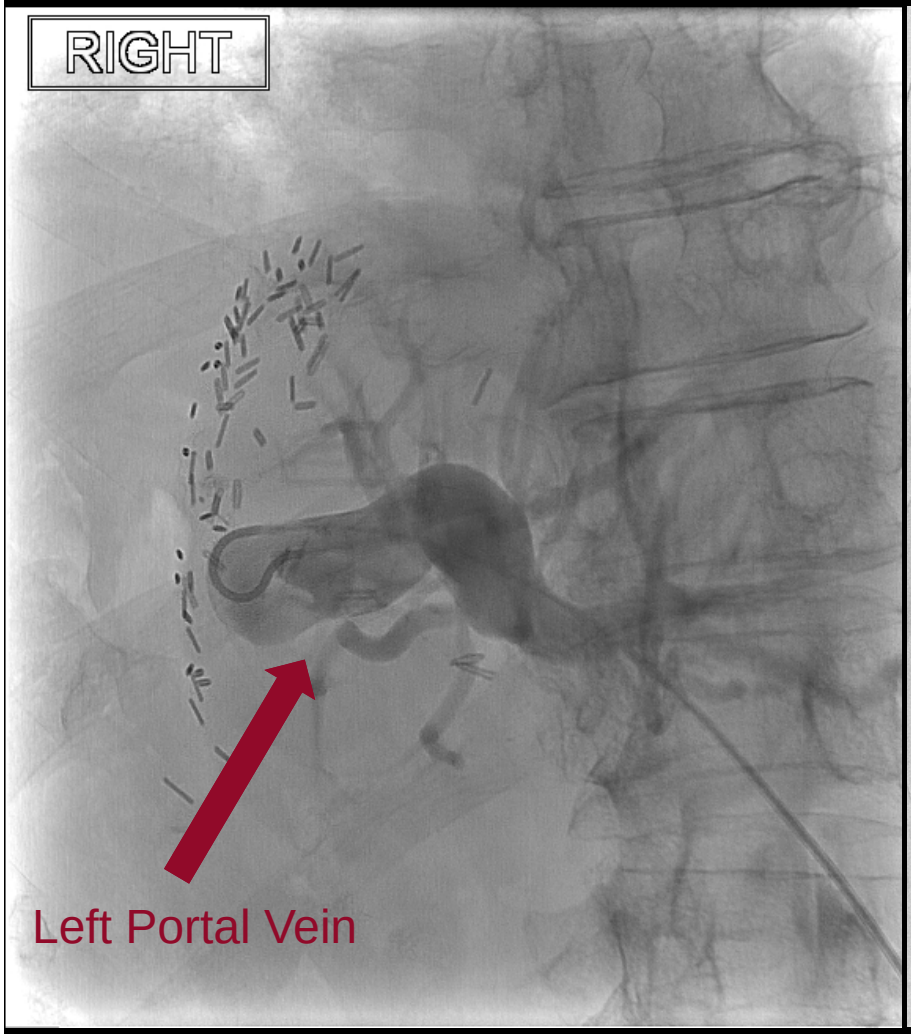
  –Demarcate caudate lobe on real time fluoroscopy as target liver tract

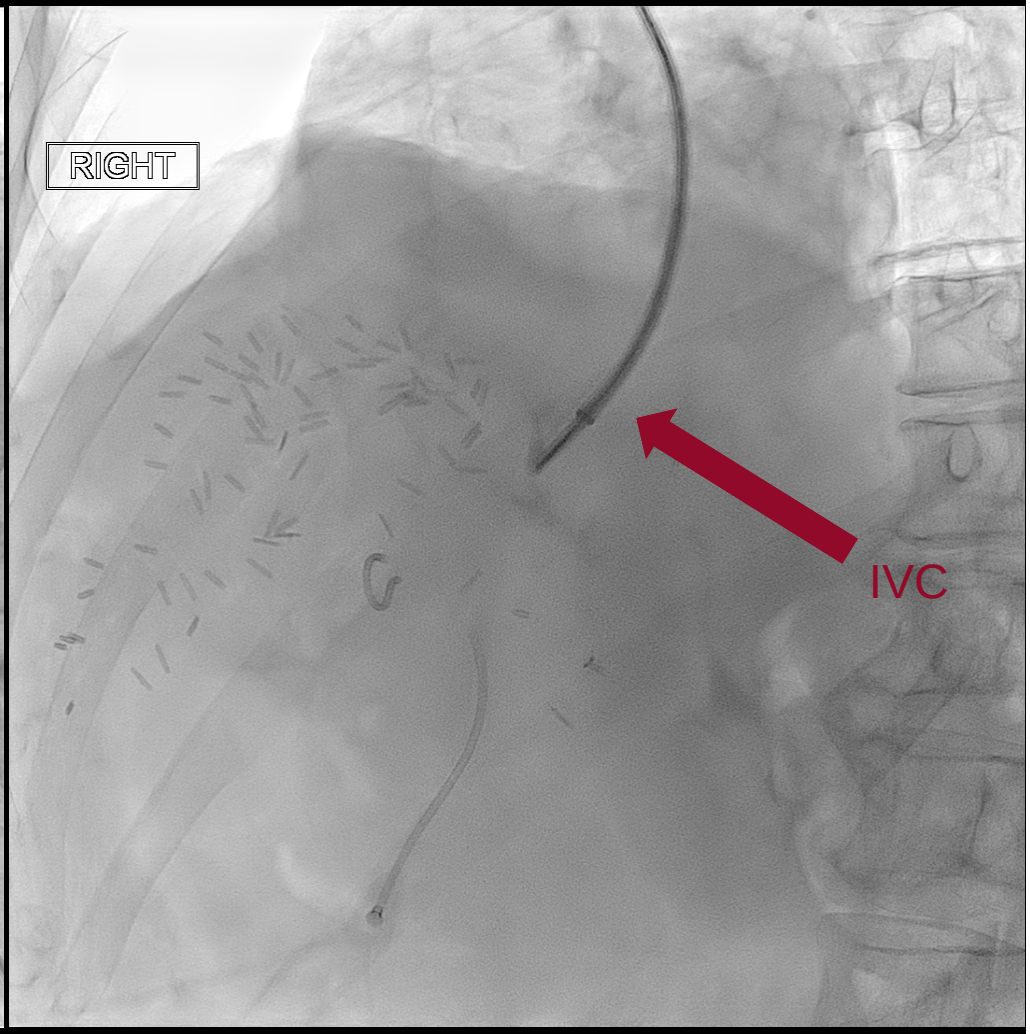
  –Combine the overlaid images on fluoroscopy to target DIPS (direct intrahepatic portocaval shunt)

DIPS

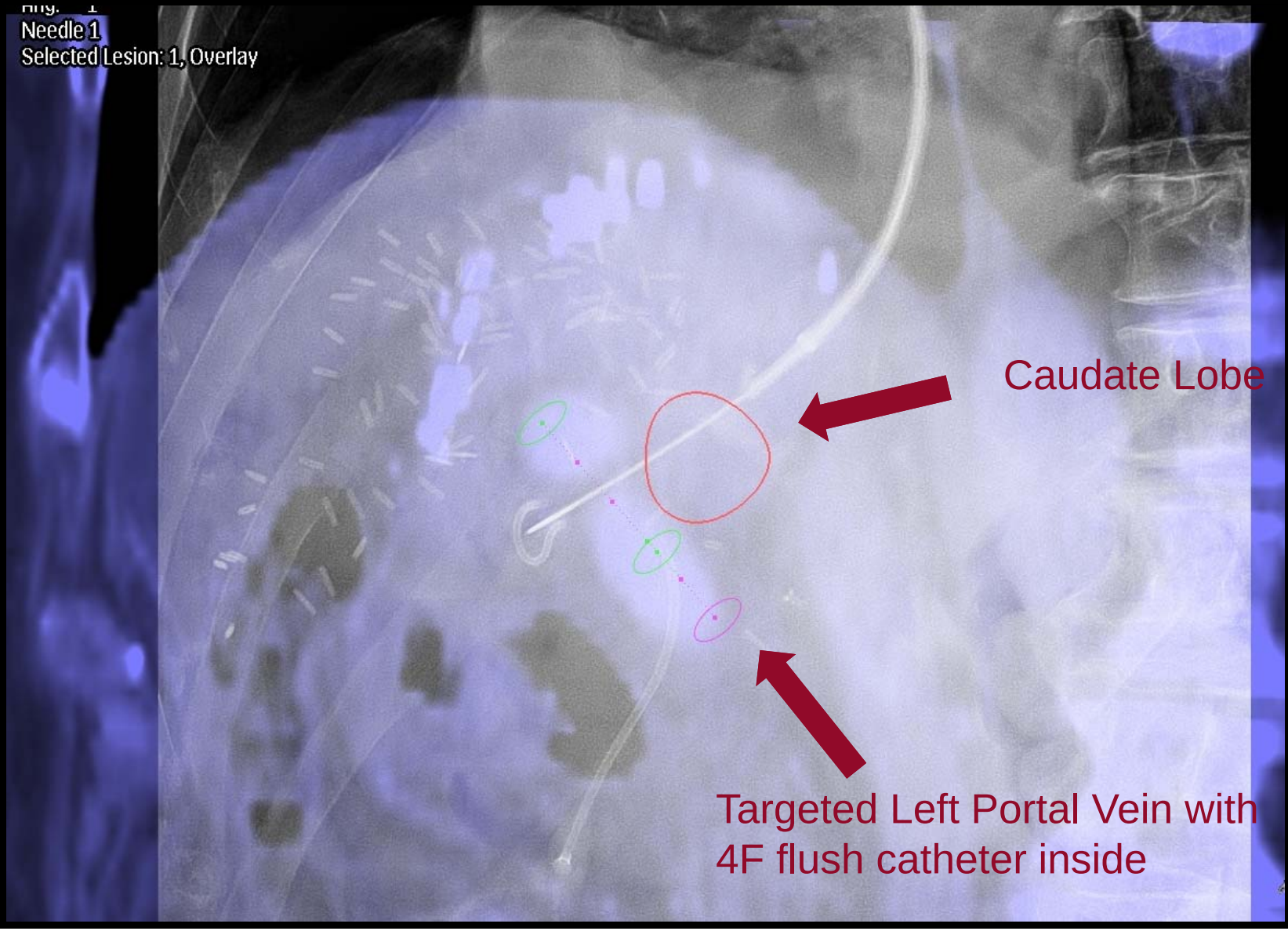
- Left portal vein punctured under ultrasound guidance
- Main portal vein selected - 4 Fr flush catheter
- IVC selected from Jugular Approach – 10 Fr catheter

DIPS





Fused CBCT

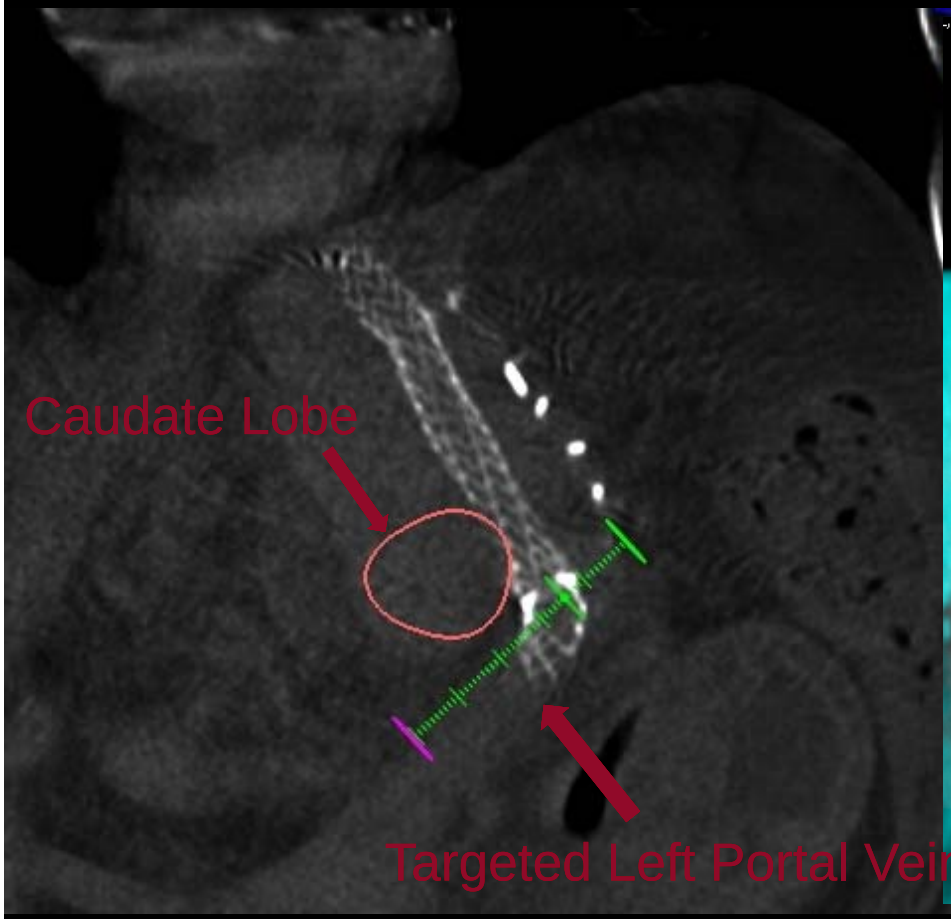

Needle 1
Selected Lesion: 1, Overlay
Caudate Lobe
Targeted Left Portal Vein with
4F flush catheter inside

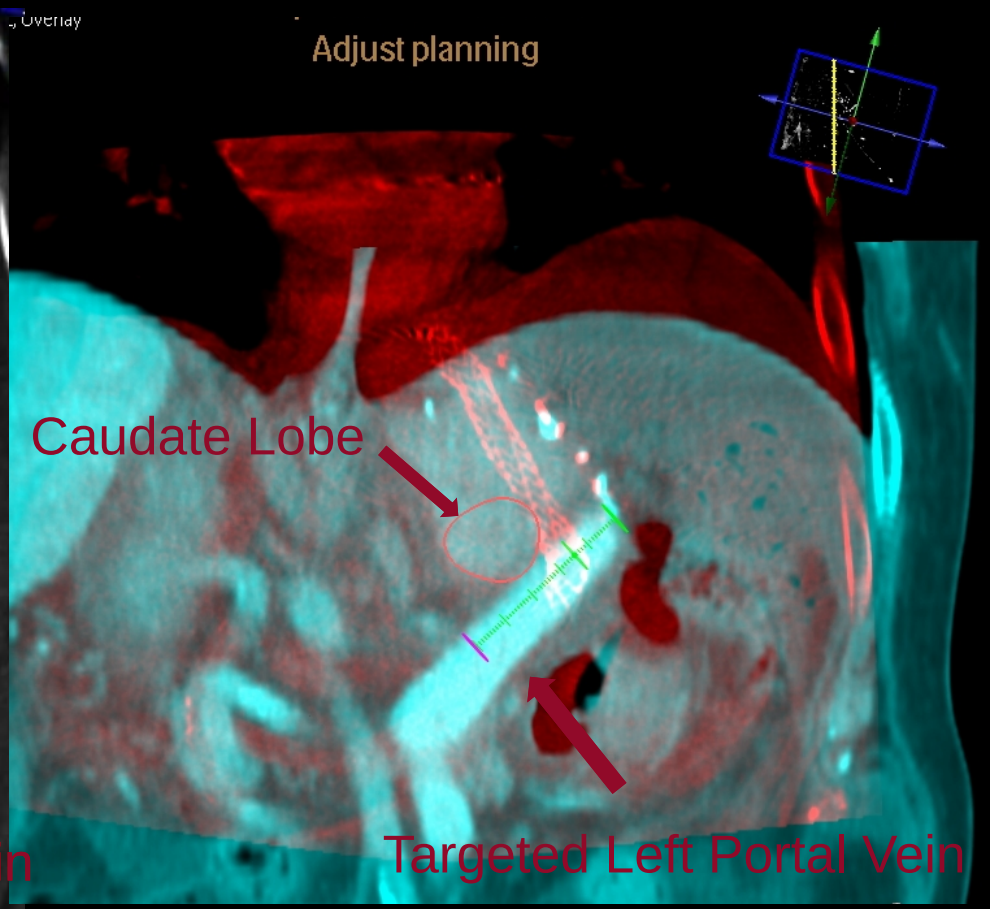
DIPS

- Multiple passes without CBCT guidance (4 Fr flush catheter as initial target) failed to enter portal system
- CBCT and fluoroscopy
  - Guidance system marked left portal vein
  - First pass with CBCT entered successfully
- Successful access just left of the planned site of portal vein entry on first pass
- 10 mm stent deployed

DIPS – Stent Placement

DIPS – Fused Images

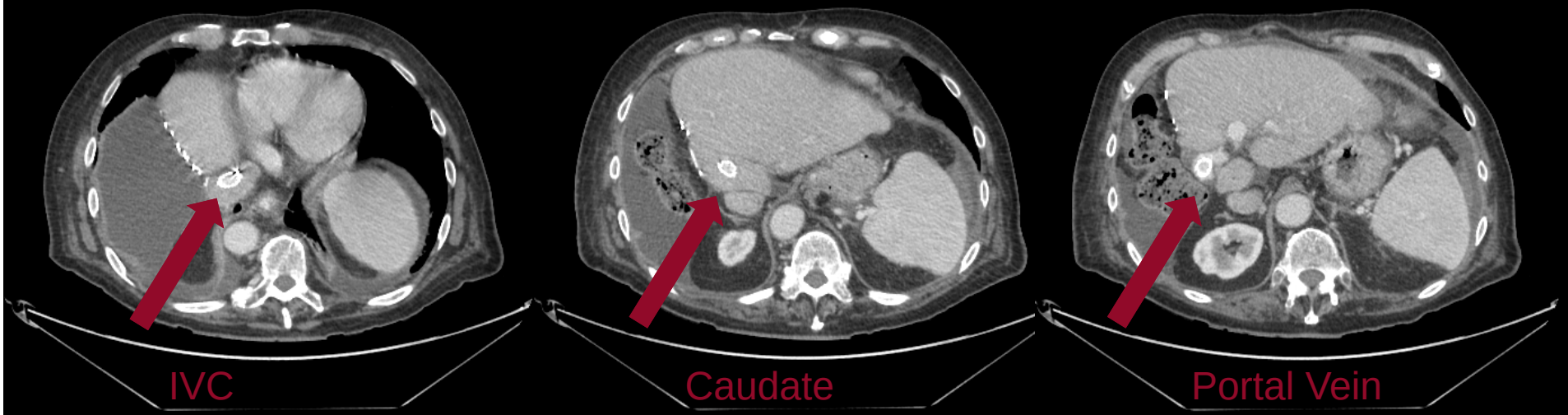




DIPS - Results

- Portal vein pressure decreased from 23 to 18 mmHg
- Right atrial pressure of 8 mmHg
- Portosystemic gradient decreased from 15 to 10 mmHg

Follow-Up CT

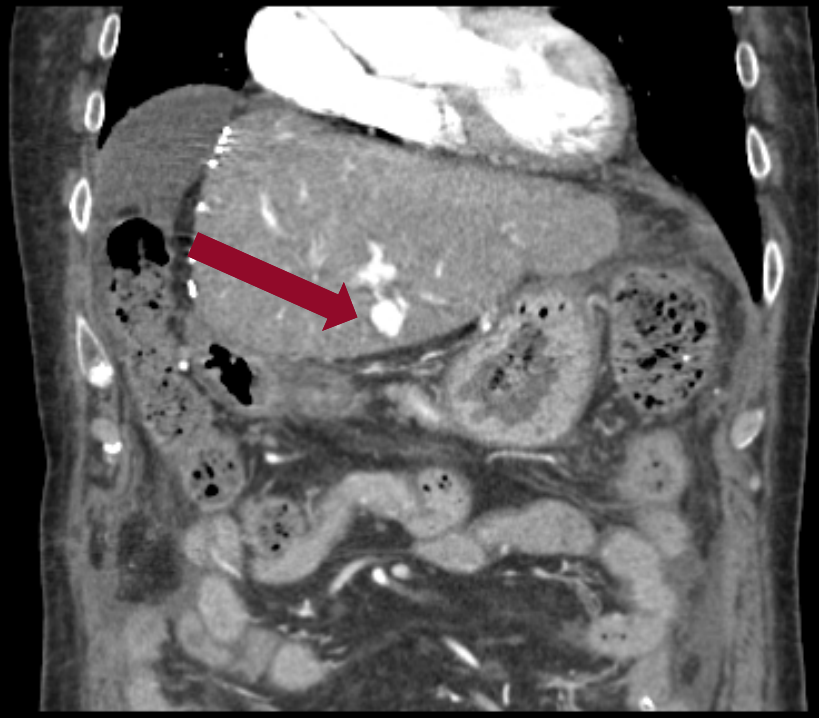


Follow-Up CT

Complications

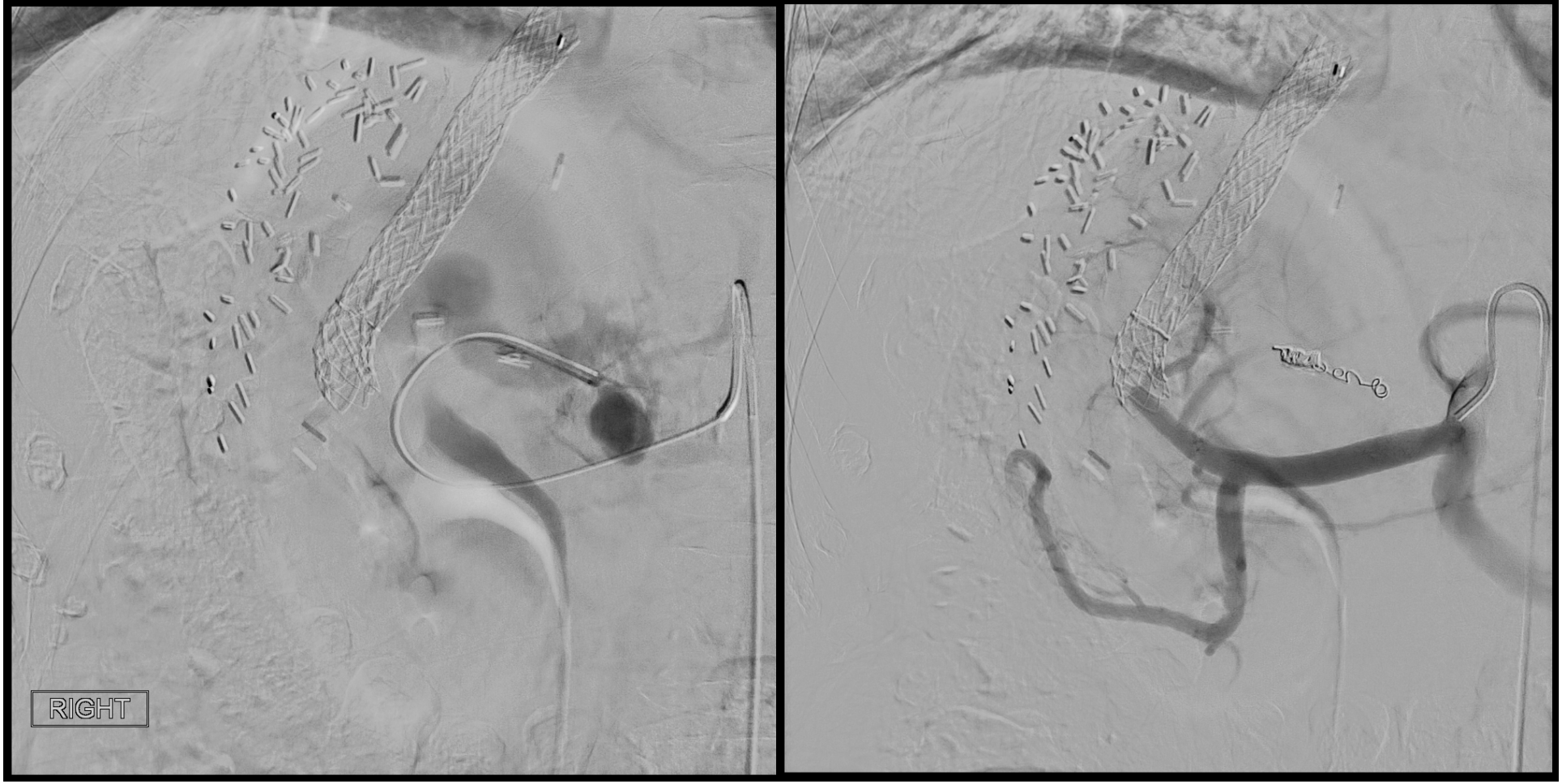
- Arterial portal venous fistula
  - Embolized
- Hepatic infarct
- Admission for delayed hepatic encephalopathy
  - Now resolved

Arterial Portal Venous Fistula

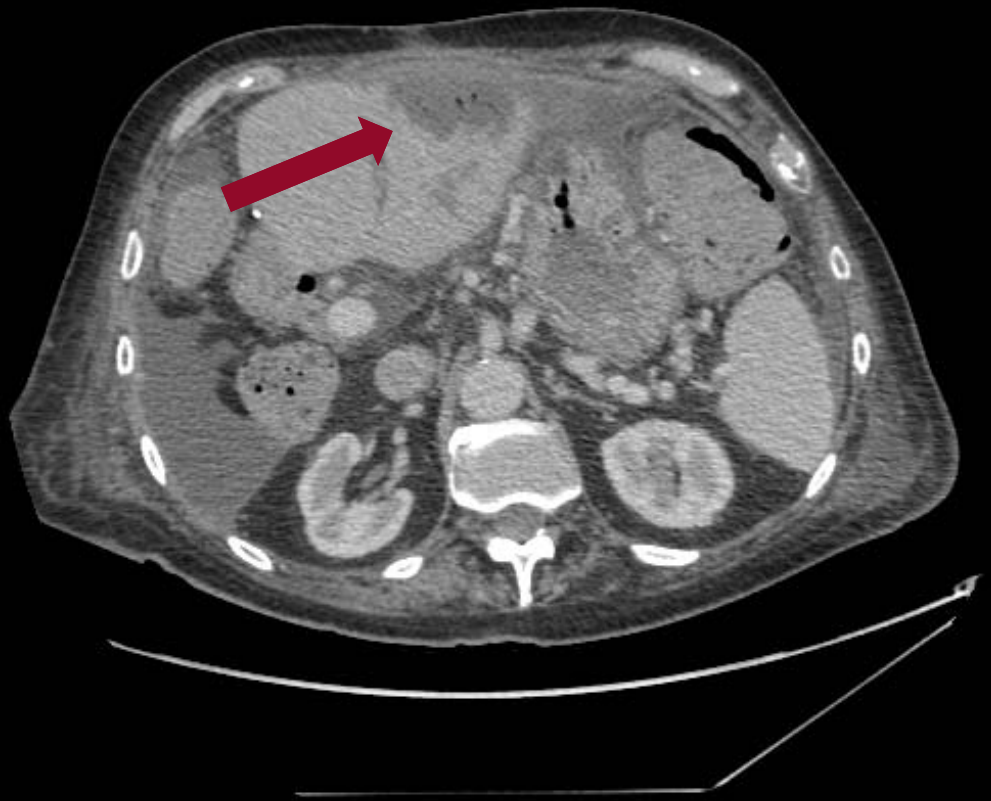


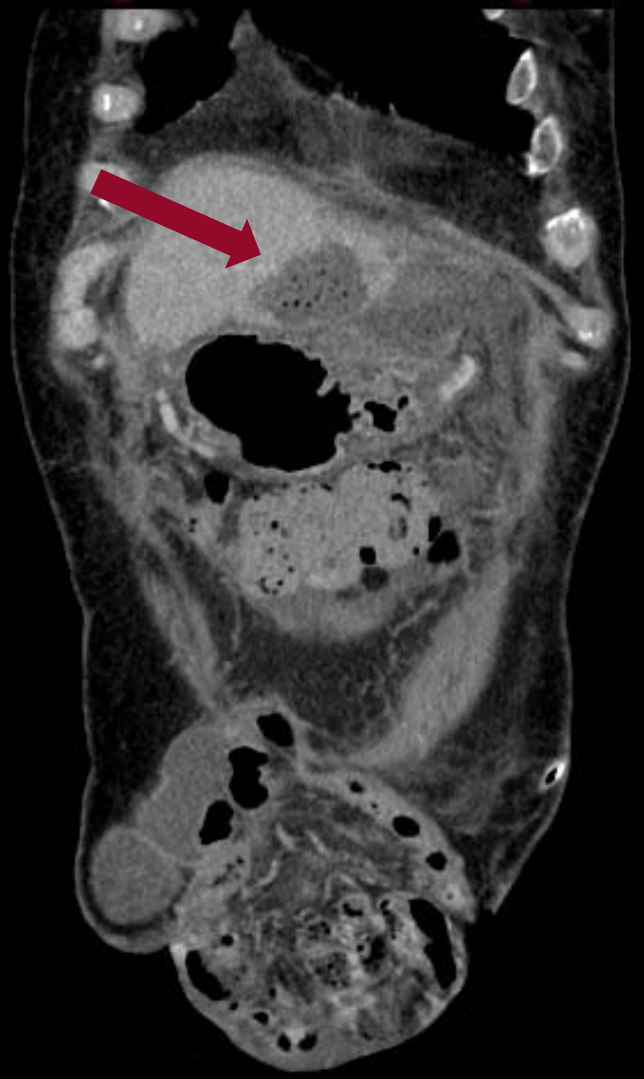
Arterialized Portal Venous System

Arterial Portal Venous Fistula



Hepatic Infarct





Discussion

- Single study has suggested CBCT superior to DSA in identifying portal vein [3]
- CBCT has been previously used to guide the blind cannulation of the portal vein in a TIPS procedure
- Needle guidance system typically delineates the needle tract. We demonstrate variant use of the guidance system to delineate the target vessel

Discussion

- No current case report of CBCT used in a DIPS procedure
- This case demonstrates CBCT can be used successfully as a guidance tool to aid in a DIPS procedure

Limitations

- Risk of poor fusion of images with respiration in the subdiaphragmatic liver
- Minimize by performing both the contrast enhanced CT and CBCT in expiration

References

Bell, B., Cura, M., Shaw, C., et C. Rees. (2015). Transjugular intrahepatic portosystemic shunt creation using a three-dimensional fluoroscopy guidance system in patients with the Budd-Chiari syndrome. Baylor University Medical Centre Proceedings. 484-487.

Racadio1, J., Babic, D., Homan R., Rampton, J., Patel, M., Racadio, J., and N. Johnson (2007). Live 3D Guidance in the Interventional Radiology Suite. American Journal of Radiology. 357- 364.

Luo, X., Ye, L., Zhou, X., Tsauo, J., Zhou B., Zhang, H., Zhang, X., et X. Li. C-Arm Cone-Beam Volume CT in Transjugular Intrahepatic Portosystemic Shunt: Initial Clinical Experience. Cardiovascular Interventional Radiology. (6). 1627-31.