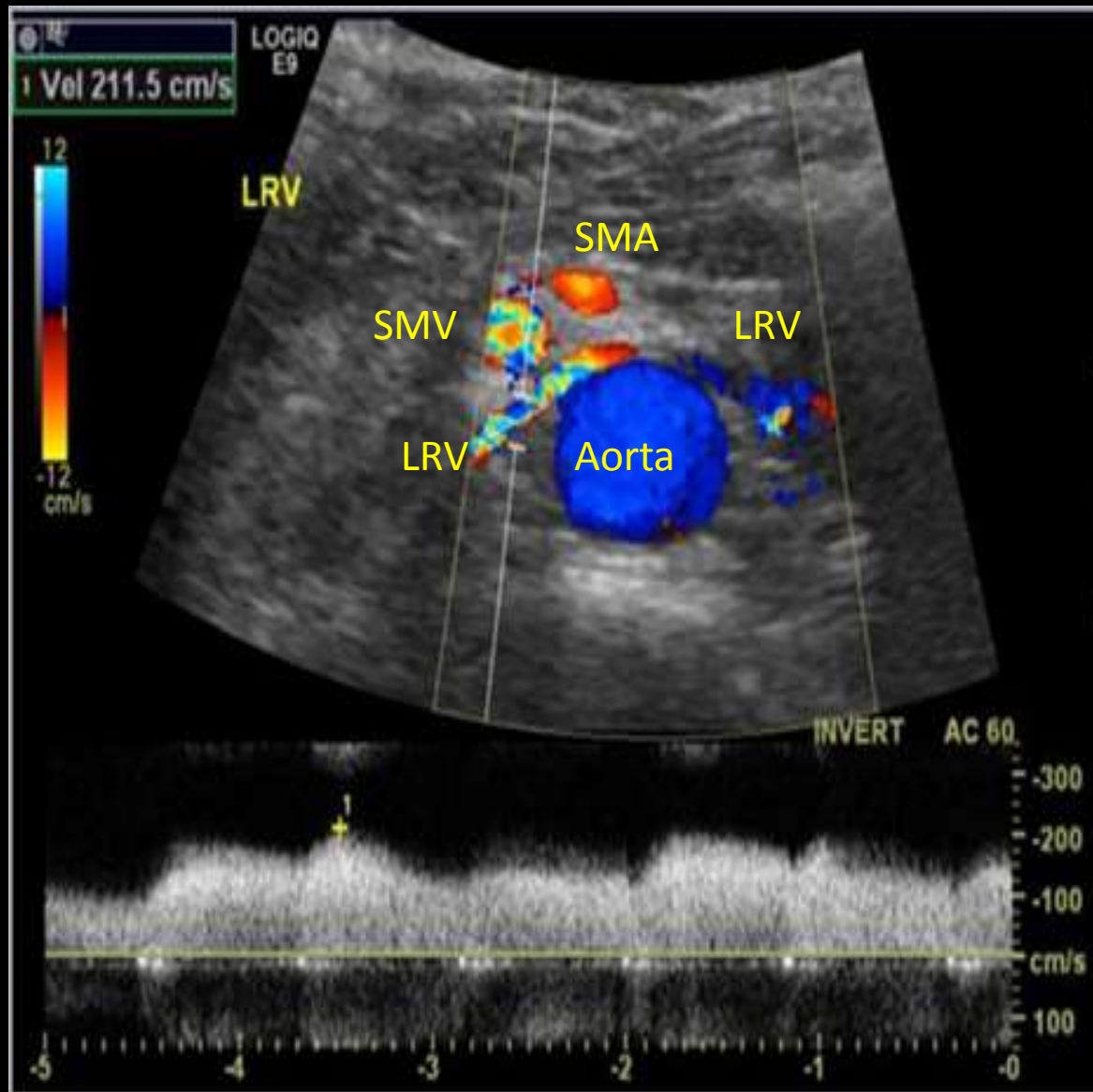


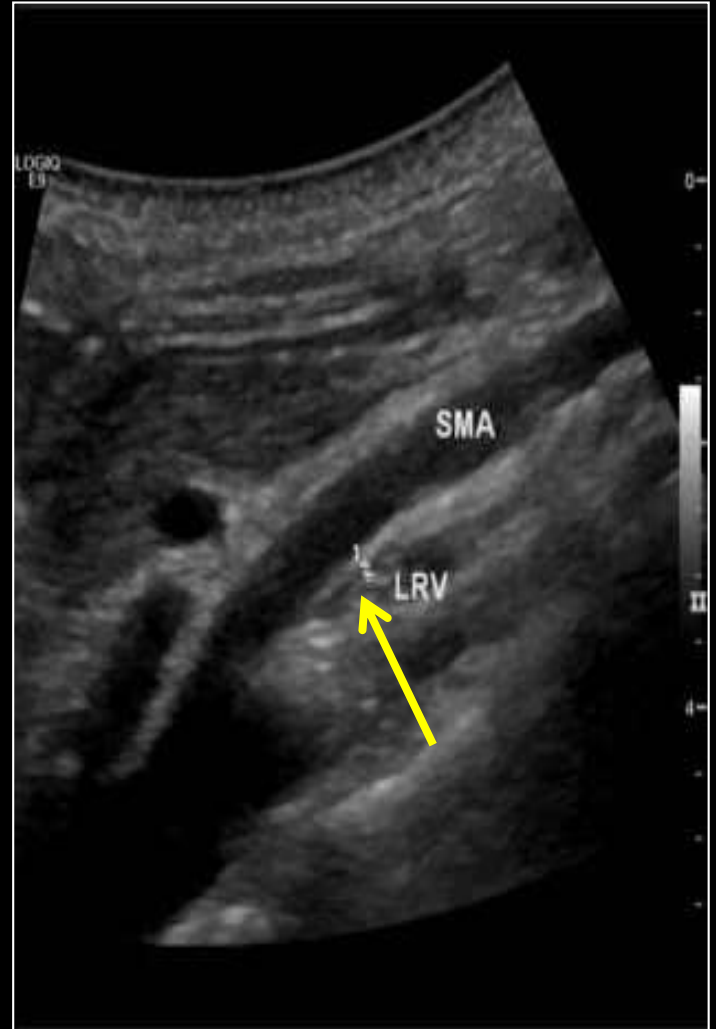
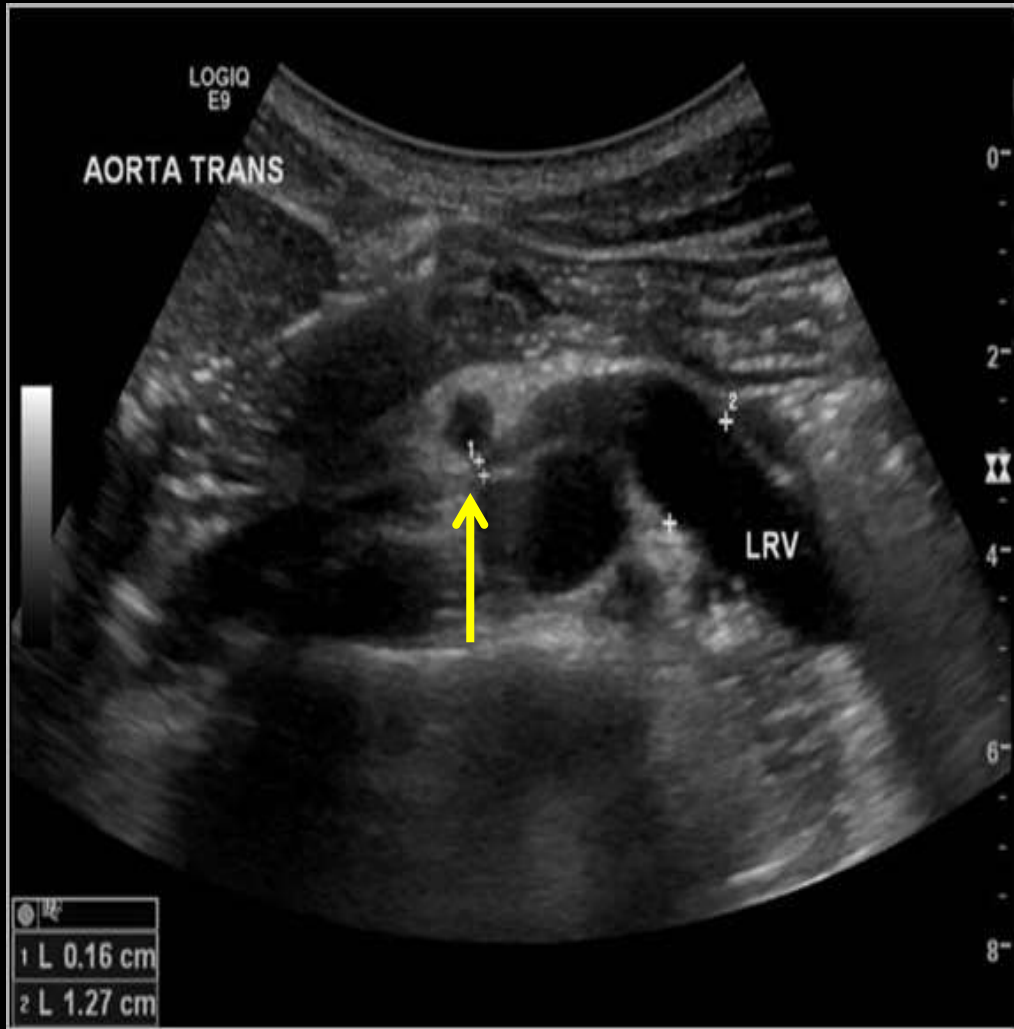
# Vascular Ultrasound: Q and A

G. Gerasymchuk, MD,  
RPVI

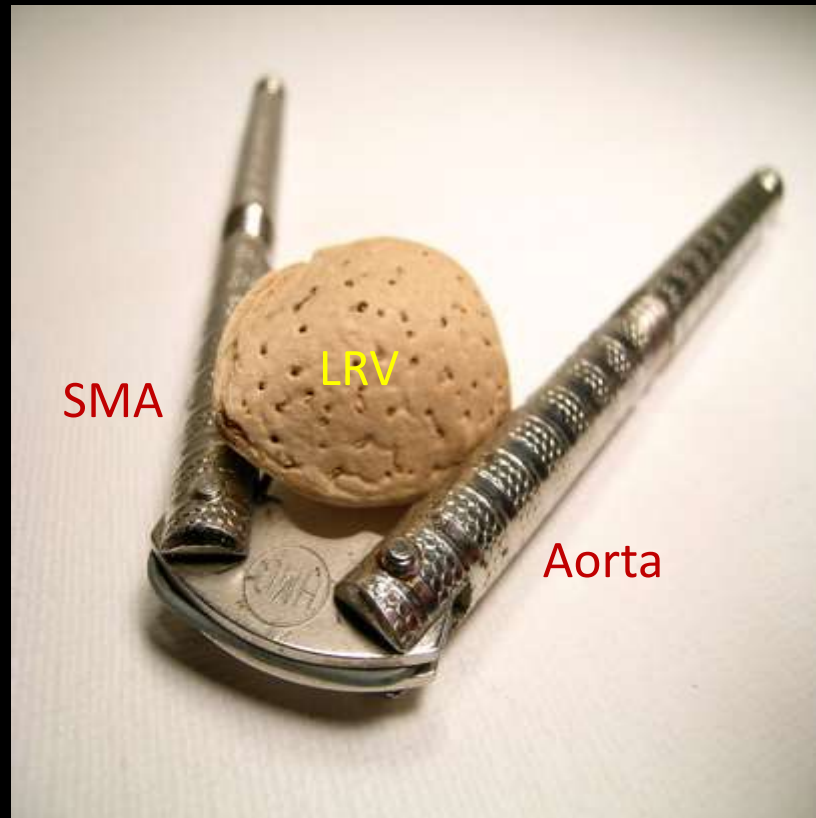
MSS Meeting  
January 21, 2015





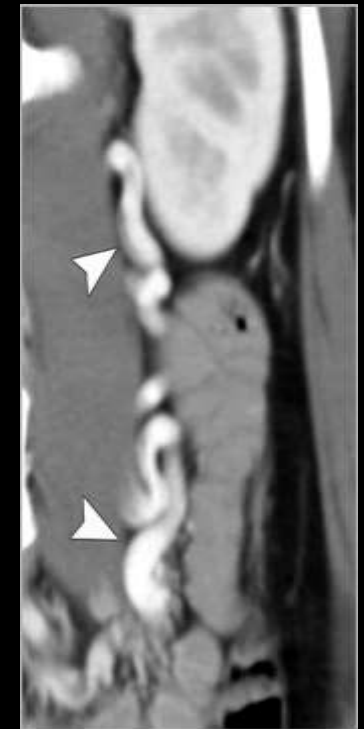


# Nutcracker Syndrome



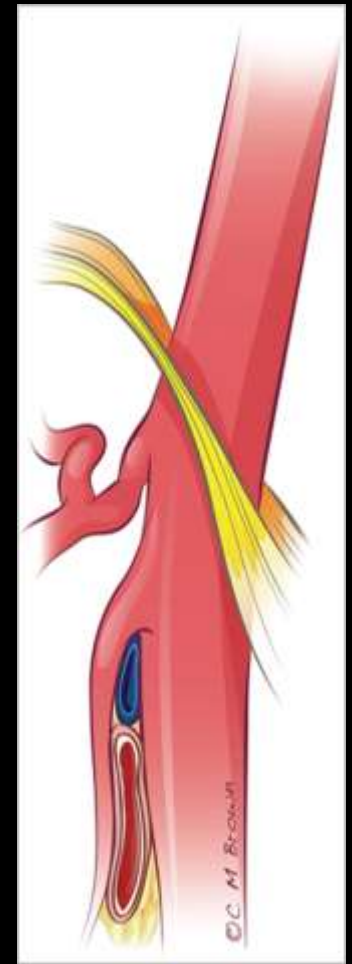
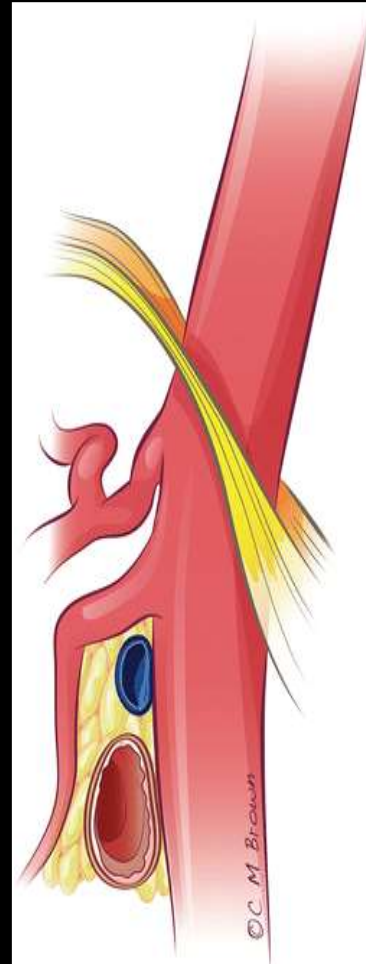
# Nutcracker Syndrome

- Compression the LRV by SMA
- It causes dilatation of the left renal vein, left gonadal vein and the uterine vein in female and pampiniform venous plexus in male patients respectively
- If the dilatation becomes symptomatic, the term nutcracker syndrome is used
- The most frequent symptoms are hematuria, flank pain, pelvic varicosities in women and varicocele in men



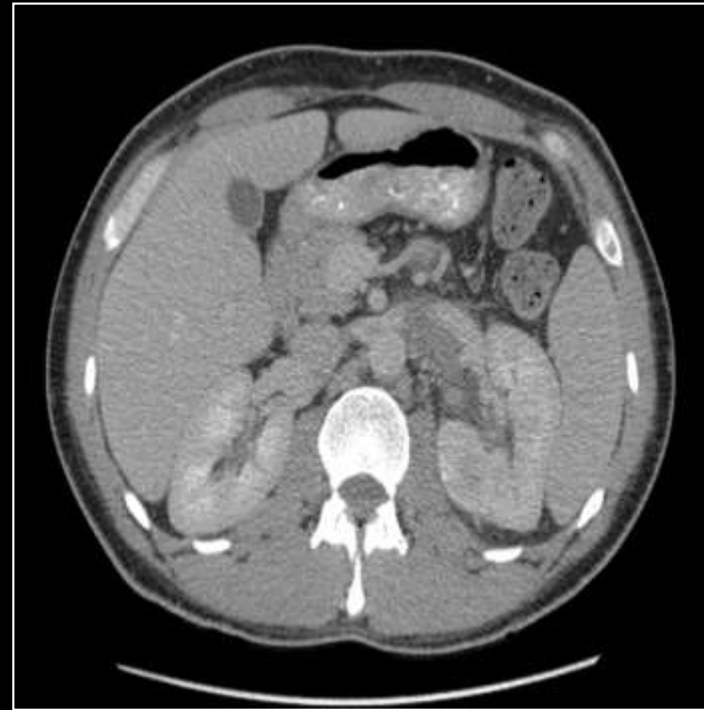
# Nutcracker Syndrome

- Findings:
  - Reduced Aorta: SMA angle (The normal angle between aorta and SMA is approximately  $45^\circ$  (38-65°))
  - Left renal vein compression
  - Pressure gradient  $>3$  mmHg on renal venography



# Nutcracker Syndrome

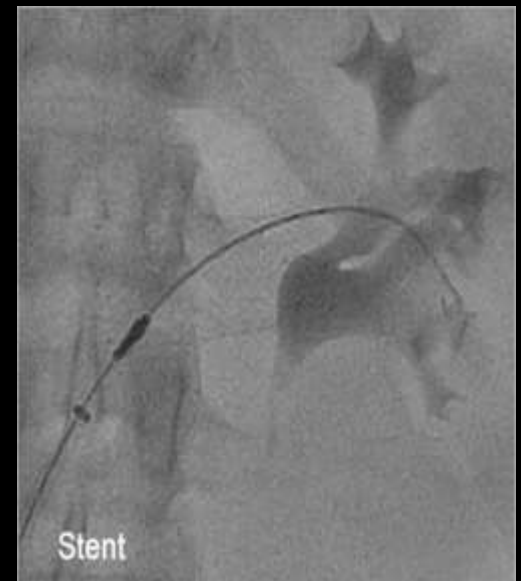
- Complications:
  - Can precipitate renal vein/gonadal vein thrombosis
  - Pelvic congestion syndrome



# Nutcracker Syndrom

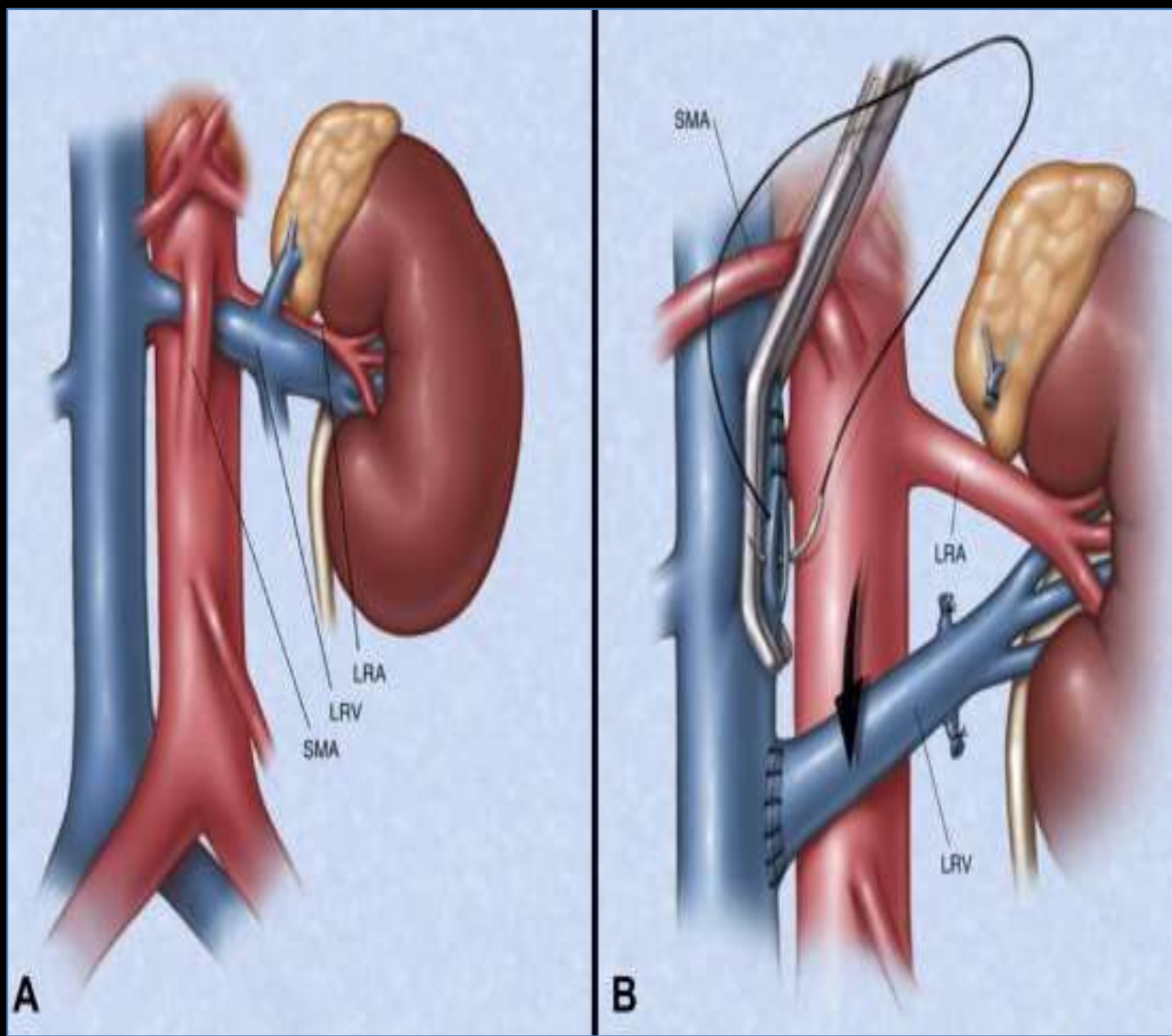
- Treatment should be started strictly when it is causing symptoms (hematuria and left flank pain):

- Angioplasty + stenting
- Surgical





# Nutcracker Syndrome



# Ovarian vein thromb

- Postpartum patients
- Incidence 1:600-1:2000 deliveries
- Pain in the lower abdomen and fever which usually appears approximately 10 days postpartum with no response to antibiotic treatment
- ~80-90% of cases, the right ovarian vein is involved



# Ovarian vein thrombosis

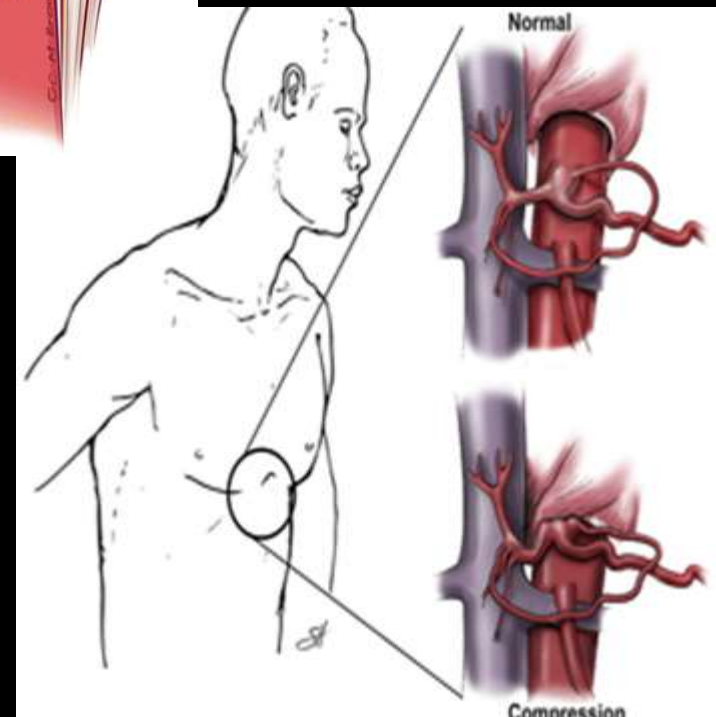
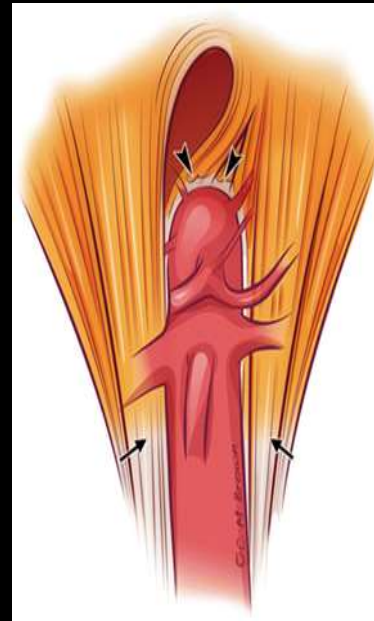
- Dx: CT with contrast and or US with Doppler
- Complications: PE
- Treatment and prognosis: anticoagulation and antibiotics
- Differential diagnosis: hydroureter; acute appendicitis

# Mesenteric Duplex Scanning >70% stenosis

	PSV	EDV
• <b>Celiac artery</b>	>250	>55
• <b>SMA</b>	>275	>45

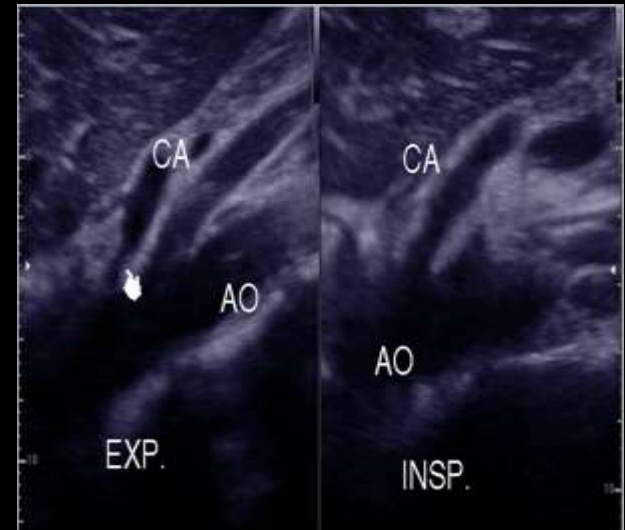
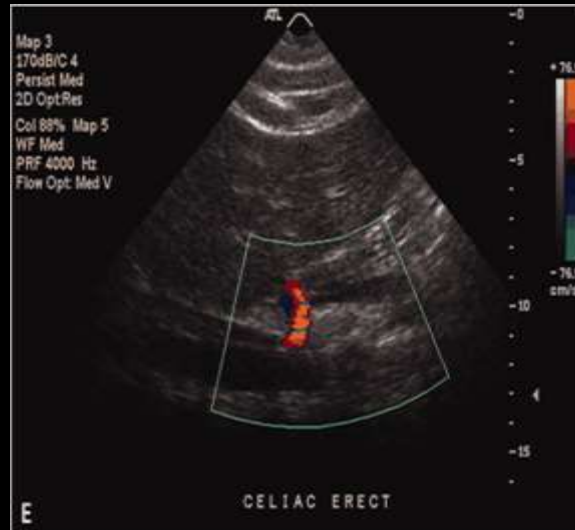
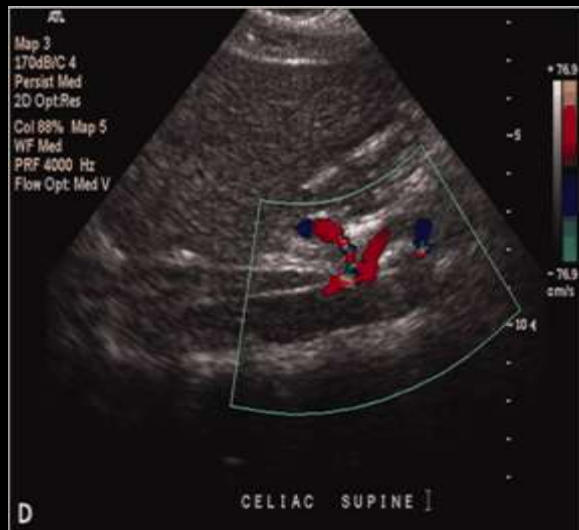
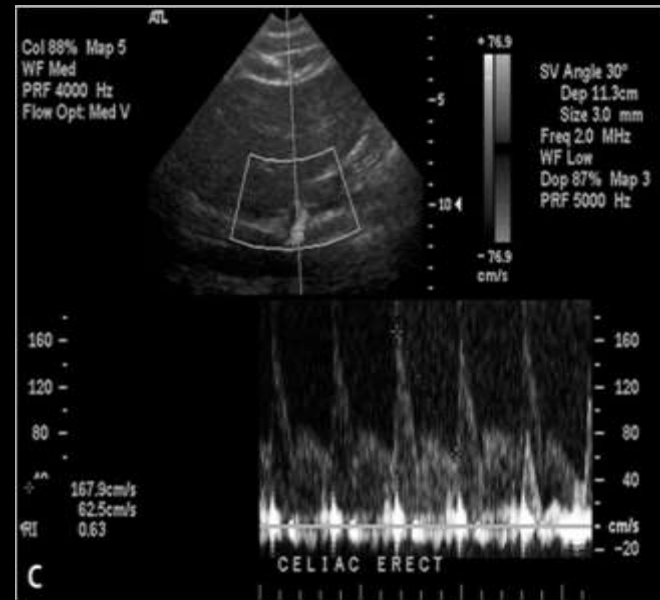
# Median Arcuate Ligament Syndrome

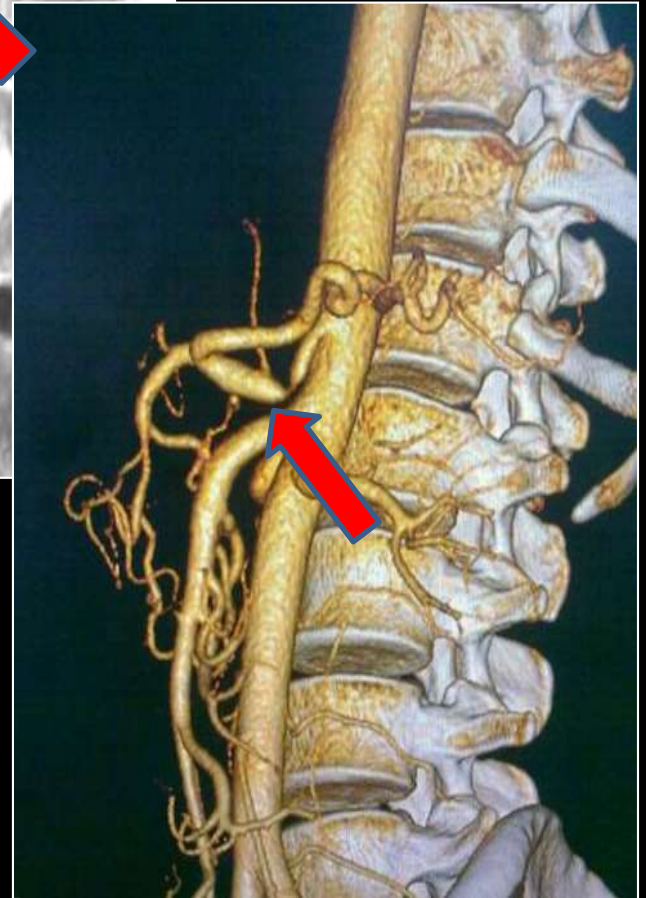
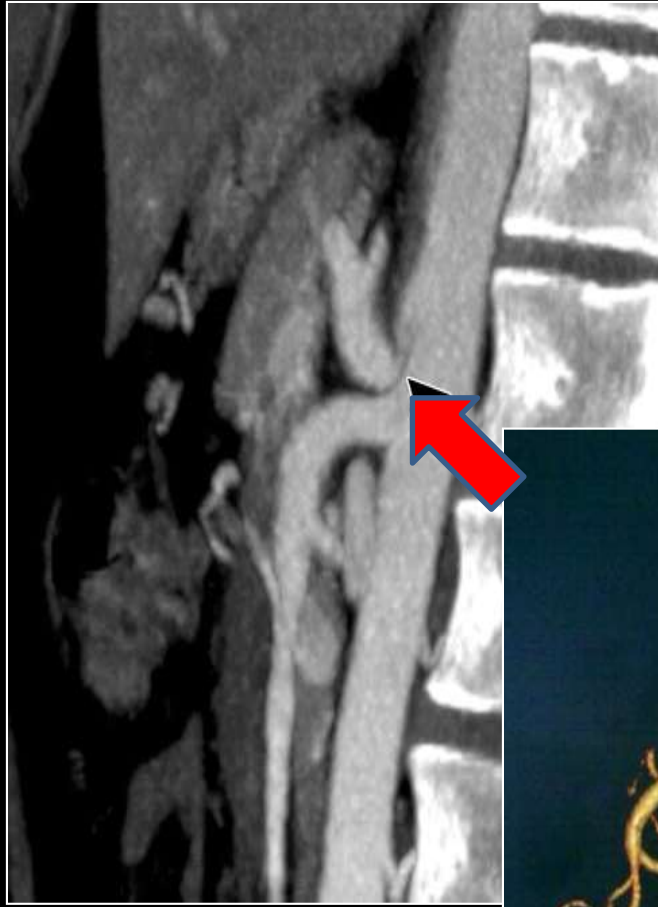
- The median arcuate ligament is a fibrous arch that unites the diaphragmatic crura on either side of the aortic hiatus and passes superior to the origin of the celiac axis
- In MALS, compression of the celiac axis, compromising blood flow and causing symptoms
- In some people, this ligament has a low insertion point and may compress the coeliac trunk.



# Median Arcuate Ligament Syndrome

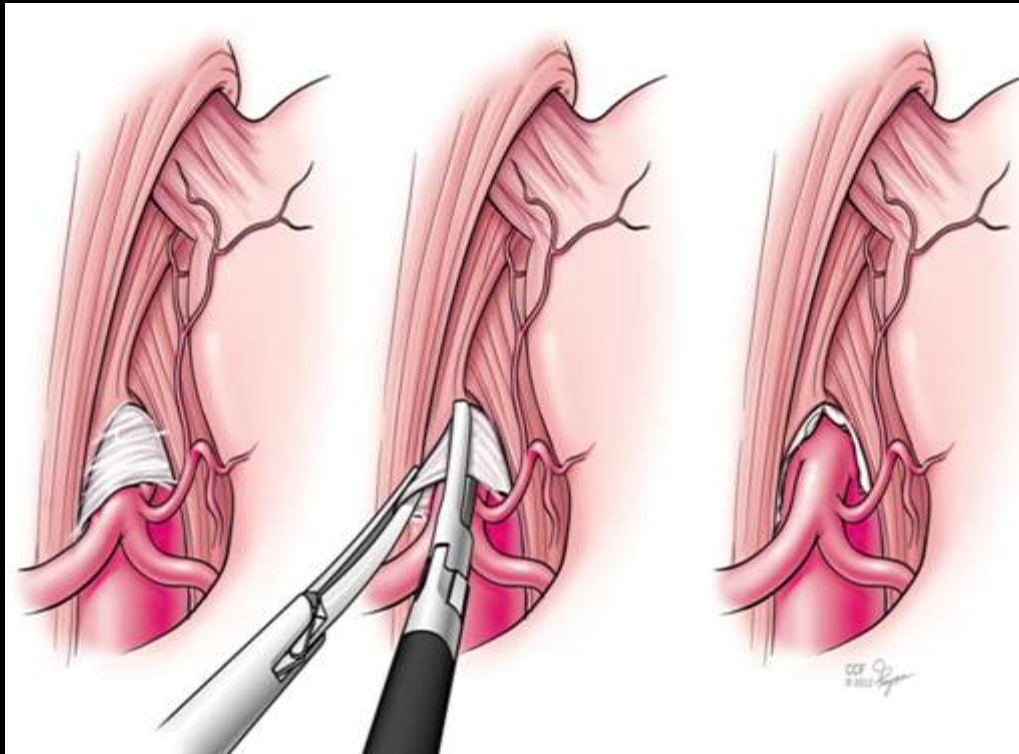
- The typical age of presentation is 20 to 40 year old
- Improvement in symptoms: inspiration and erect position





# Median Arcuate Ligament Syndrome

- Treatment: Symptomatic patients are treated with surgical decompression. This is usually performed laparoscopically by dividing the median arcuate ligament.





# Renal Duplex Criteria >70%

**Renal Artery Stenosis  
Renal/Aortic Ratio**

**PSV**

**<70%**

**180-200**

**<3.5**

**>70%**

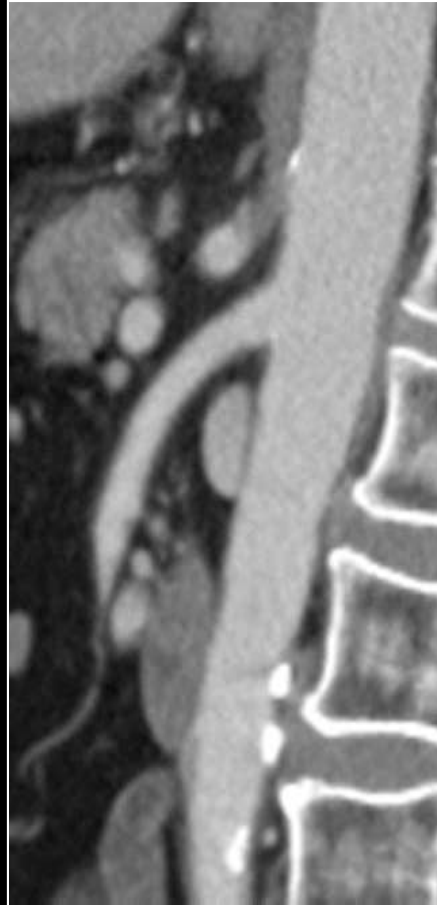
**>200**

**>3.5**

**Occlusion**

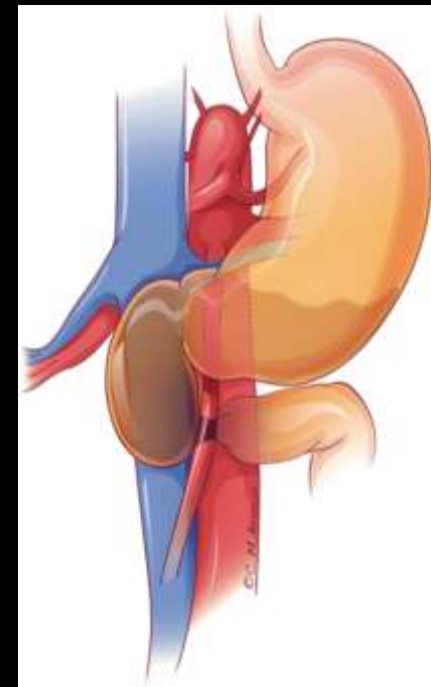
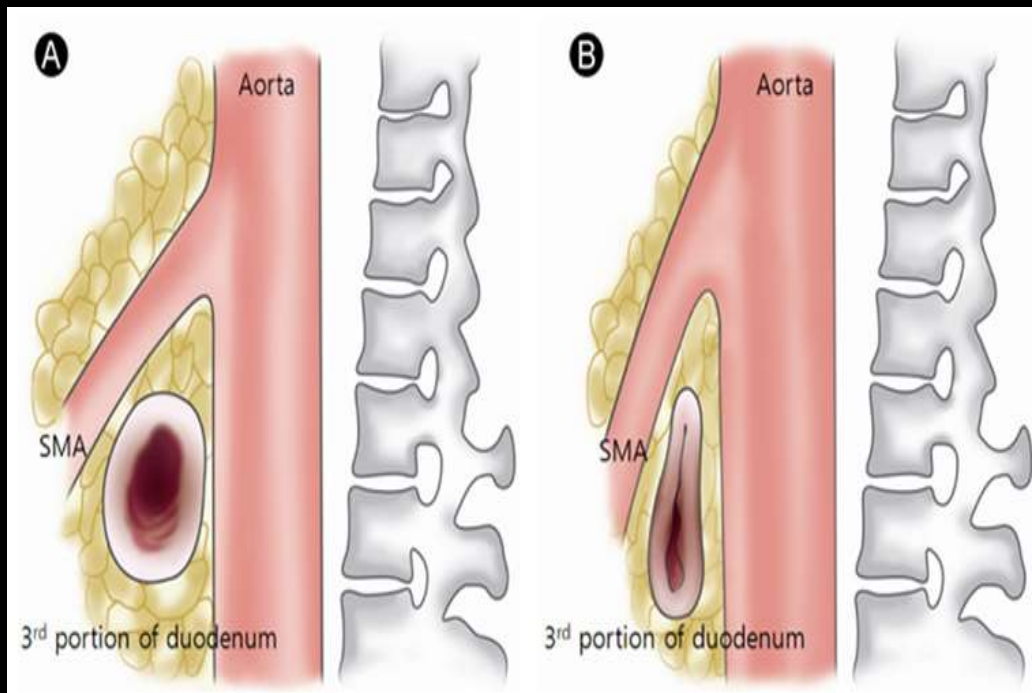
**No signal**





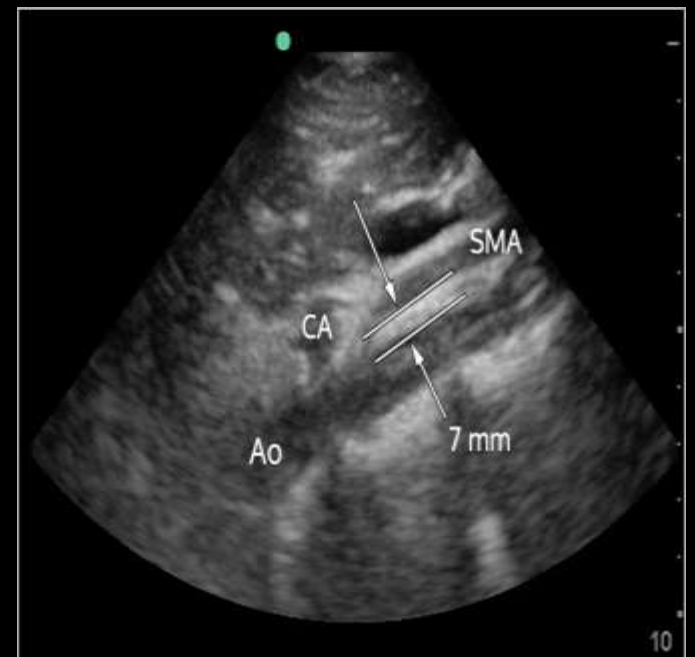
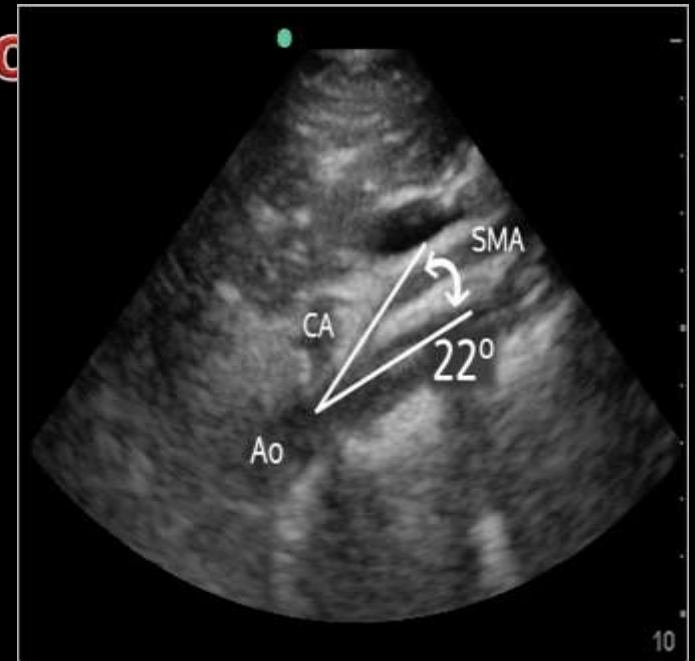
# The Superior Mesenteric Artery Syndrome a.k.a. Wilkie Syndrome

- Classic presentation: recurrent postprandial distension and vomiting
- SMA syndrome is a rare condition (3%): the third (transverse) portion of the duodenum is mechanically blocked by the narrow angle between the SMA and the aorta. This results in proximal obstruction



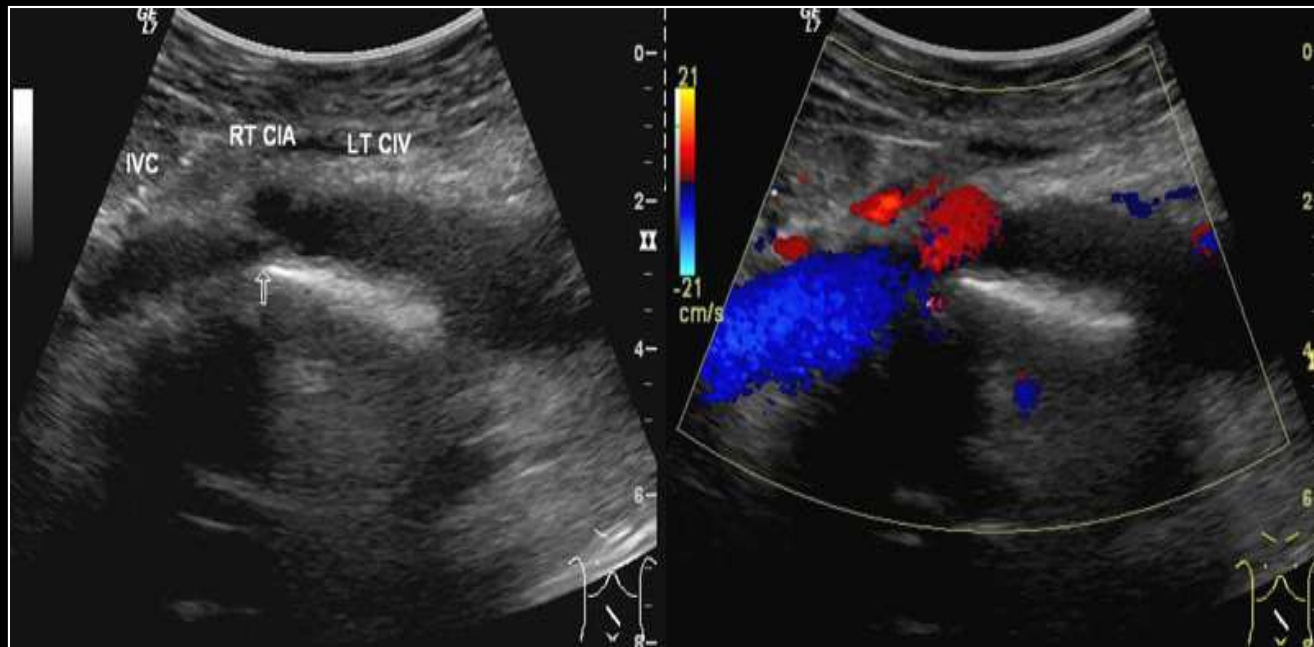
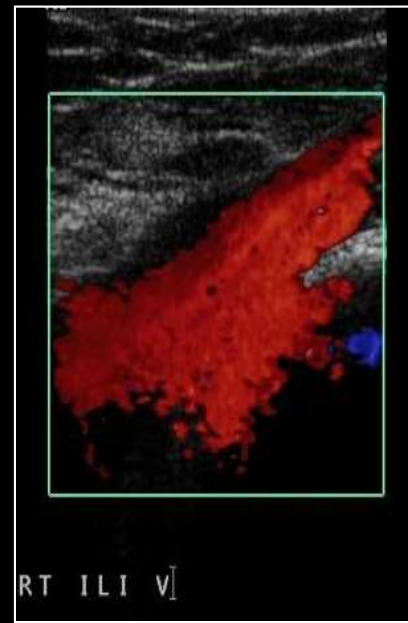
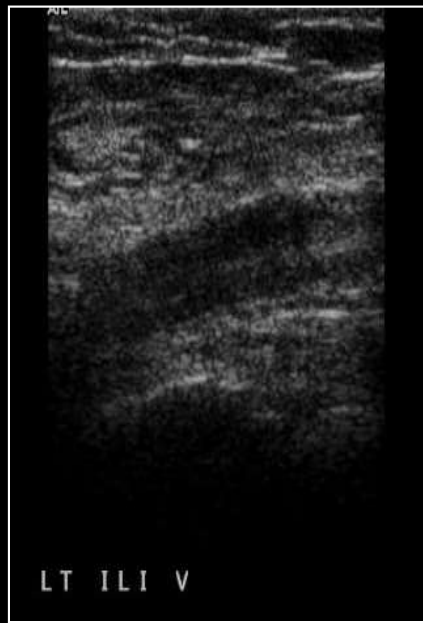
# The SMA Syndrome

- A normal aortomesenteric angle is approximately 45 degrees, and an aortomesenteric angle of 6-25 degrees confirms the diagnosis of SMA syndrome
- Additionally, a normal aortomesenteric distance is 10-28 mm. An aortomesenteric distance <8-10mm would suggest SMA syndrome



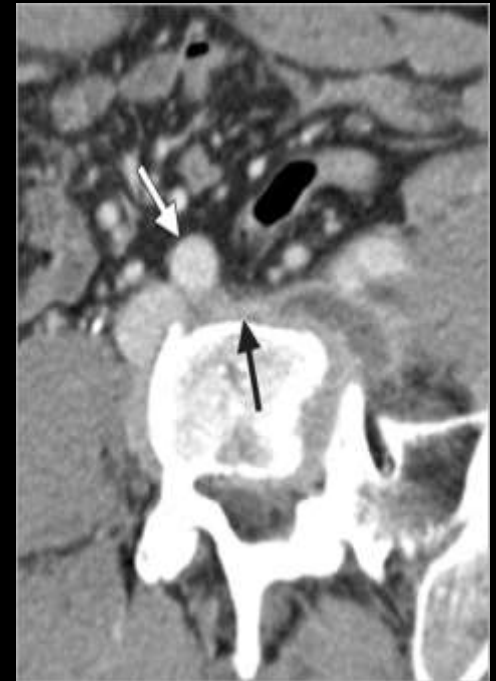
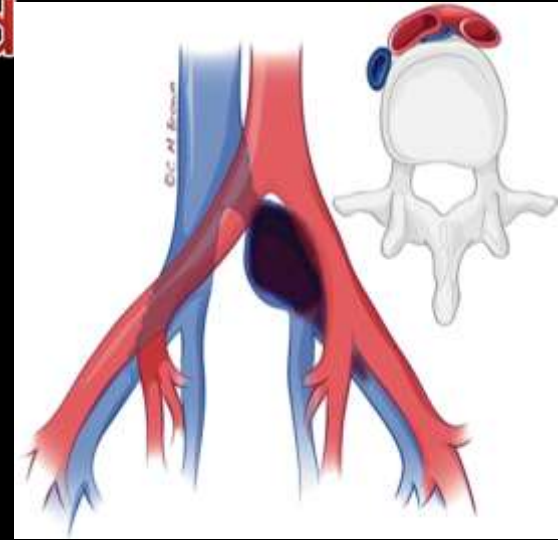
# The SMA Syndrome

- Initial management of SMA syndrome involves relieving the proximal obstruction via nasogastric tube decompression
- If conservative measures are not effective, or if the patient has severe recurrent symptoms they should be referred for surgical intervention: duodenojejunostomy or gastrojejunostomy



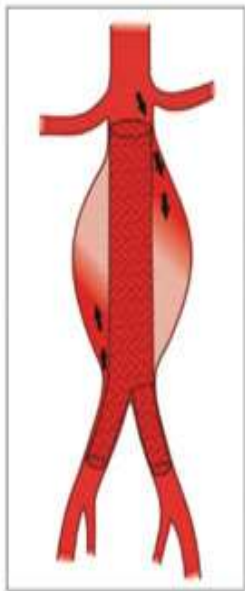
# May-Thurner synd

- DVT resulting from chronic compression of the left common iliac vein against the lumbar vertebrae by the overlying right common iliac artery
- Treatment and prognosis: thrombolysis and stenting

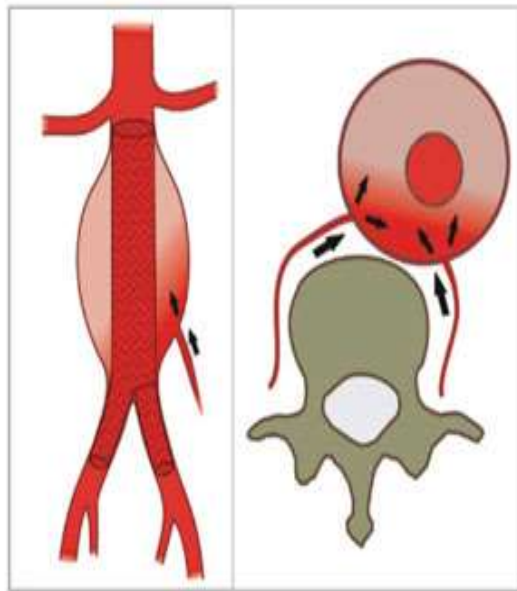




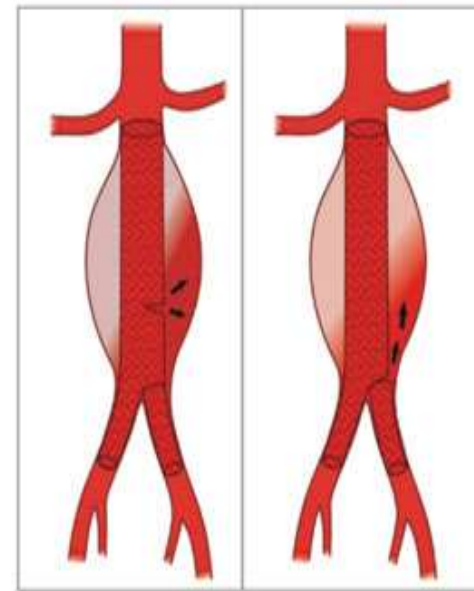




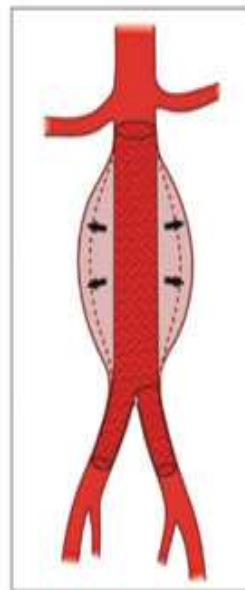
Type I



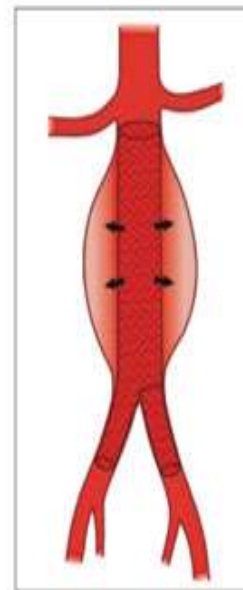
Type II



Type III



Type IV

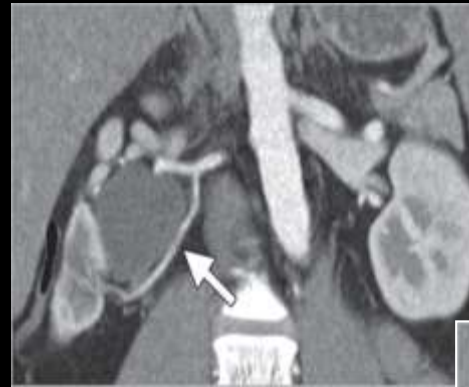
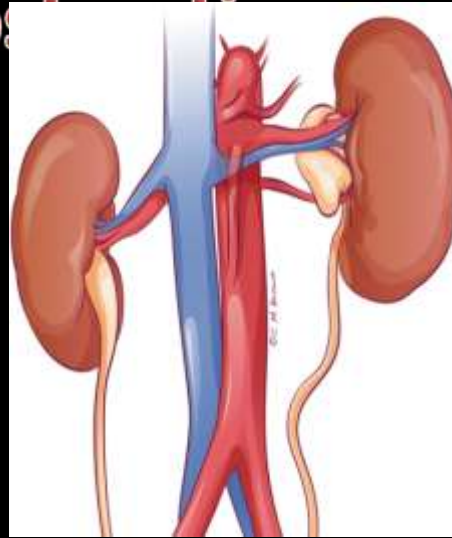


Type V

# UPJ Obstruction

## Causes:

- **Congenital (neonatal)**
  - idiopathic and often unknown; proposed causes include
    - abnormal muscle arrangement at the UPJ
    - anomalous collagen collar at UPJ
    - ischemic insult to UPJ region
    - urothelial ureteral fold
- **Adult**
  - preceding renal pelvic trauma
  - obstructing calculus immediately distal to UPJ
  - previous pyelitis with scarring
  - intrinsic malignancy, e.g. TCC
  - extrinsic ureter compression or encasement
    - fibrosis (retroperitoneal fibrosis)
    - malignancy/lymphadenopathy
    - an aberrant, accessory, or early-branching lower pole segment vessel



# Fibromuscular dysplasia (FMD)

- A non-inflammatory, non-atherosclerotic angiopathy of medium-sized arteries
- Fibrous or fibromuscular thickening of the arterial wall
- Young women with a female to male ratio of 3:1
- FMD is frequently asymptomatic
- Symptomatic patients commonly present with hypertension, stenosis, dissection



# Fibromuscular dysplasia (FMD)

- Some arteries more frequently involved:
  - renal arteries (one of the commonest sites of involvement)
  - extracranial internal carotid arteries
  - vertebral arteries
  - iliac arteries
  - mesenteric arteries
- Complications: spontaneous dissection, distal embolisation (of thrombus formed in aneurysm), aneurysm rupture
- Radiographic features: String of beads sign
- FMD responds well to angioplasty, with high long-term patency rates. A stent is generally not required

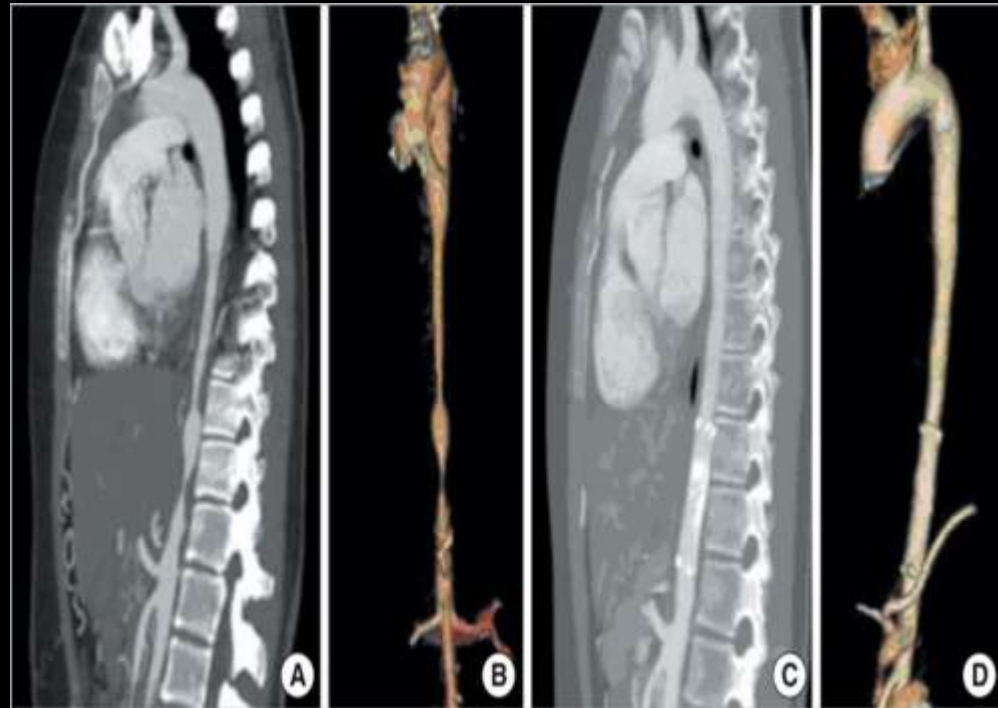
# Duplication of the Inferior Vena Cava

- Occurs in up to 3% of the population.
- The left renal vein then typically crosses anterior to the aorta to join the right IVC usually at the level renal veins
- Anatomic variations of the inferior vena cava and its tributaries are generally asymptomatic, but they must be recognized during vena cava filter placement because collateral pathways for emboli to bypass the filter may exist
- Double IVC necessitates a single suprarenal or paired caval filters



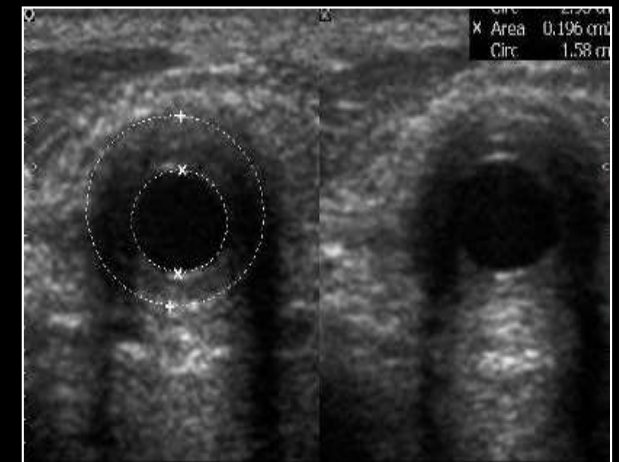
# Takayasu Arteritis (TA)

- **AKA Pulsless disease**
- A strong young Asian female predominance
- Induces clinically varied ischemic symptoms due to stenotic lesions or thrombus formation
- Usually aorta and large arteries including PA

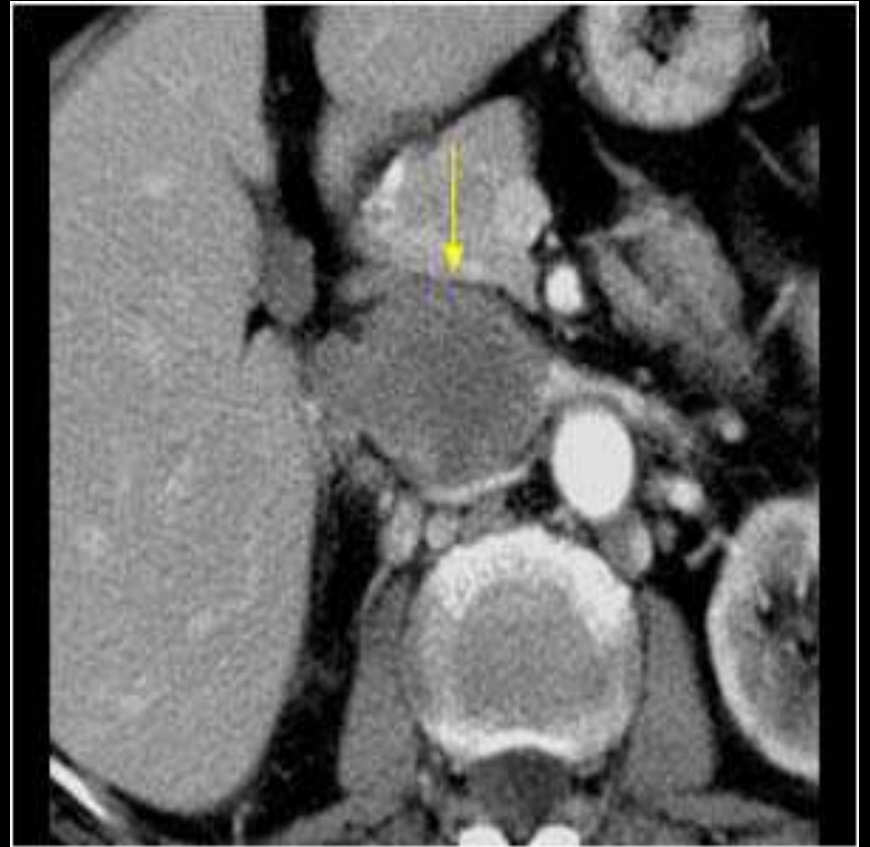


# Takayasu Arteritis

- Two phases of the disease are classically described:
  - pre-pulseless phase: characterized by nonspecific systemic symptoms
  - pulseless phase: presents with limb ischemia or renovascular hypertension
- **Macaroni sign**
- Treatment is with systemic steroids and judicious use of angioplasty.







# Tumor thrombus

- Tumor thrombus is often seen in renal cell carcinoma (20%), where this tumor invades the renal vein and migrates proximally - occasionally reaching the right atrium
- It is composed of both tumor and thrombotic components
- Tumor thrombus may not be adherent to the wall and in some cases can be removed by retrograde fashion at nephrectomy.
- The presence of tumor thrombus affects renal cell carcinoma staging

# Tumor thrombus

- Other tumors which may show this phenomenon are
  - Hepatocellular carcinoma
  - Adrenal Carcinoma
  - Retroperitoneal Angiosarcoma, Liposarcoma

# Gallbladder Varices in Chronic Portal Vein Occlusion

- Gallbladder varices, in particular, represent porto-portal collaterals, found in 30% of patients with portal vein thrombosis
- Clinical significance is their propensity to bleeding during surgery
- The preoperative recognition and evaluation of the varices, if cholecystectomy is scheduled, is important in order to avoid hazardous complications

**Thank You**