Non-traumatic Venous Emergencies of the Abdomen

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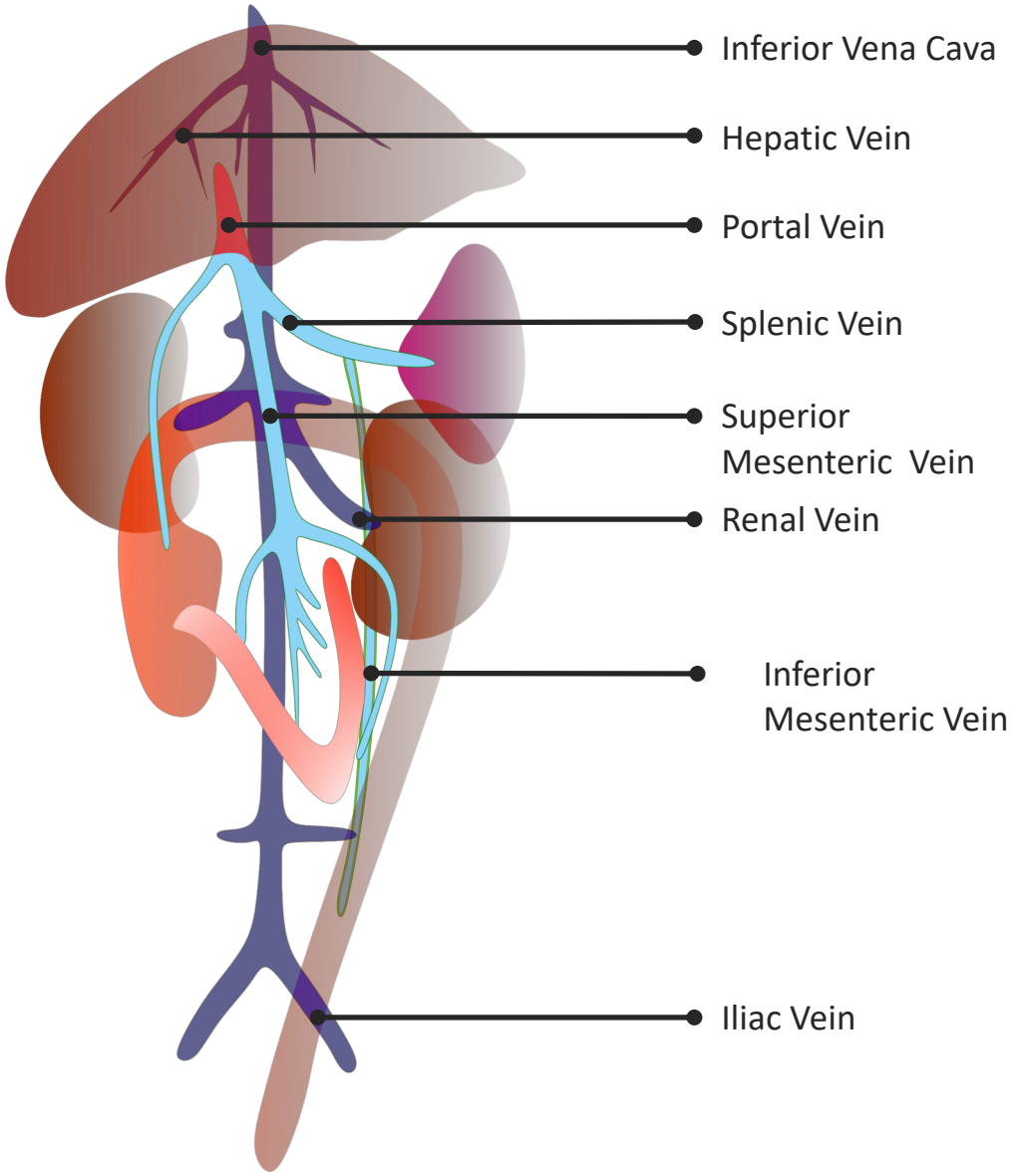
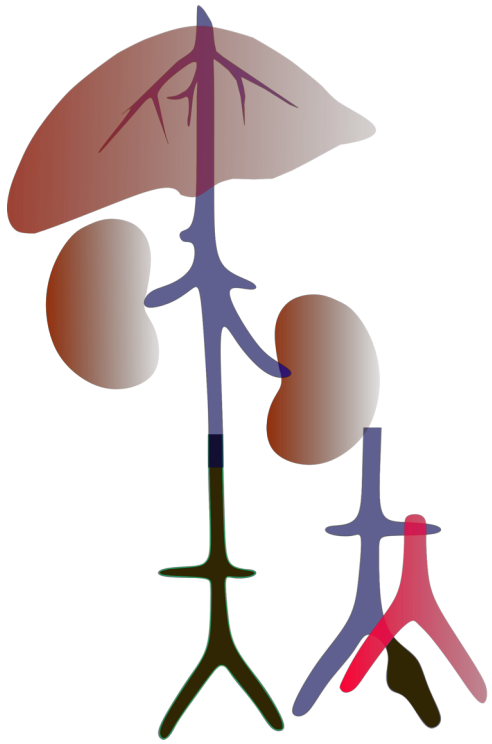


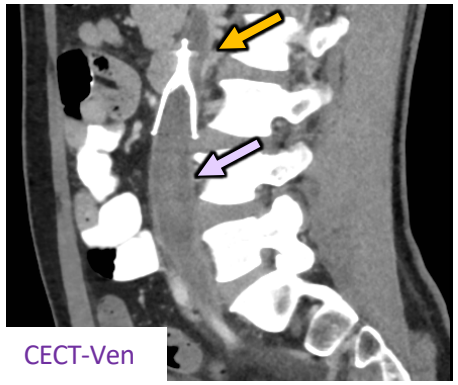
*All illustrations by author

Ilio-caval Thrombosis



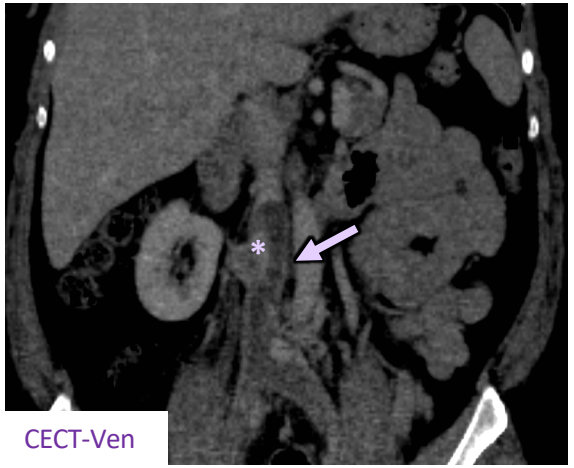
Cases

Bland IVC thrombus in setting of inherited hypercoagulopathy with thrombus extending above the filter IVC filter (yellow)



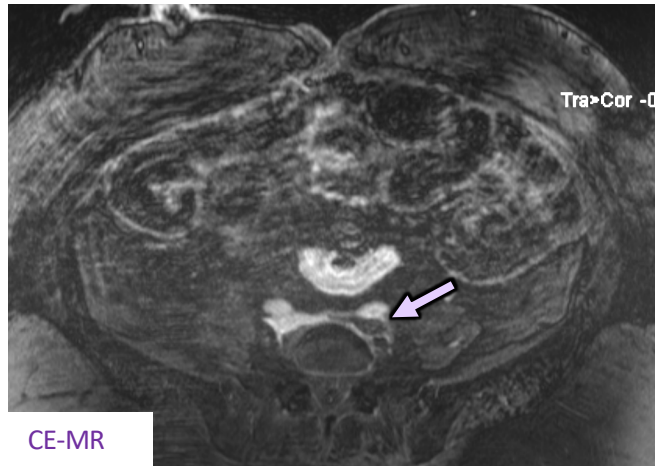
CECT-Ven

Leiomyosarcoma (*) of the IVC with secondary bland thrombus (arrow)



CECT-Ven

May-Thurner Syndrome (MTS)

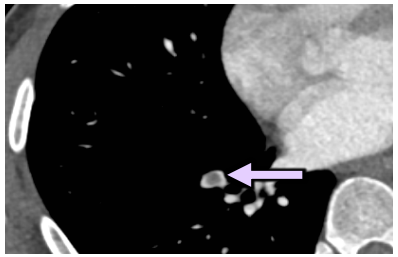


CE-MR

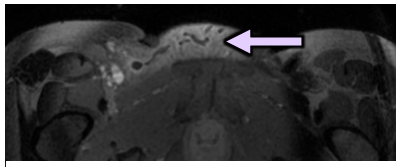
Causes

1) Inherited coagulopathy
2) Acquired coagulopathy
   - i. Immobility
   - ii. Malignancy
   - iii. Myeloproliferative disorders
   - iv. Recent surgery
3) Local tumor invasion
   - i. Renal / hepatic cancers
   - ii. Primary IVC leiomyosarcoma
4) Compression syndromes
   1) May-Thurner (MTS)

Clinical Implications



Pulmonary Embolism



Pubic Varices

1) Embolism (pulmonary)
2) Chronic stasis
   - i. Varices
   - ii. Dermatitis and ulcers
   - iii. Male infertility due to varicocele
3) Extension to visceral tributaries

Management

1) Anticoagulation, IVC filter
2) Mechanical thrombectomy
3) Venous stenting/bypass-MTS

Imaging

- Duplex US for DVT in lower extremities
- CT and/or MR venography

1) Differentiate acute vs chronic

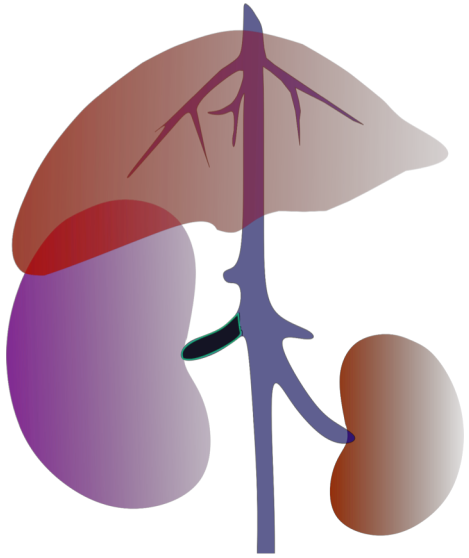
i. *Acute*-expanded vein, wall enhancement, fat stranding

ii. *Chronic*-eccentric thrombus, narrow vessel caliber, calcifications, webs, collaterals / varices

2) Bland vs Tumoral thrombus

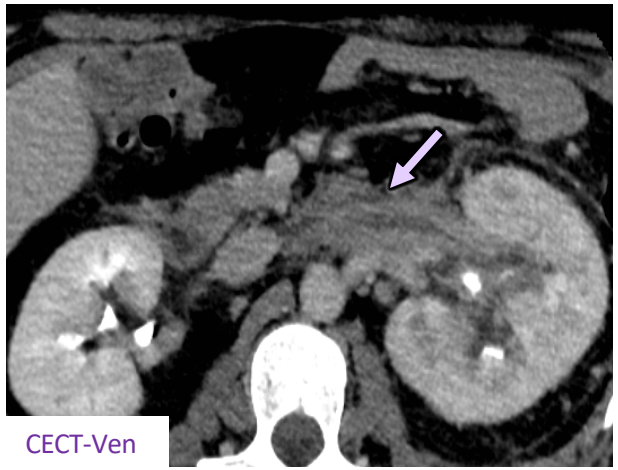
i. Tumor thrombus-greater degree of venous expansion, thrombus vascularity, diffusion restriction, metabolically active on PET

Visceral Caval Tributary Thrombosis

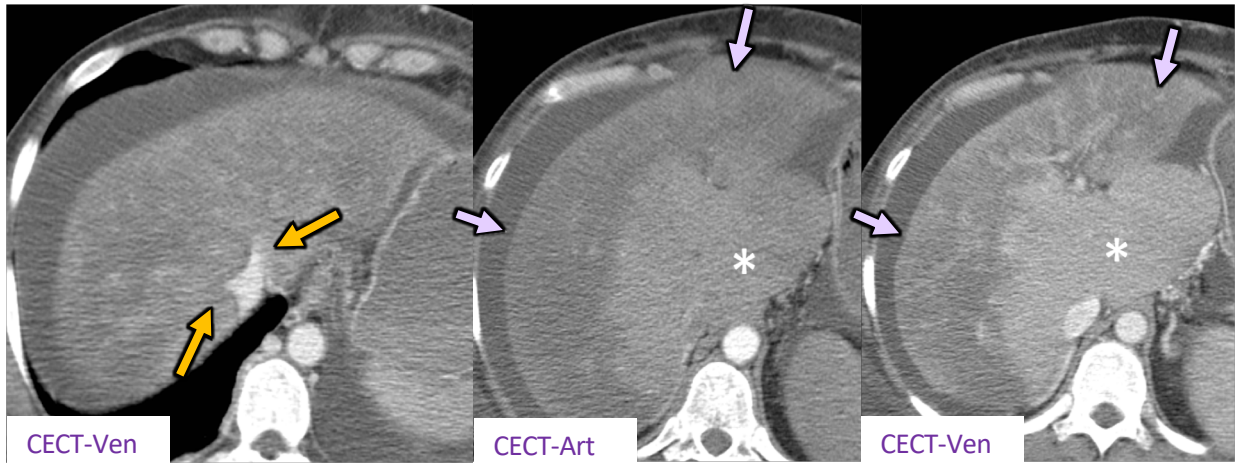


Cases

Renal Vein Thrombosis in Behçet Syndrome



Budd Chiari Syndrome with hepatic vein attenuation (yellow), reduced peripheral enhancement (purple), increased central enhancement (*) and ascites



Causes

General

1) Inherited coagulopathy
2) Acquired coagulopathy
   i. Dehydration
   ii. Vasculitis
3) Local tumor invasion
   i. Renal / hepatic cancers

Specific

1) Budd Chiari Syndrome – Congenital (webs), myeloproliferative disorder, local tumors and abscesses
2) Renal Vein Thrombosis – nephrotic syndrome, sickle cell, renal abscess

Clinical Implications

Budd Chiari

1) Hepatic dysfunction, hepatic failure
2) Cirrhosis, regenerative nodules, hepatocellular carcinoma
3) Portal hypertension and its sequelae

Renal Vein Thrombosis

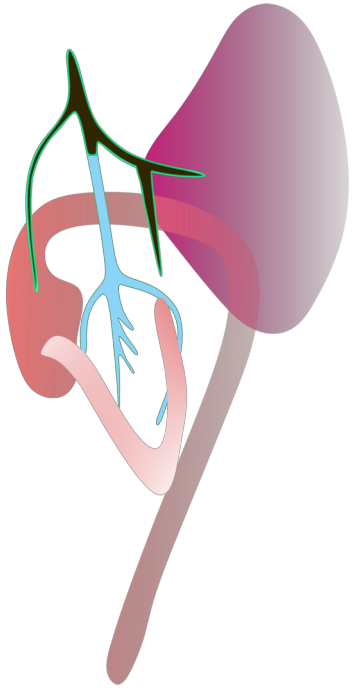
1) Acute renal failure
2) Renal atrophy
3) Papillary necrosis

Imaging

Budd-Chiari- Multiphase CT and/or MR
i. Acute-Venous occlusion, hepatosplenomegaly, ascites, decreased peripheral parenchymal and increased central parenchymal enhancement
ii. Subacute/chronic-Atrophy with caudate hypertrophy, arterialized peripheral blood flow, collaterals, regenerative nodules, venous calcifications

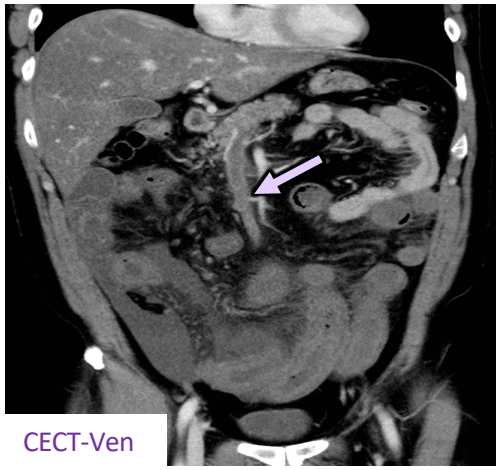
Renal vein thrombosis- Doppler, CT/MR angiography
i. Acute-Nephromegaly, reversal of diastolic arterial flow, increased RI, vein thrombus, venous infarction, persistent cortical enhancement and reduced/lack of enhancement
ii. Chronic-Atrophy, collaterals, venous calcifications

Porto-splanchnic Thrombosis

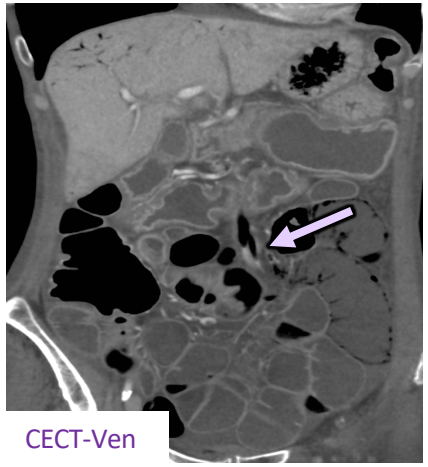


Cases

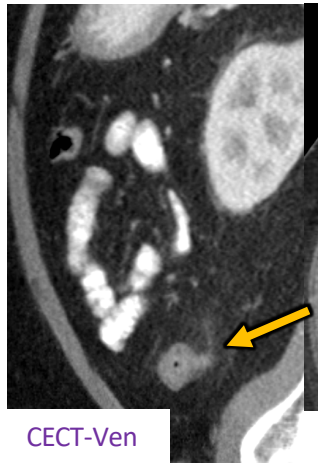
SMV thrombus with bowel ischemia

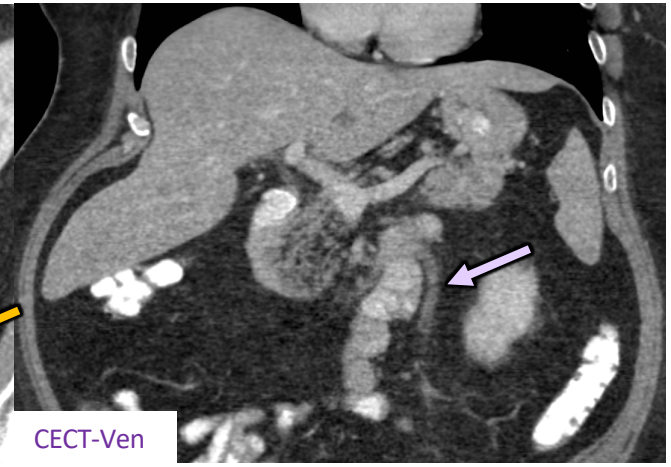


Secondary venous gas due to bowel ischemia



IMV thrombosis (purple) secondary to sigmoid diverticulitis (yellow)





Causes

1) Inherited coagulopathy
2) Acquired coagulopathy
   - i. Idiopathic
   - ii. Cirrhosis
   - iii. Pancreatitis
   - iv. Myeloproliferative disorders
   - v. Abdominal surgery
3) Local tumor invasion
   - i. HCC*

*Tumor thrombus- vein expansion greater degree, thrombus vascularity, diffusion restriction, hot on PET

Clinical Implications

Superior mesenteric vein (SMV)

1) Mesenteric congestion and bowel wall edema
2) Bowel ischemia

Portal vein Thrombosis

1) Findings of SMV thrombosis
2) Splenic congestion
3) Porto-systemic collaterals

Splenic vein thrombosis

1. Isolated splenomegaly with gastric varices

Imaging

- Multiphase CT and/or MRI

SMV thrombosis

i. Acute – Venous occlusion, bowel wall thickening, dilation, mesenteric fat stranding, ascites and hyper-enhancement. Bowel infarction with pneumatosis, venous luminal air and lack of enhancement

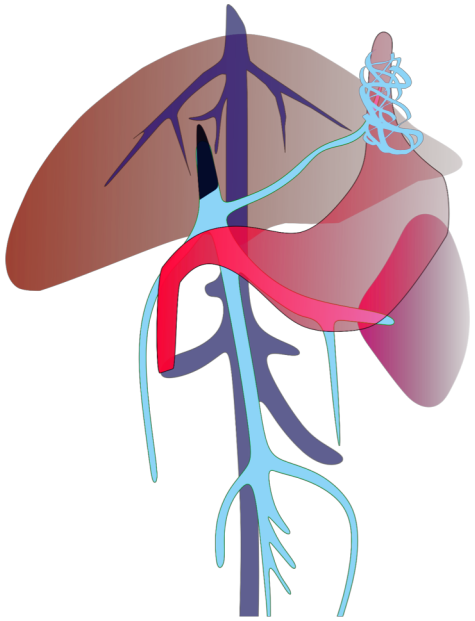
ii. *Subacute/chronic* –Recanalization of vessel, collateral formation, venous calcifications

Portal vein thrombosis

i. Acute –thrombosis, splenomegaly, vein thrombus, absent/decreased flow

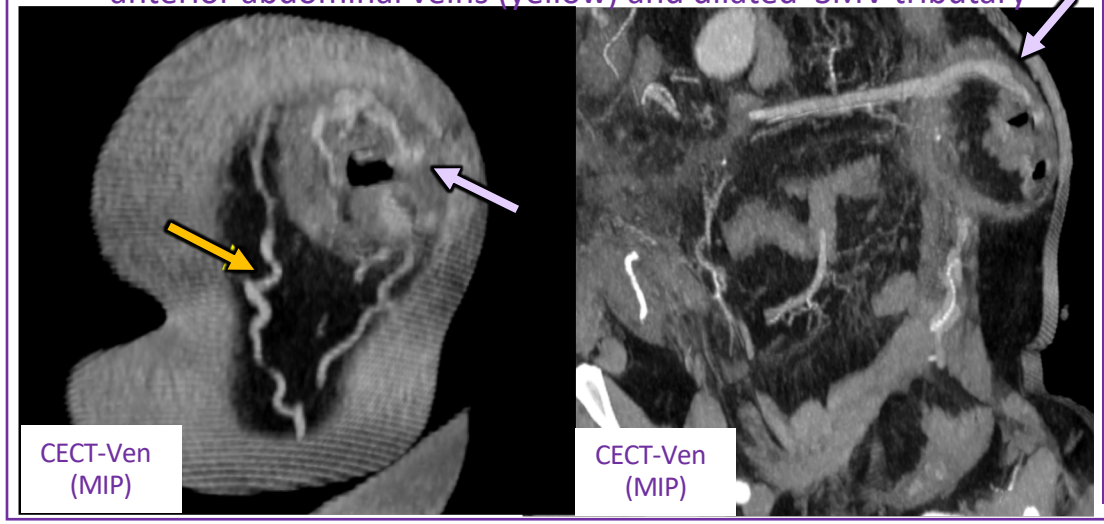
ii. Chronic- Cavernoma, venous calcifications, Porto-systemic collaterals

Variceal Hemorrhage

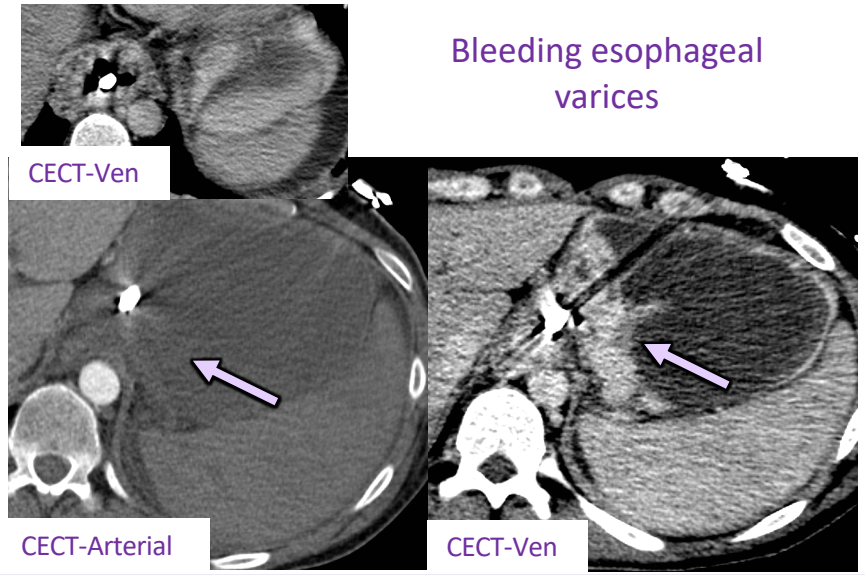


Cases

Peristomal venous hemorrhage in portal hypertension with dilated anterior abdominal veins (yellow) and dilated SMV tributary



Bleeding esophageal varices



Causes

Esophageal/gastric varices are commonly seen in the setting of chronic portal hypertension. These can bleed.

Variceal hemorrhage is a life threatening emergency and imaging is not typically performed in patients with suspected variceal bleed.

Variceal hemorrhage is rarely seen on cross sectional imaging.

Clinical Implications

Esophageal varices

1) Life threatening hemorrhage

Stomal varices

1) Rare entity
2) Bowel ostomies recruit mesenteric vasculature (branches of SMV) in close proximity with systemic veins in the abdominal wall. Therefore, in long standing cases, this is a potential site for development of portosystemic shunts
3) Peristomal varices are a rare cause of stomal site bleed

Imaging

- Multiphase CT and/or MRI

Esophageal varices

Serpiginous vessels around gastroesophageal junction. Additional collaterals at porta hepatis, perisplenic, periumbilical and perirectal locations. In active hemorrhage, brisk extravasation is seen on venous/delayed phases that is absent on arterial phase

Stomal varices

Serpiginous vessels around the stoma with dilated anterior abdominal wall collaterals and dilated adjacent SMV tributary

Pitfalls and Artifacts

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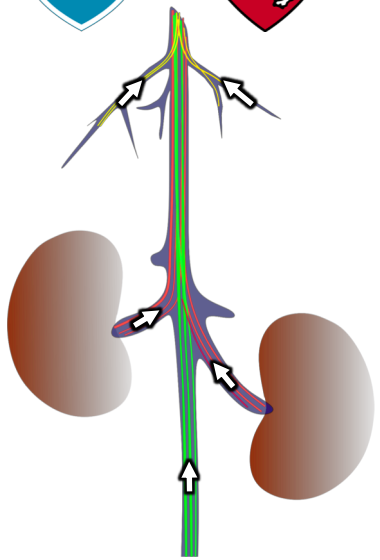
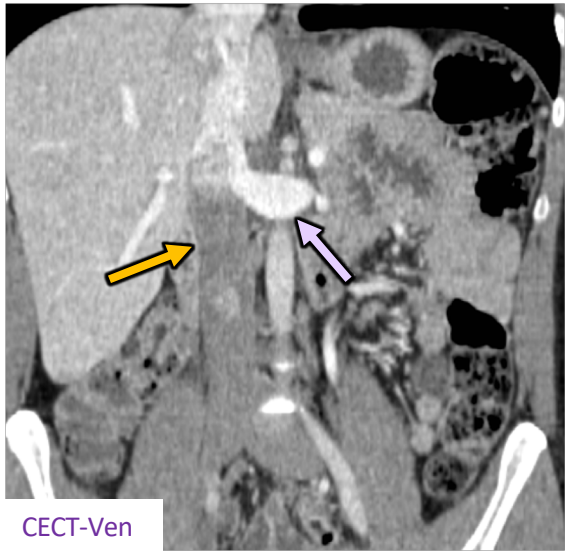
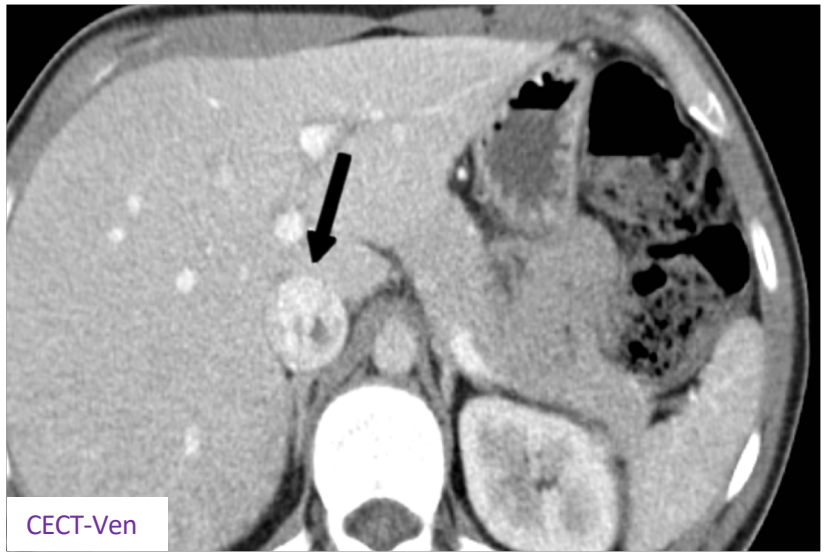


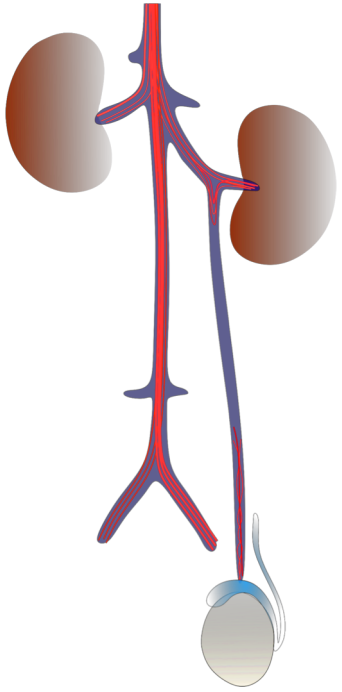


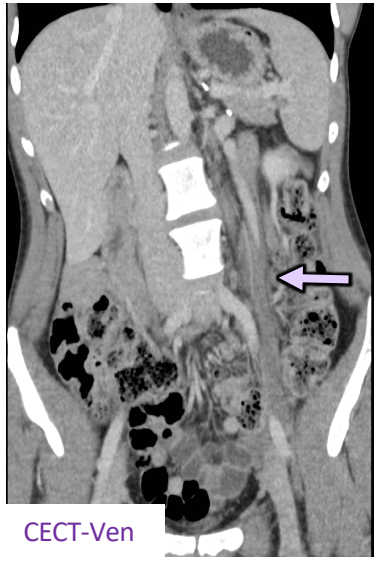


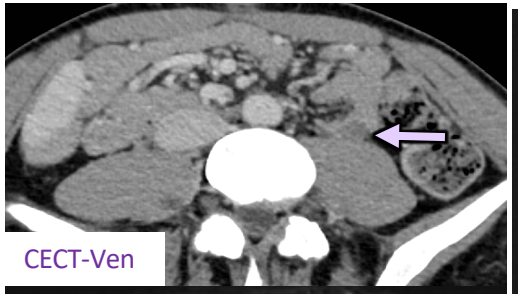
Case: Apparent filling defect in intrahepatic IVC (black) due to admixing of unenhanced blood from infrarenal IVC (yellow) and enhanced blood from renal veins (purple).

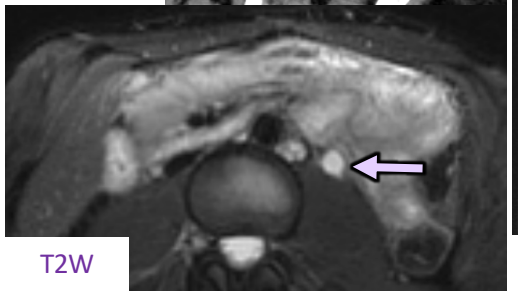
Clinical Implication: May be falsely called as thrombus

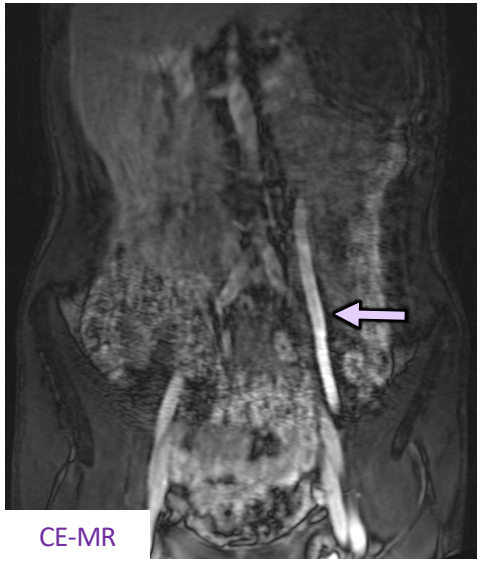
Mitigate: By performing delayed imaging, typically at 2 minutes, to differentiate from true thrombosis











Case: *Nutcracker syndrome; Post renal vein bypass.* Apparent thrombosis of a large gonadal vein (purple) on venous phase CT, that is bright on T2W. Delayed phase MR post contrast administration demonstrates enhancement.

Mitigate: Additional delayed phases in a setting of a large venous channel fed by a small organ/territory.

Thank You

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