

# Mesenteric Angiography with Intervention for Chronic Portal Vein Occlusion

Janelle Korf

1/17/2020

RAD 3030 Diagnostic Radiology Elective

Dr. Zagum Bhatti



# Clinical History

**CC:** Abdominal Pain

45 yo F

**PMHx:** HTN, Obesity, Gastric Sleeve 2016, PCOS, Endometriosis on OCPs/Spironolactone for >20years, and chronic anemia

**ROS:**

- RUQ pain 1 year, worse when bending down
- Fatigue x3 months
- Denies jaundice, confusion, hematemesis, melena, or hematochezia

# Clinical History

Sx: Denies history of tobacco or alcohol abuse

FHx: Factor V Leiden

## Physical Exam:

Vitals all in normal limits

BMI 28.1

General: AOx3, NAD

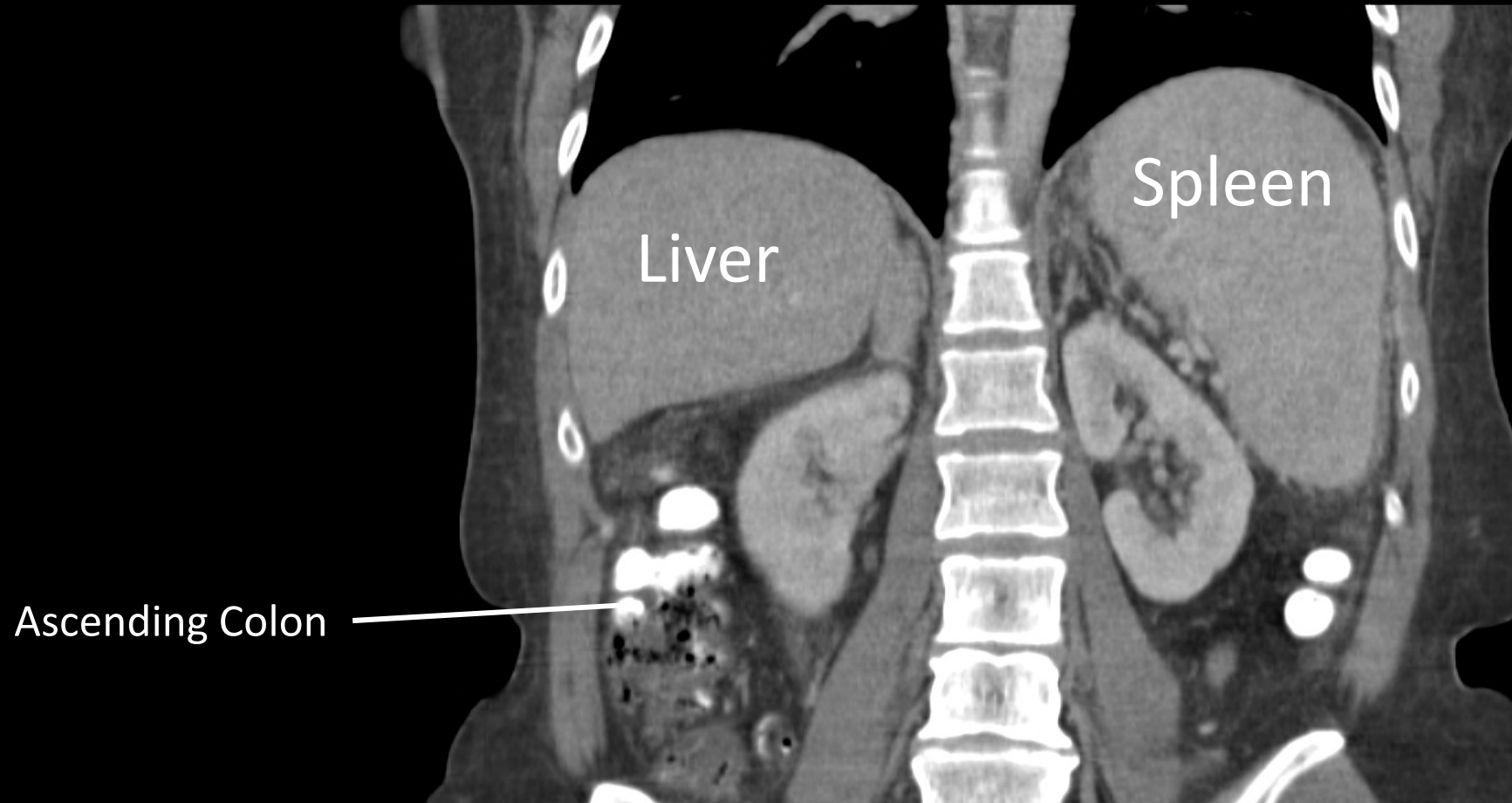
Abdomen: +BS, depressible, TTP in RUQ, no caput medusae

Skin: No petechiae or large ecchymosis, no jaundice

# HPI

- PCP diagnosed pt with anemia
- Referred to hematology
- Started on B12 IM, Folate, and Fe-infusions, with no symptom improvement
- Imaging conducted at outside hospital

# CT w/ Contrast Coronal View





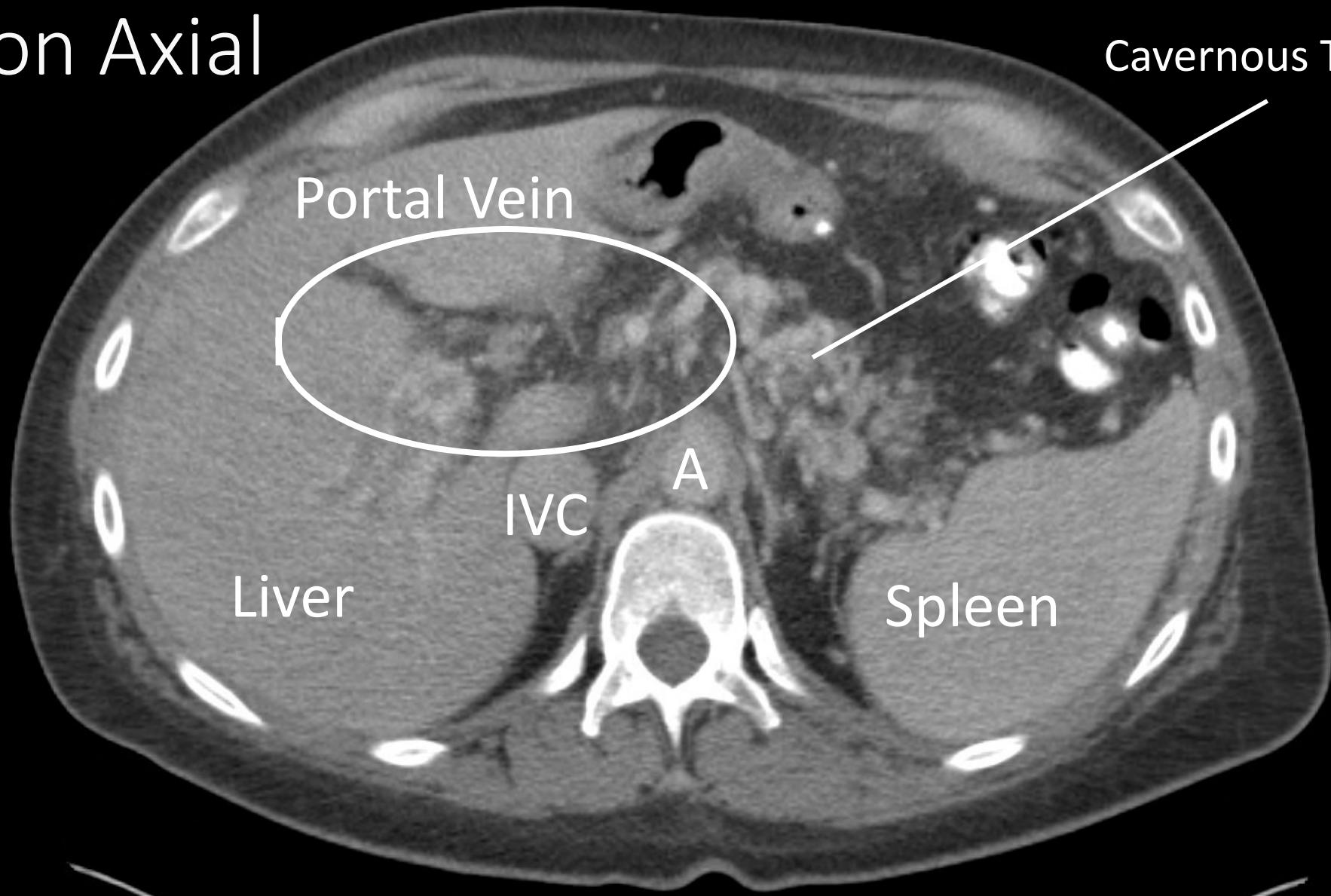
Liver

Splenic Flexure

Mesentery

Cavernous Transformation

CT w/ Con Axial



Cavernous Transformation

Portal Vein

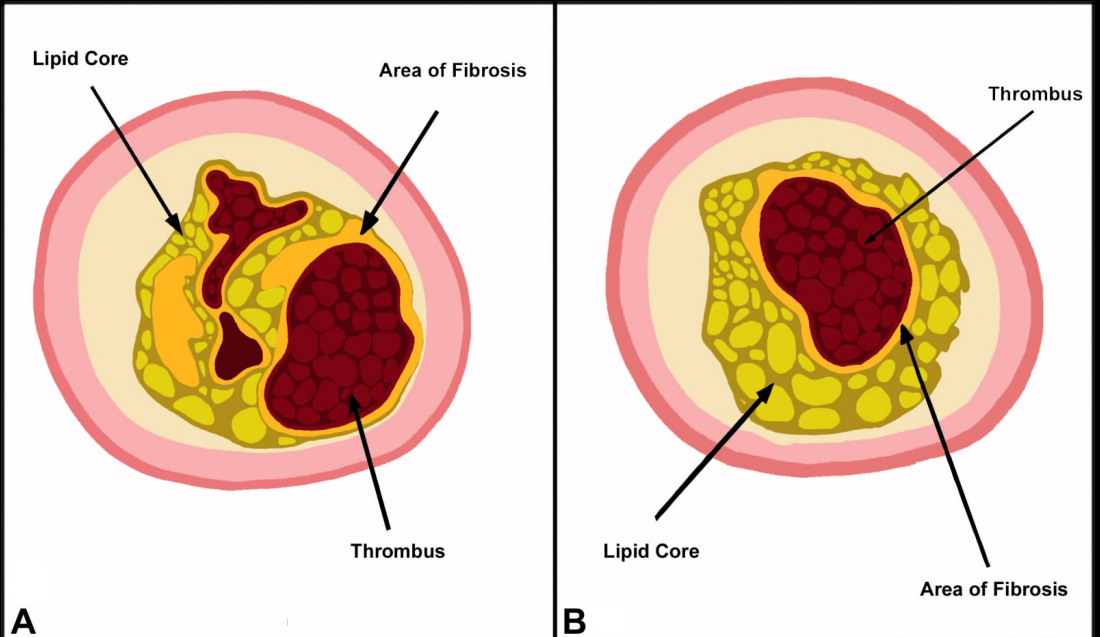
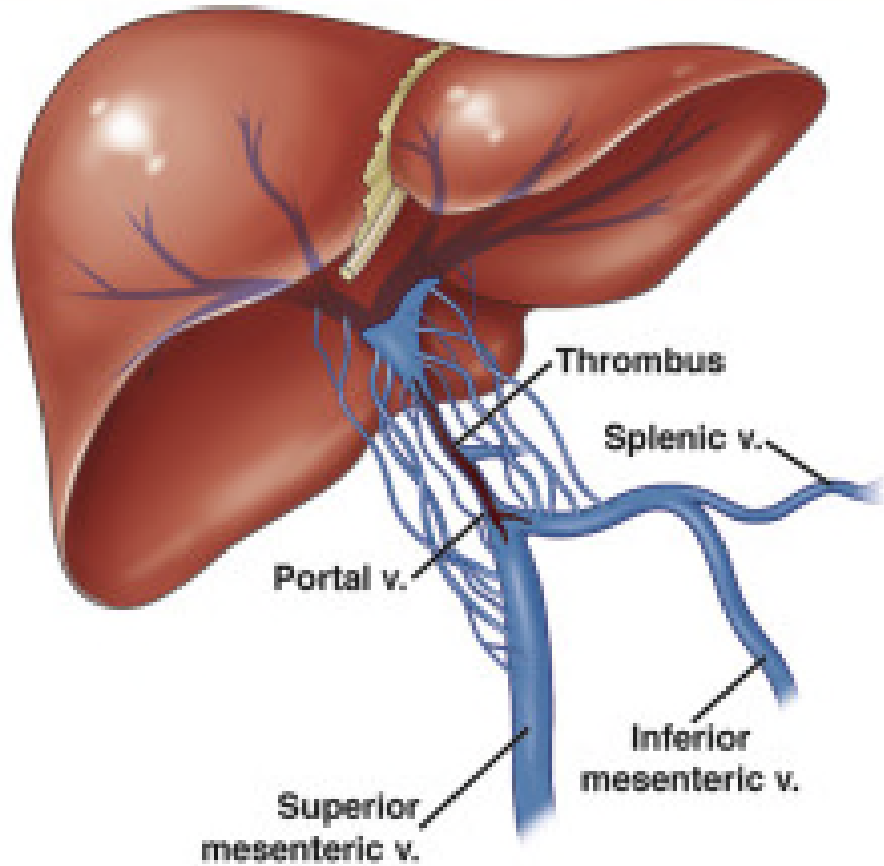
Liver

IVC

A

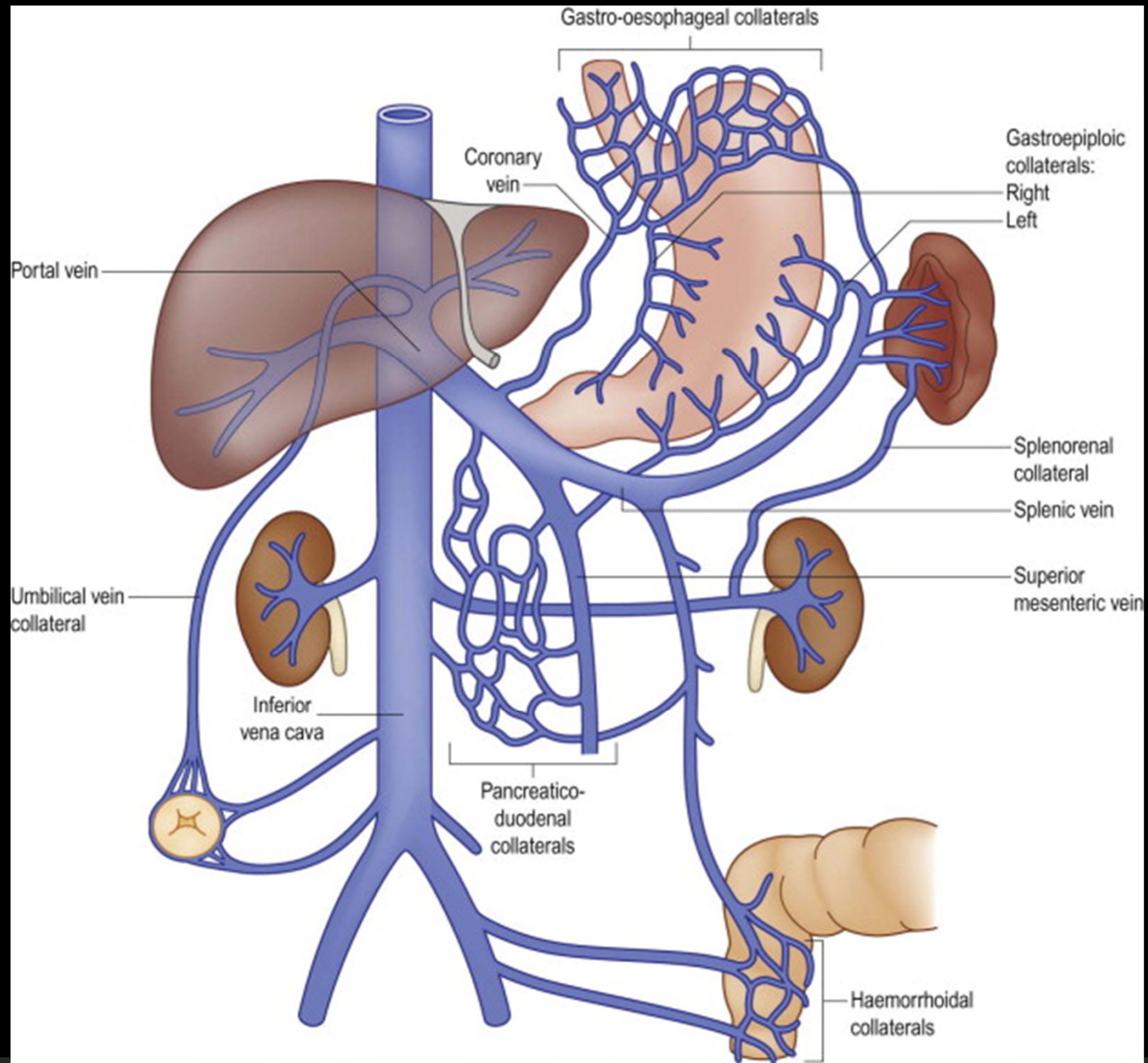
Spleen

# Chronic

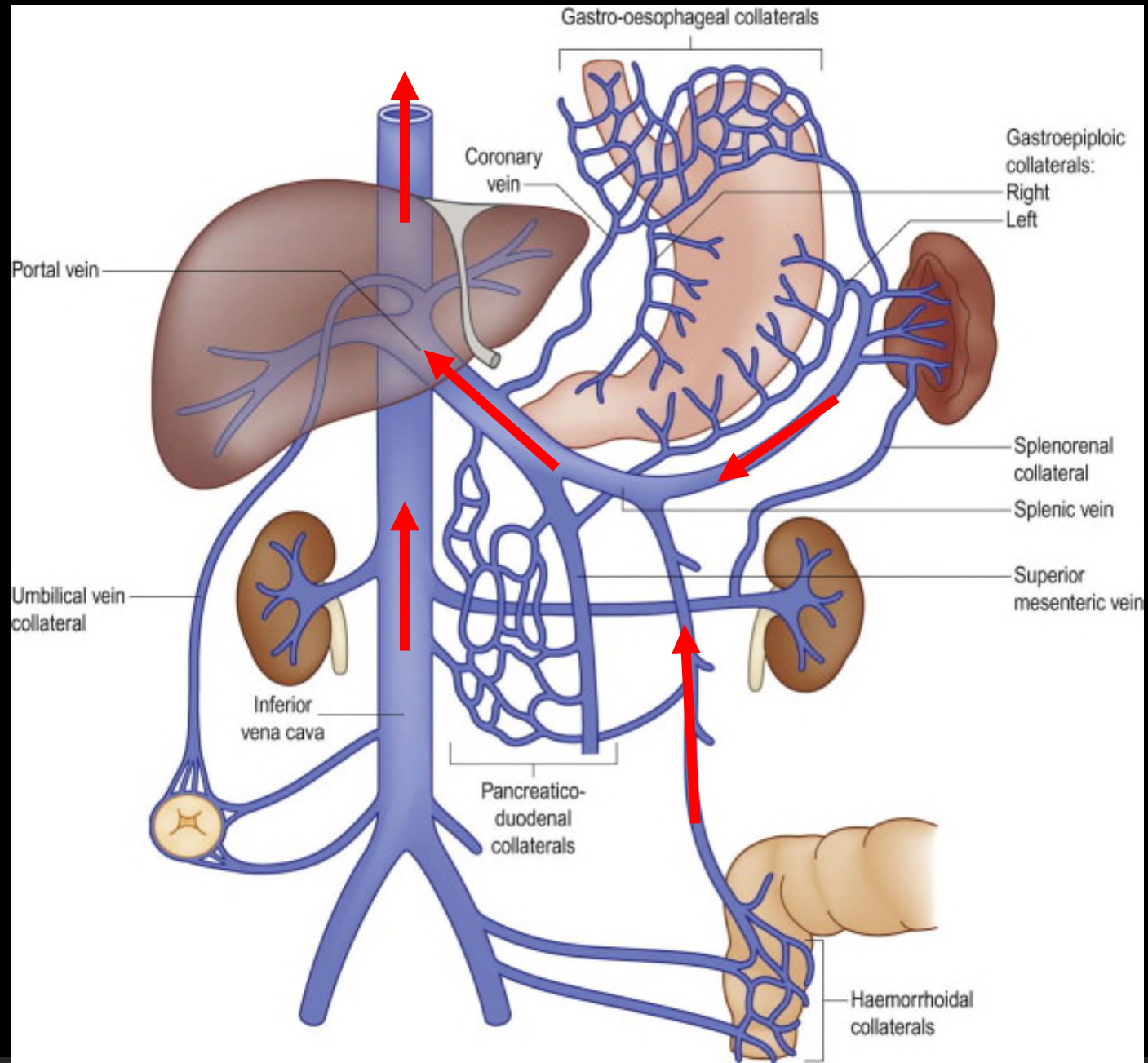


<https://www.intechopen.com/books/what-should-we-know-about-prevented-diagnostic-and-interventional-therapy-in-coronary-artery-disease/percutaneous-recanalization-of-chronic-total-occlusion-cto-coronary-arteries-looking-back-and-moving>

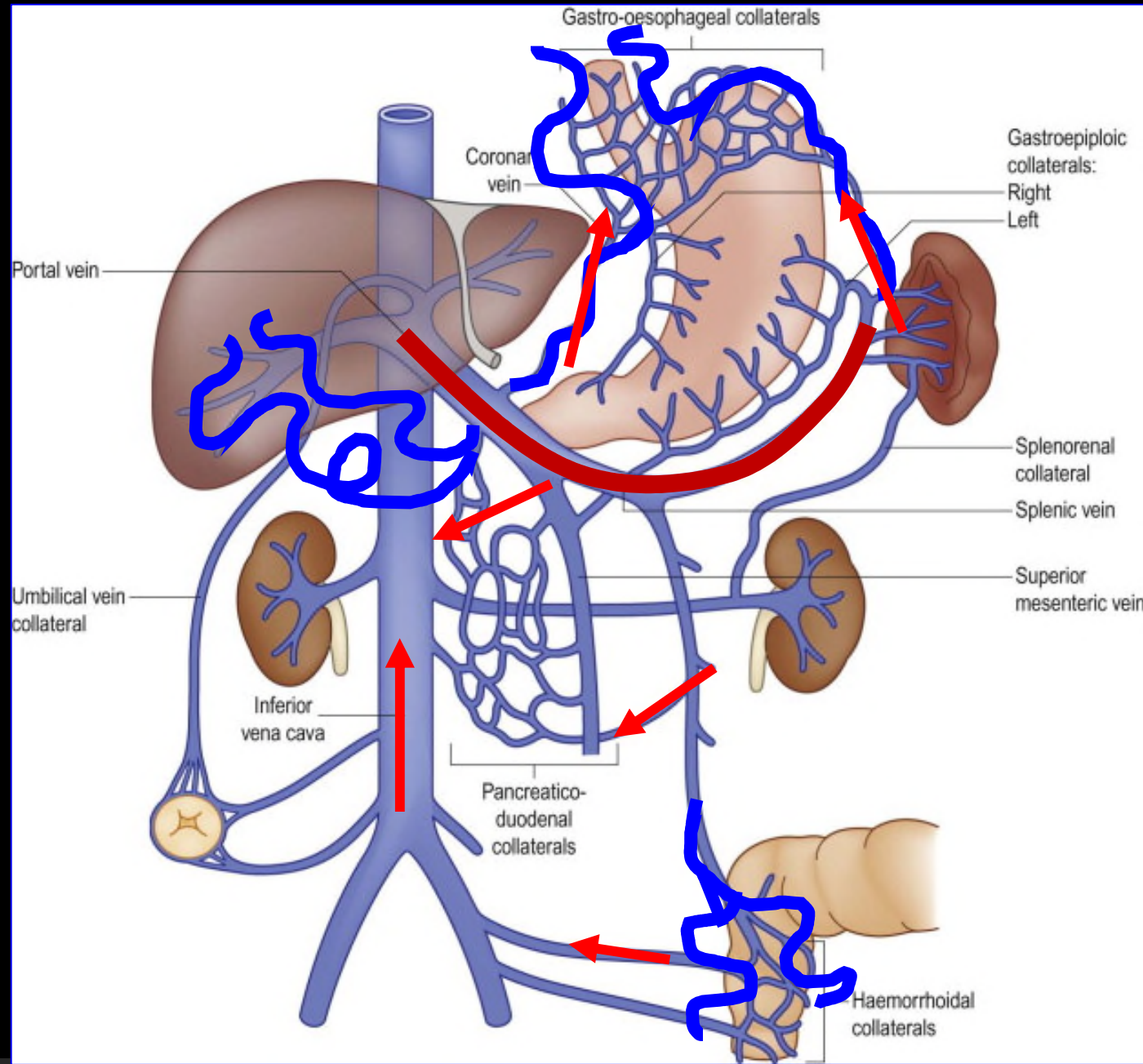




<https://www.sciencedirect.com/topics/neuroscience/portal-venous-pressure>



<https://www.sciencedirect.com/topics/neuroscience/portal-venous-pressure>



<https://www.sciencedirect.com/topics/neuroscience/portal-venous-pressure>

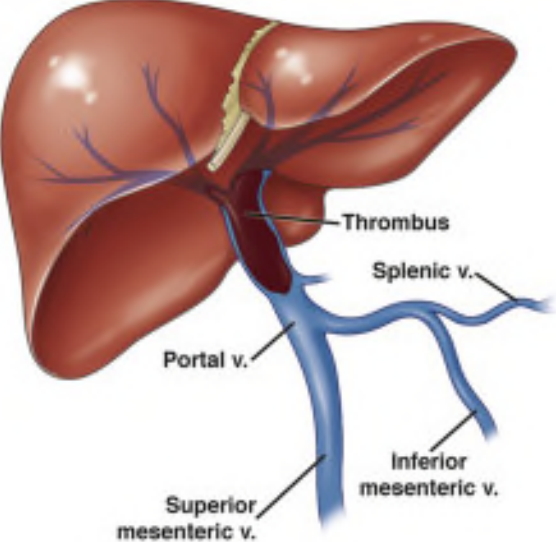
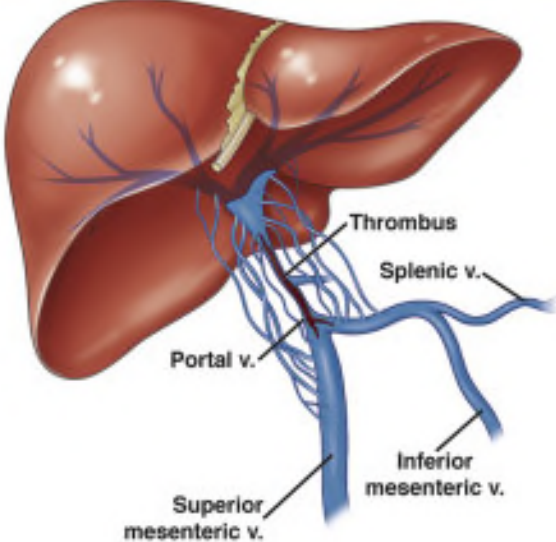
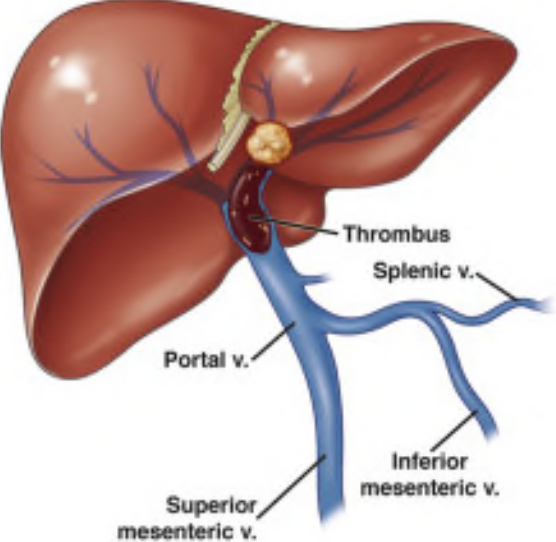
# Sinistral (Left Sided) Portal Hypertension

- Obstruction of the splenic vein
- <5% of all PH
- Asymptomatic until bleeding from ruptured varices
- Angiography of splenic vein is the gold standard for diagnosis
- Usually results from compression of the pancreatic vein
- Management to treat the underlying pathology, and splenectomy to decompress the left portal venous system

# Differential Diagnosis: Virchow's triad

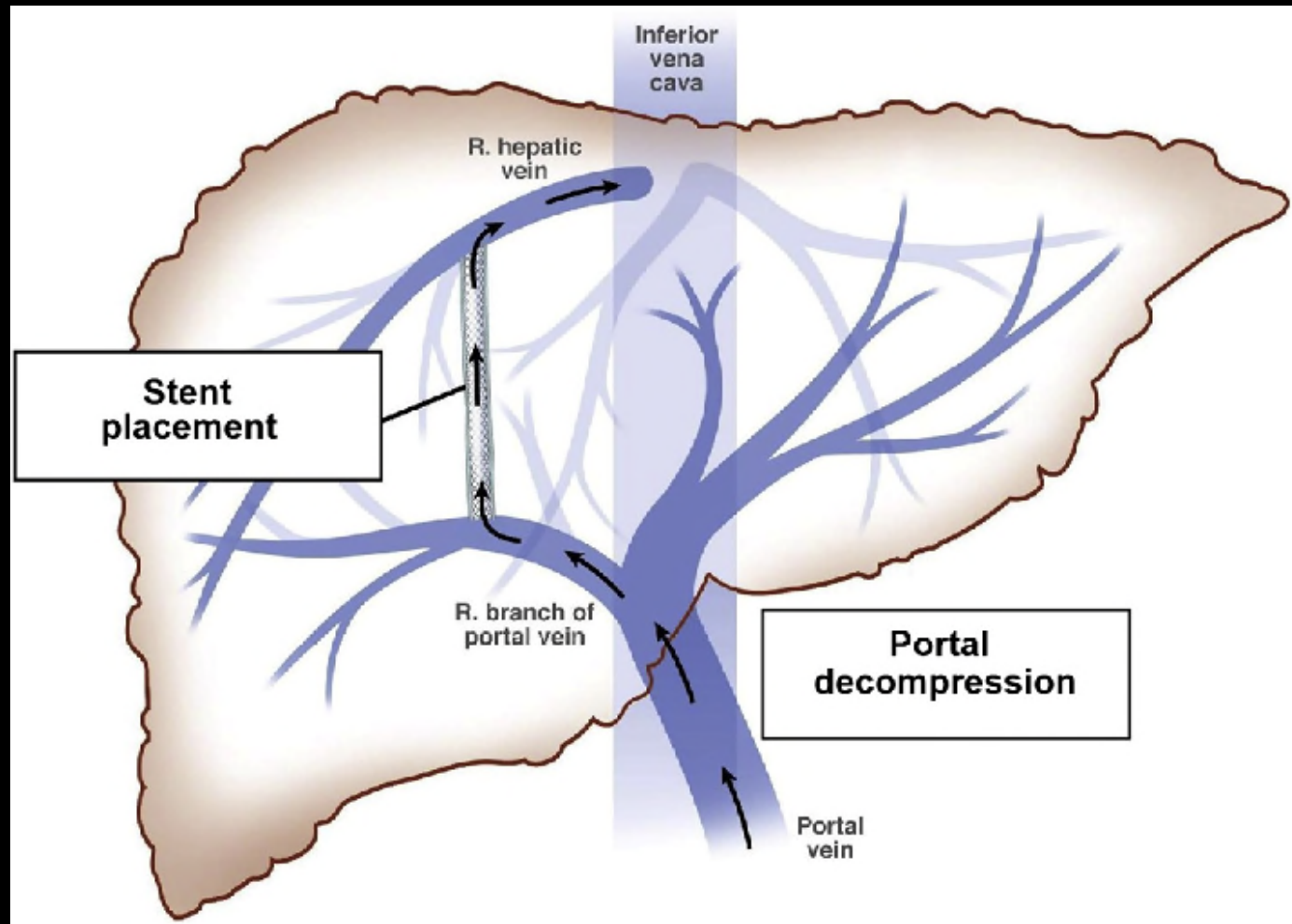
- **reduced flow / portal hypertension**
  - cirrhosis: most common
  - malignancy
- **hypercoagulable state**
  - inherited prothrombotic conditions
  - malignancy
  - myeloproliferative disorders
  - IBD
  - dehydration
  - OCPs
  - pregnancy
  - trauma
- **endothelial disturbance**
  - local inflammation/infection (common)



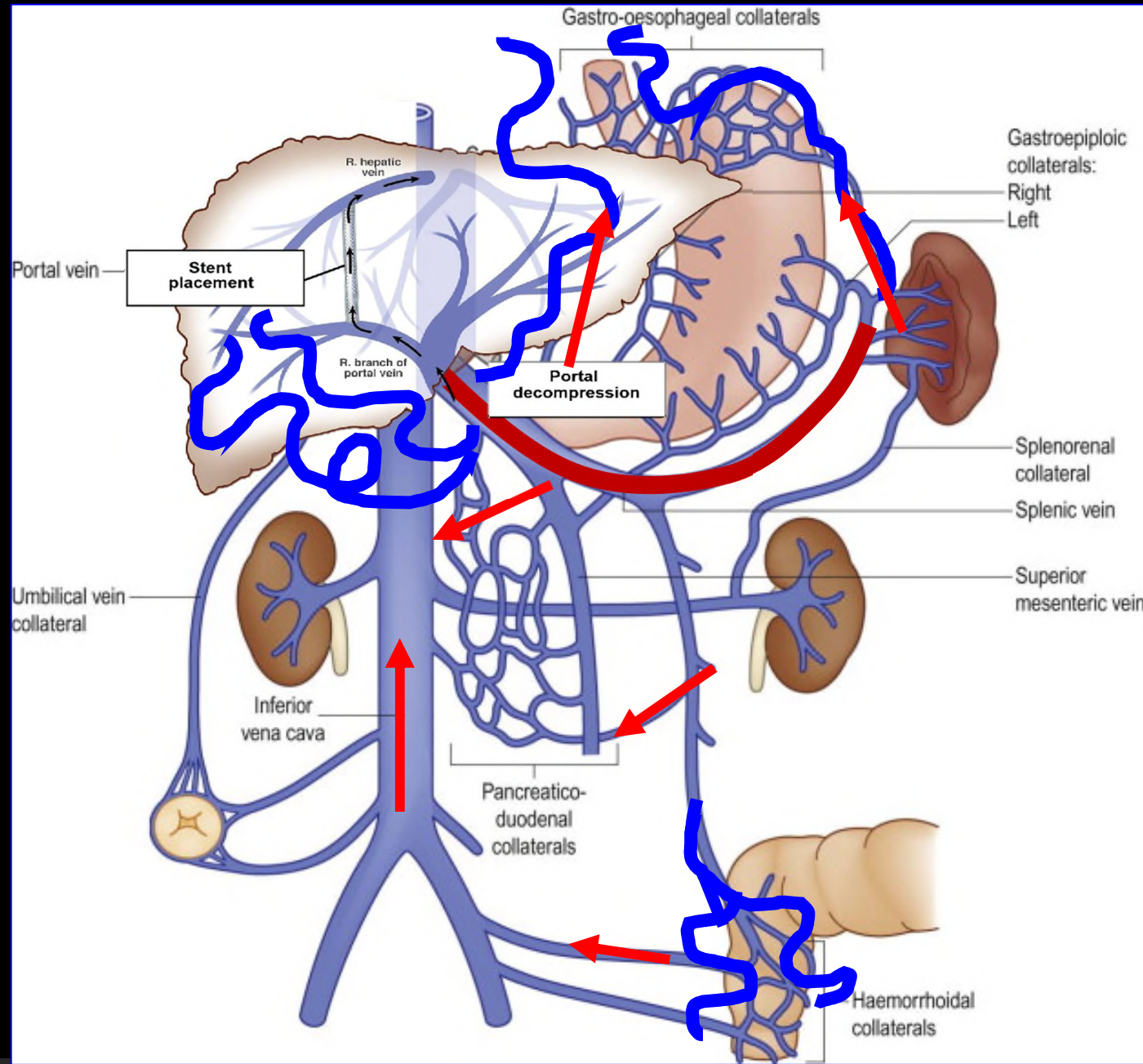
Acute	Chronic	Tumor related
		
<p><b>Non-cirrhotic</b></p> <ul style="list-style-type: none"> <li>• Often presents with pain and treatment with anticoagulation is standard of care</li> <li>• Commonly progresses to chronic cavernoma if left untreated</li> </ul>	<p><b>Non-cirrhotic</b></p> <ul style="list-style-type: none"> <li>• Collateral circulation usually contains significant portoportal or mesoportal collateral veins</li> <li>• Portal hypertension including bleeding gastroesophageal and ectopic varices can occur</li> </ul>	<p><b>Malignant PVT</b></p> <ul style="list-style-type: none"> <li>• Consideration of hepatocellular carcinoma is essential in cirrhosis</li> <li>• Characteristic features on imaging include expanding thrombus with disruption of the vessel wall and arterial phase enhancement</li> <li>• Distinguishing bland thrombus with uninvolved tumor is important in directing management</li> <li>• Extrahepatic metastases should be considered as well in both non-cirrhotic and cirrhotic cases</li> </ul>
<p><b>Cirrhotic</b></p> <ul style="list-style-type: none"> <li>• Often found incidentally on imaging, but can present with symptoms</li> <li>• Anticoagulation is indicated in certain situations (see text)</li> <li>• Up to 40% may spontaneously recanalize with no therapy</li> </ul>	<p><b>Cirrhotic</b></p> <ul style="list-style-type: none"> <li>• Collateral circulation dominated by portosystemic shunts</li> <li>• If advanced especially with involvement of the confluence with superior mesenteric vein may complicate liver transplantation</li> </ul>	

<https://www.sciencedirect.com/science/article/pii/S0016508519303725>

# Transjugular Intrahepatic Portosystemic Shunt



<https://www.semanticscholar.org/paper/Transjugular-intrahepatic-portosystemic-shunt.-Patidar-Sydnor/1505fc61db7521c4145780cc6885a0d0693b4577/figure/0>



<https://www.sciencedirect.com/topics/neuroscience/portal-venous-pressure>

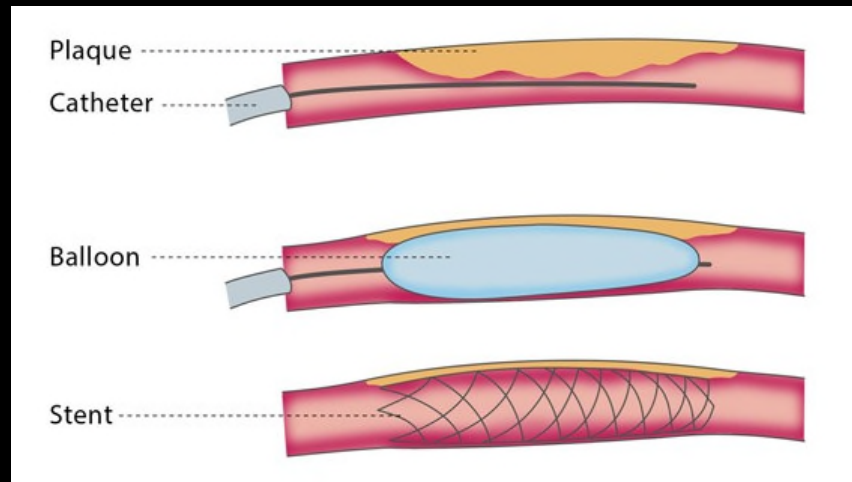


# Final Diagnosis

- Chronic Portal and Splenic Vein Thrombosis w/Sinistral Portal HTN
- A long-standing thrombosis in non-cirrhotic patients is implicated by the presence of
  - a cavernoma
  - venous collateralization
  - features of PH
- Failure to detect and treat thromboses can result in
  - mesenteric ischemia
  - chronic cavernous transformation
  - complications of portal hypertension

# Treatment

- Ultrasound and fluoroscopic guided percutaneous transhepatic access to portal venous system and splenic vein
- Revascularization of splenic and portal vein occlusion using angioplasty and stent placement



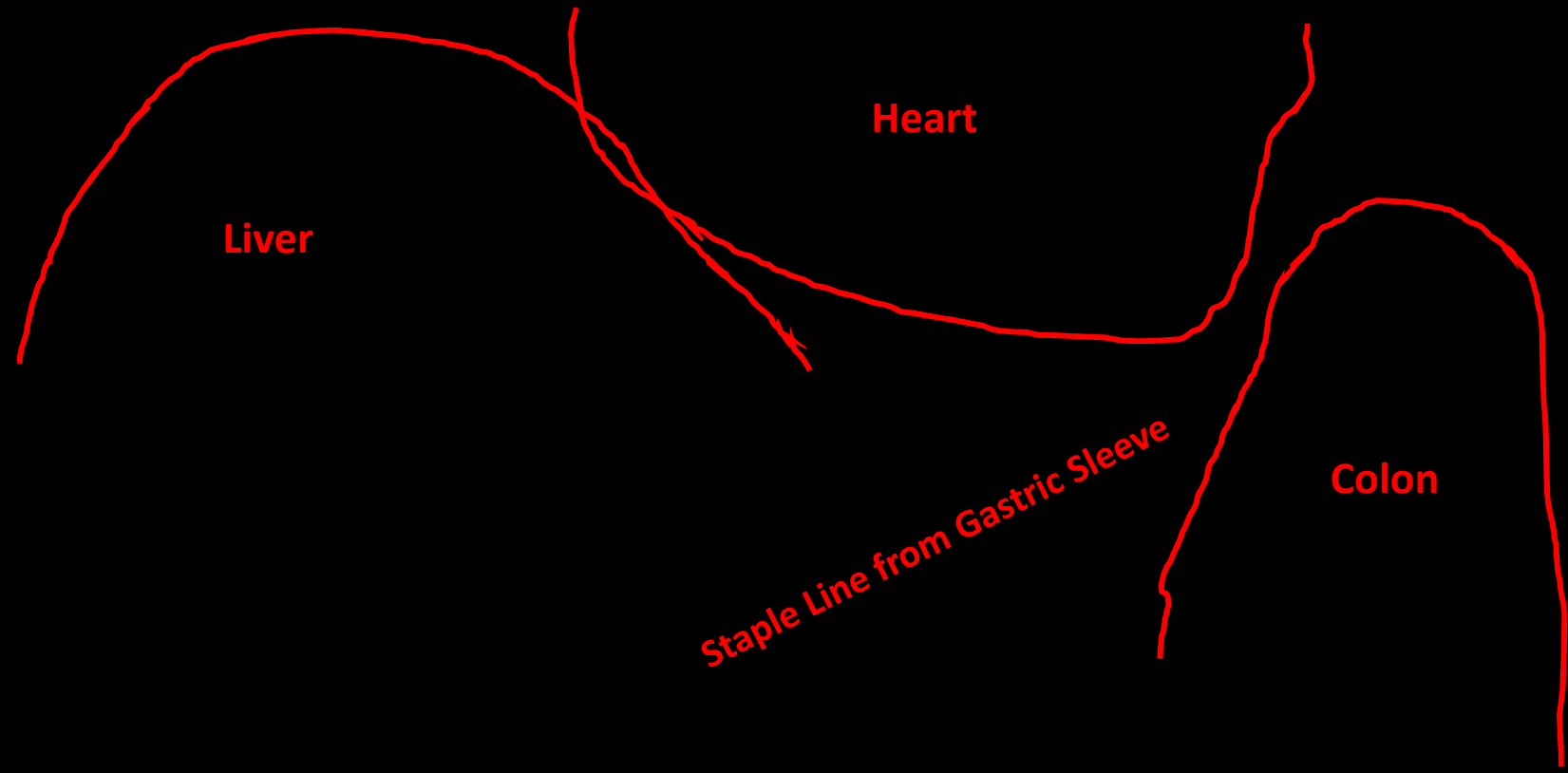
<https://www.cirse.org/patients/ir-procedures/angioplasty-and-stenting/>

# Hepatic Entry

Right Portal Vein



# Cavernous Transformation



Renal Pelvis

# Splenic Entry

Splenic Vein

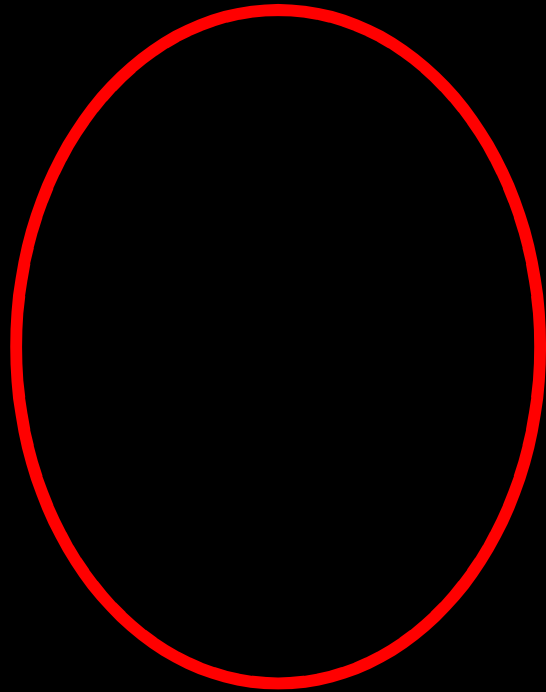


Spleen

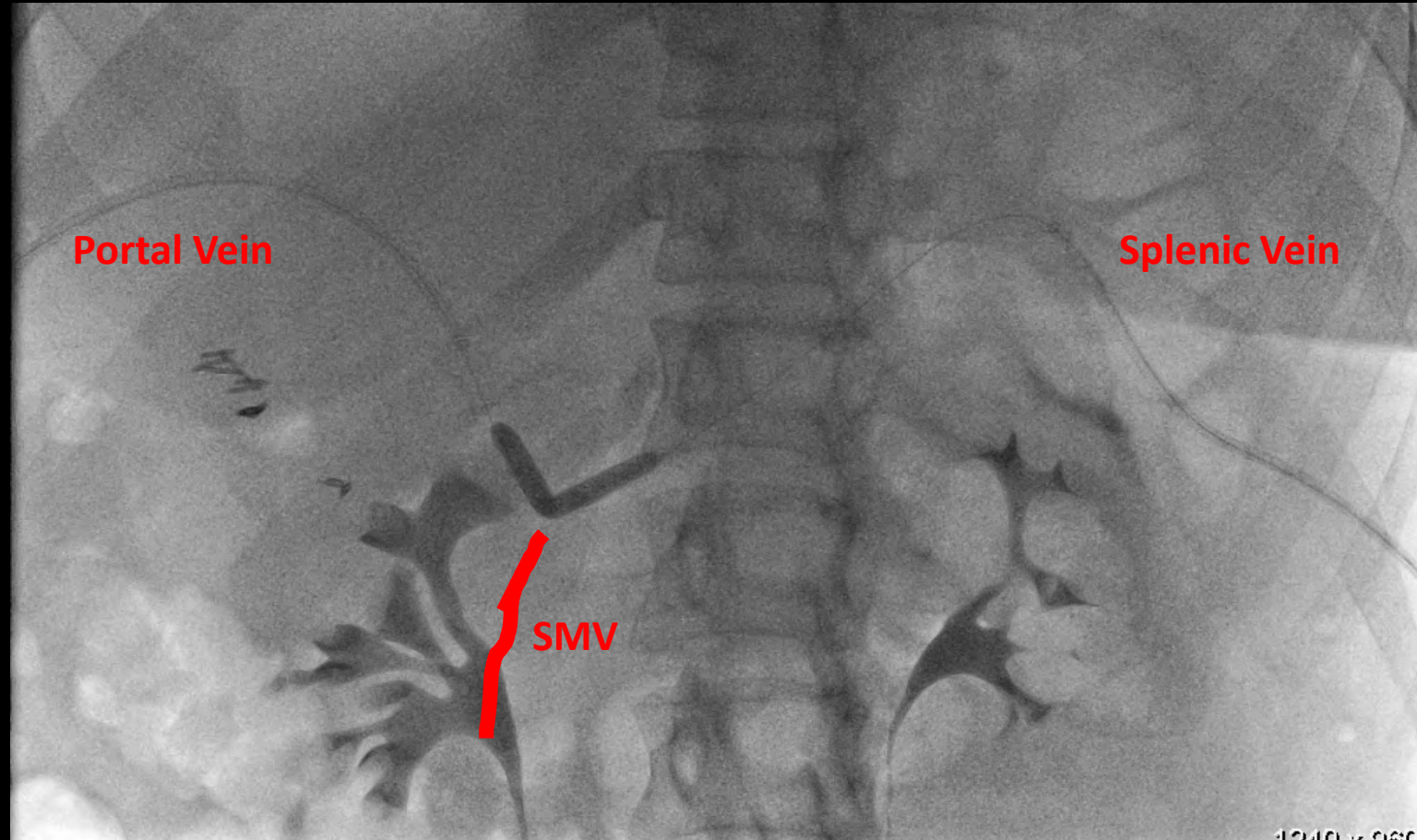




**Superior  
Mesenteric Vein**



# Portal and Splenic Vein Angioplasty

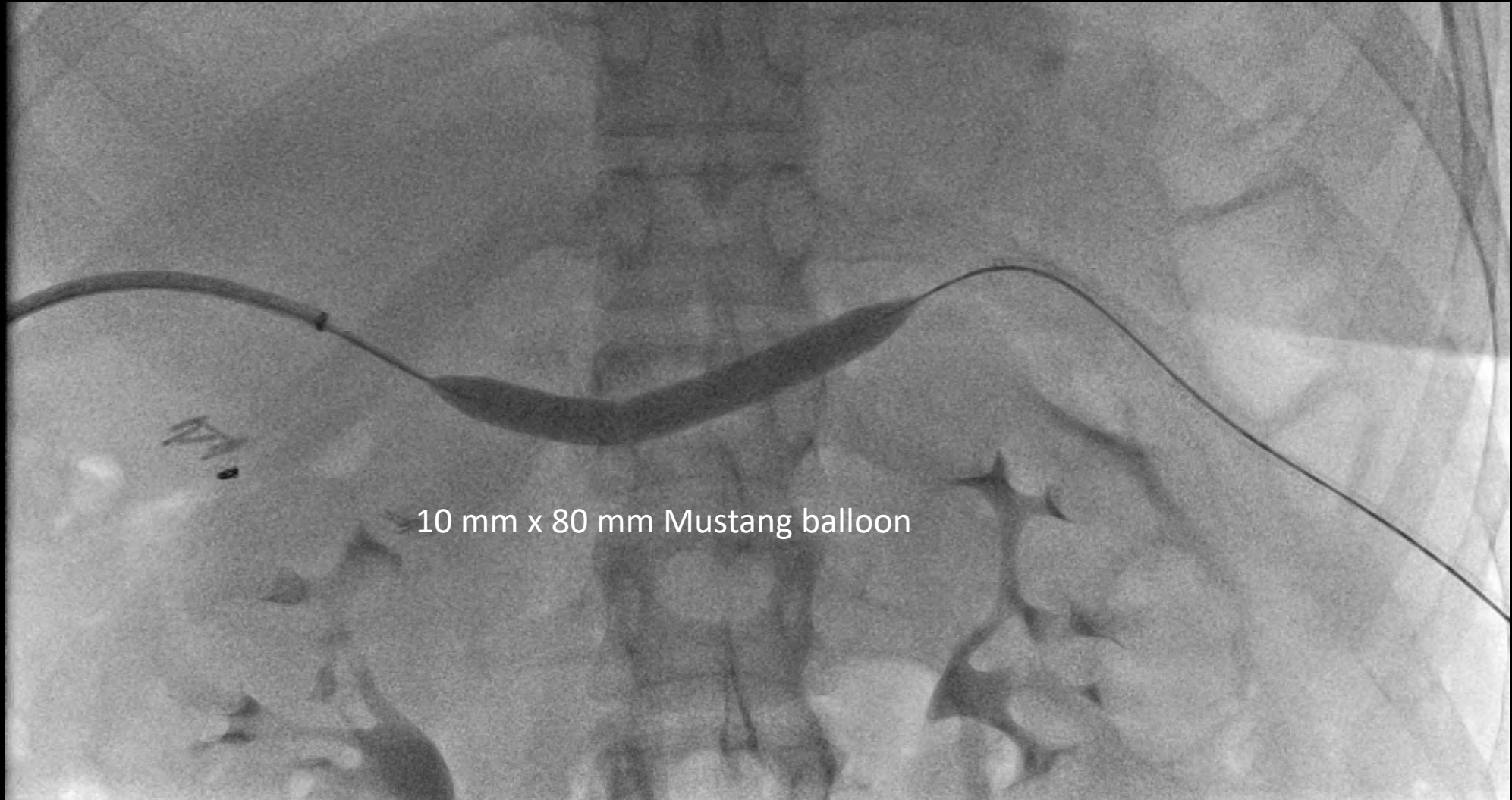




# Portal and Splenic Vein Angioplasty



# Portal and Splenic Vein Angioplasty



# Reestablishment of Physiologic Blood Flow

Liver

Spleen

14 mm x 90 mm self expandable  
bare metal Vici stent

# ACR appropriateness Criteria

Variant 8: Patient with chronic intrahepatic and extrahepatic portal vein occlusion with cavernous transformation on CT with gastric variceal bleeding.

Procedure	Appropriateness Category	SOE	Adult RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Portal vein recanalization plus TIPS	Usually appropriate	Strong References	N/A	N/A	8	8	0	0	0	0	0	1	3	5	2
Endoscopic management (sclerosis or cyanoacrylate injection)	May be appropriate	Limited References	N/A	N/A	6	6	0	0	0	1	4	1	1	3	1
Partial splenic embolization	May be appropriate	Limited References	N/A	N/A	6	6	0	0	0	1	1	6	3	0	0
Surgical management	May be appropriate	Expert Consensus	N/A	N/A	6	6	0	0	1	0	2	4	3	1	0
BRT0	Usually not appropriate	Limited References	N/A	N/A	2	2	0	8	2	0	0	0	0	0	0

# Charge Master Costs

EGD W/BAND LIGATION VARICES-----	\$9,067.75
ANGIOGRAPHY PACK-----	\$437.75
TRLUML BALO ANGIOP 1ST VEIN-----	\$3352.50

Estimated cost: \$12,858.00

# Charge Master Costs

TIPS-----	\$11,914.00
ANGIOGRAPHY PACK-----	\$437.75
TRLUML BALO ANGIOP 1ST VEIN-----	\$3352.50
Guide wire-----	\$400.00
Stent-----	\$2,000.00
CT ABDOMEN W/O-W CON-----	\$6,534.00
CT ABDOMEN W/ CON-----	\$5,540.00
ULTRASOUND 15 MIN-----	\$210.00
ESOPHAGUS ENDOSCOPY-----	\$9,178.50
EGD W/BAND LIGATION VARICES-----	\$9,067.75

Estimated cost: \$20,608.00

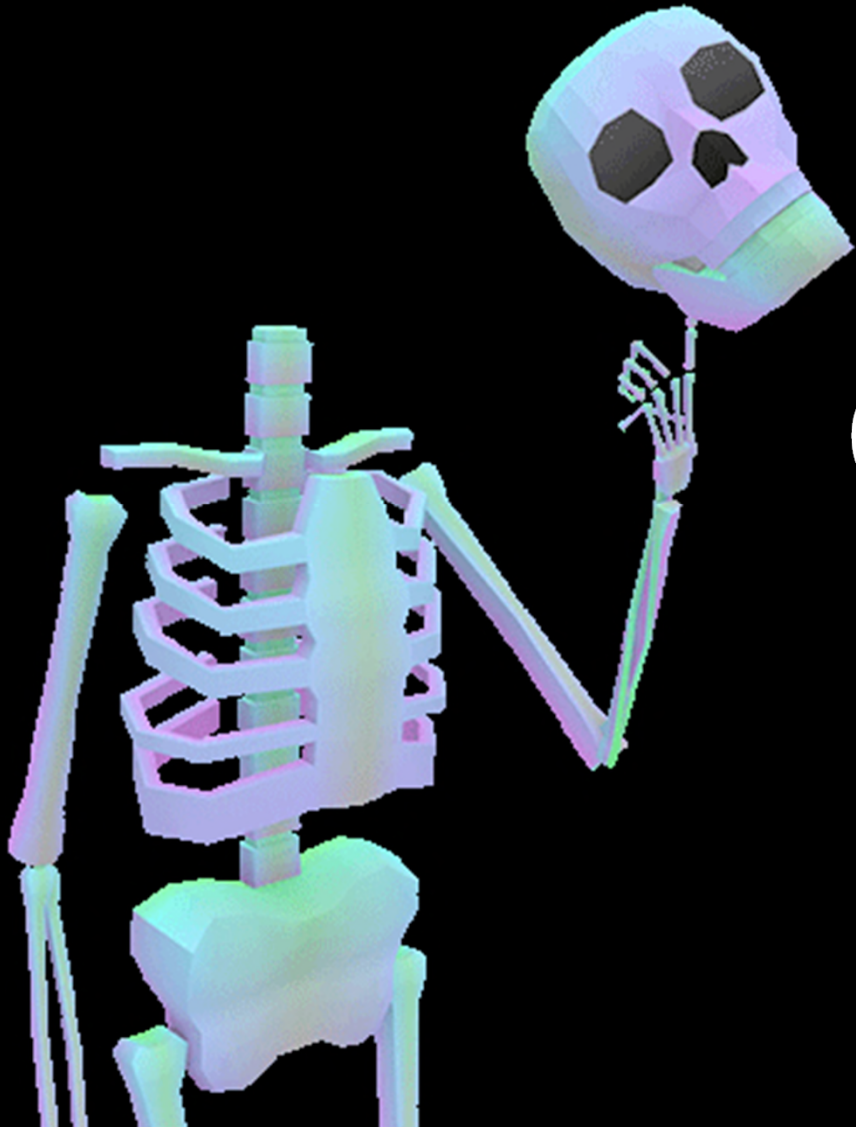
# Take Home Points

- Sinistral Portal HTN is the result of splenic vein occlusion
- Cavernous transformation indicates the presence of a chronic portal vein thrombosis
- Virchow's Triad can be used as a guide for developing a differential diagnosis for PVT
- Interventional Radiology treatment options include TIPS, angioplasty, and embolization

# References

- American College of Radiology ACR Appropriateness Criteria® Radiologic Management of Gastric Varices. (n.d.). Retrieved from [https://acsearch.acr.org/list?\\_ga=2.84235738.237833903.1580065429-846897611.1580065429](https://acsearch.acr.org/list?_ga=2.84235738.237833903.1580065429-846897611.1580065429).
- American College of Radiology ACR Appropriateness Criteria® Right Upper Quadrant Pain. (n.d.). Retrieved from [https://acsearch.acr.org/list?\\_ga=2.84235738.237833903.1580065429-846897611.1580065429](https://acsearch.acr.org/list?_ga=2.84235738.237833903.1580065429-846897611.1580065429).
- A. Kabbani, F. Gaillard, et al. **Portal Vein Thrombosis**, Radiopaedia (2005-2020), <https://radiopaedia.org/articles/portal-vein-thrombosis?lang=us>.
- Christopher J. Harvey, Adrian K.P. Lim, in Clinical Ultrasound (Third Edition), 2011
- N.M. Intagliata, S.H. Caldwell, A. Tripodi, **Diagnosis, development, and treatment of portal vein thrombosis in patients with and without cirrhosis**, Gastroenterology (March) (2019), pp. 1-18.
- Memorial Herman Hospital ChargeMaster, 2020.
- Pereira P, Peixoto A. Left-Sided Portal Hypertension: A Clinical Challenge. *GE Port J Gastroenterol*. 2015;22(6):231–233. Published 2015 Nov 23. doi:10.1016/j.jpge.2015.10.001





Questions?

# Ultrasound for Portal Vein Thrombosis

- **hypo-** or **iso-echoic** material in lumen of a mildly dilated vein in acute PVT
- hyperechoic material in chronic PVT after clot organization
- Doppler detection of flow in multiple small vessels in the usual PV location is characteristic of “cavernous transformation”
- Cavernous transformation may form in as few as 6 days.
- US has a reported sensitivity of 89%–93% and specificity of 92%–99% in 2 separate studies

<https://www.sciencedirect.com/science/article/pii/S0016508519303725>