

The Major Collateral Pathway between Celiac axis and SMA (superior mesenteric artery)

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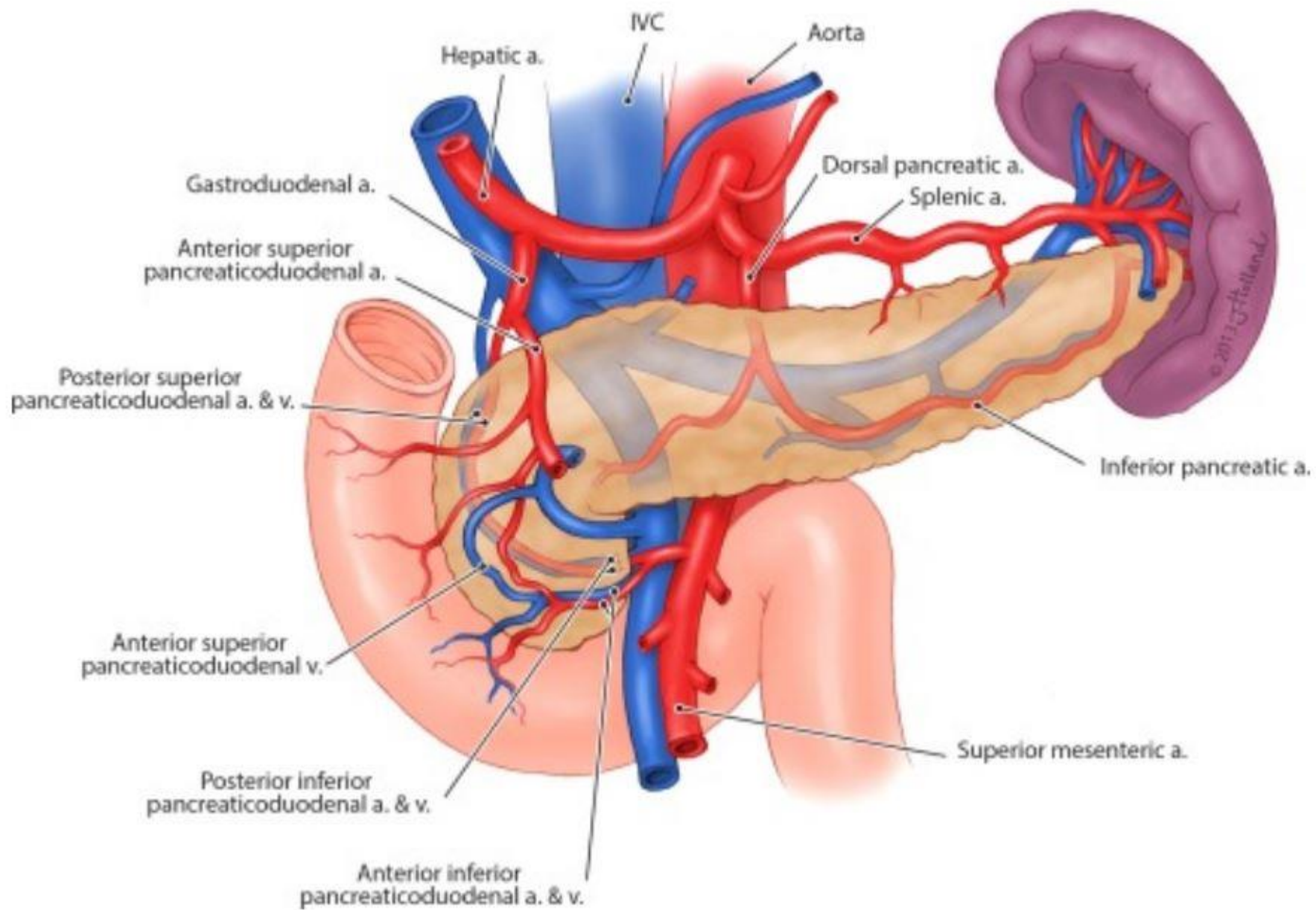
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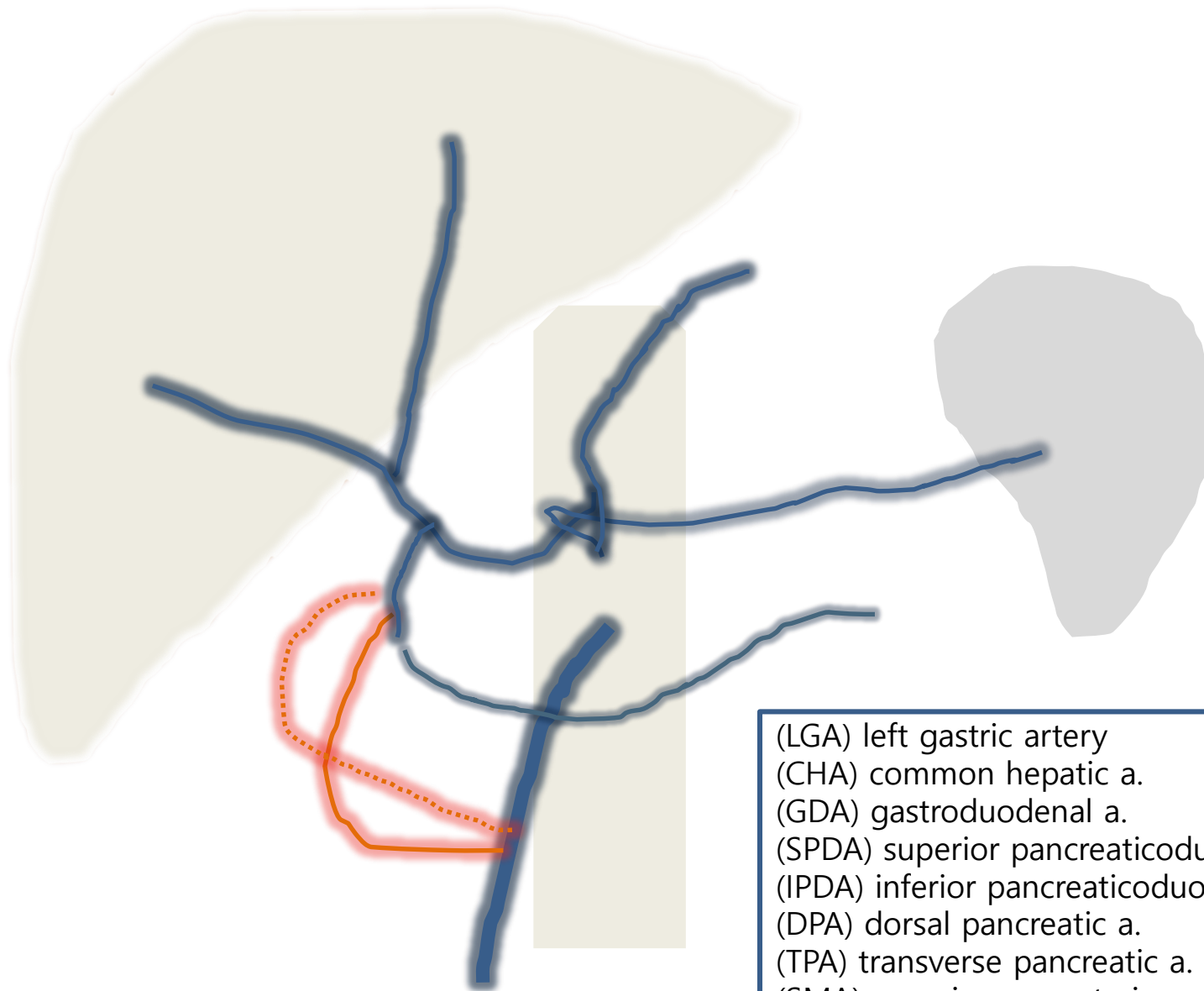
Learning Objectives (1)

- ❖ To explain the basic anatomy between celiac axis and SMA with its' major anatomical variant and demonstrating the MDCT and CT angiography finding.

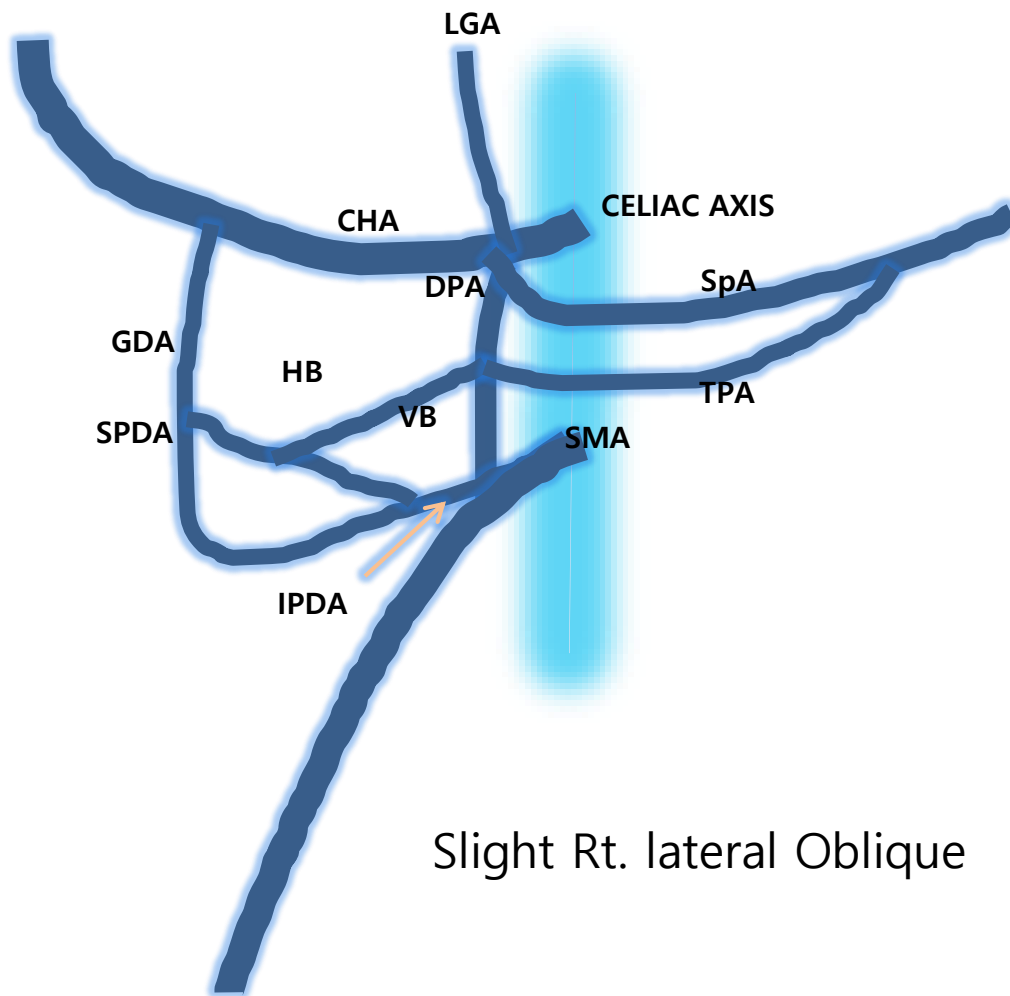
Major Collateral Pathways between Celiac Axis and SMA

- ✓ Pancreaticoduodenal arcades
- ✓ Dorsal pancreatic artery
 - longitudinal and transverse subtype pathway
- ✓ Arc of Bühler
- ✓ Arc of Barkow





(LGA) left gastric artery
(CHA) common hepatic a.
(GDA) gastroduodenal a.
(SPDA) superior pancreaticoduodenal a.
(IPDA) inferior pancreaticoduodenal a.
(DPA) dorsal pancreatic a.
(TPA) transverse pancreatic a.
(SMA) superior mesenteric a.
(SpA) splenic a.



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(SMA) superior mesenteric a.
(SpA) splenic a.
(HB) horizontal branch
(VB) vertical branch



Normal vs HM trunk+GSp trunk (n=4)

a.



HM trunk+Sp+LG vs HSp trunk+LG+SM (n=1)

b.



HM trunk+GSp trunk vs HGSp trunk; CH-LG (n=1)

c.



HSpM trunk+LG vs CM trunk (n=1)

d.



Normal vs CM trunk (n=1)

e.

Figure 4: Schematic drawings of ambiguous celiac axis anatomy caused by the presence of two types of persistent anastomotic channels: (a–c) through a pancreaticoduodenal arcade and (d, e) through a vertical anastomosis. CH-LG = CHA originating from left gastric artery, CM = celiacomesenteric, GSp = gastrosplenic, HGSp = hepatogastrosplenic, HM = hepatomesenteric, HSp = hepatosplenic, HSpM = hepatosplenomesenteric, LG = left gastric artery, SM = superior mesenteric artery, Sp = splenic artery.

Learning Objectives (2)

- ❖ To depict the major medical problems related on the celiac axis and SMA involvement and related collateral pathway formation.

- I. Celiac axis (trunk) stenotic condition
- II. Median arcuate ligament syndrome
(vascular impingement)
- III. Complication of pancreatic head
involving disease (pancreatitis and
pancreatic cancer)

Celiac axis (trunk) stenosis/occlusion condition

- ✓ Atherosclerosis
- ✓ Trauma, procedure and operation relation, inflammation (pancreatitis), infection, rare vasculitis.
- ✓ Median arcuate syndrome -retrograde vascular flow incensement relation

Celiac axis stenosis

- ✓ Frequently encountered condition
- ✓ Rare significant ischemic bowel disease due to rich collateral circulation from superior mesenteric artery (SMA)
- ✓ Incidental, no symptomatic >> aneurysm, rupture (fetal condition - about 10-20%)
- ✓ Important collateral vessel
 - ① Pancreaticoduodenal arcade
 - ② Dorsal pancreatic artery - longitudinal and transverse subtype pathway

Segmental stenosis of celiac trunk probably due to atherosclerosis

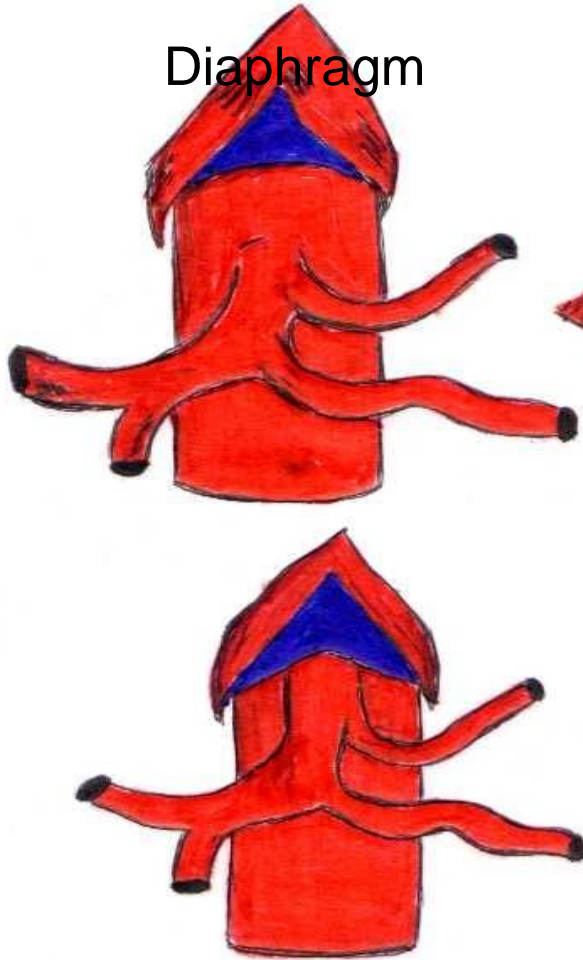


Median arcuate ligament syndrome (vascular impingement)

Median arcuate ligament

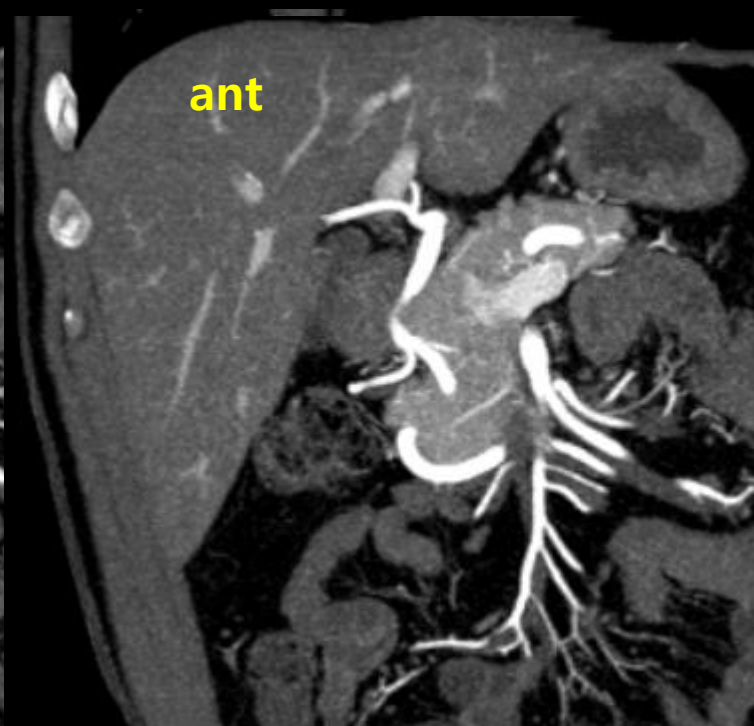
- ✓ Fibrous arch that connects the diaphragmatic crura to form the anterior margin of the aortic hiatus
- ✓ Low-lying and cross over the proximal portion of celiac axis (10-20%)
- ✓ Nonobstructive anatomic variant or compression of celiac axis resulting in mesenteric ischemia

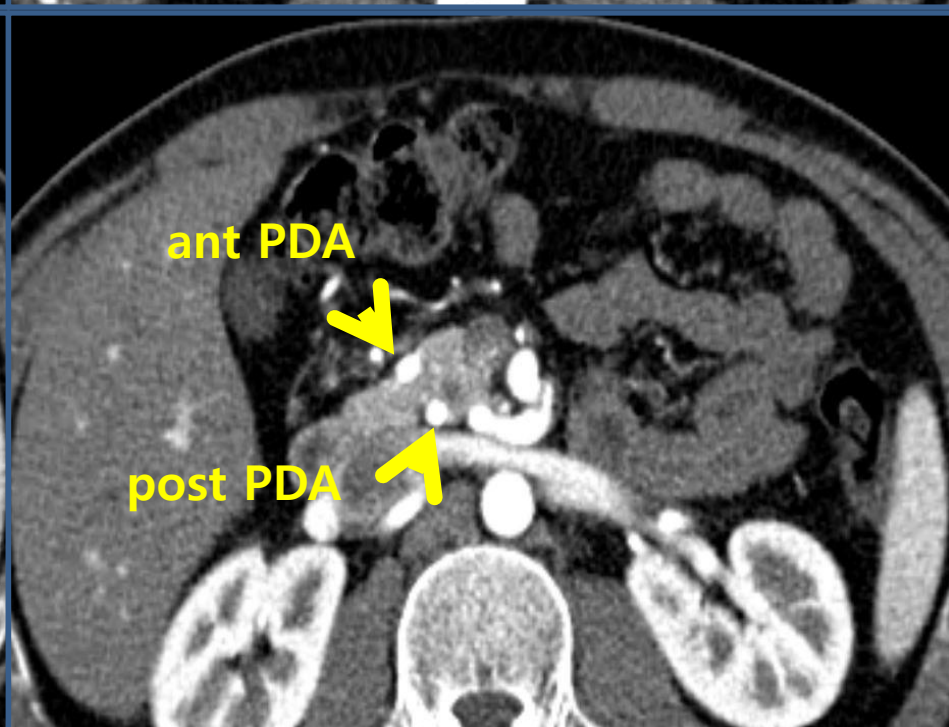
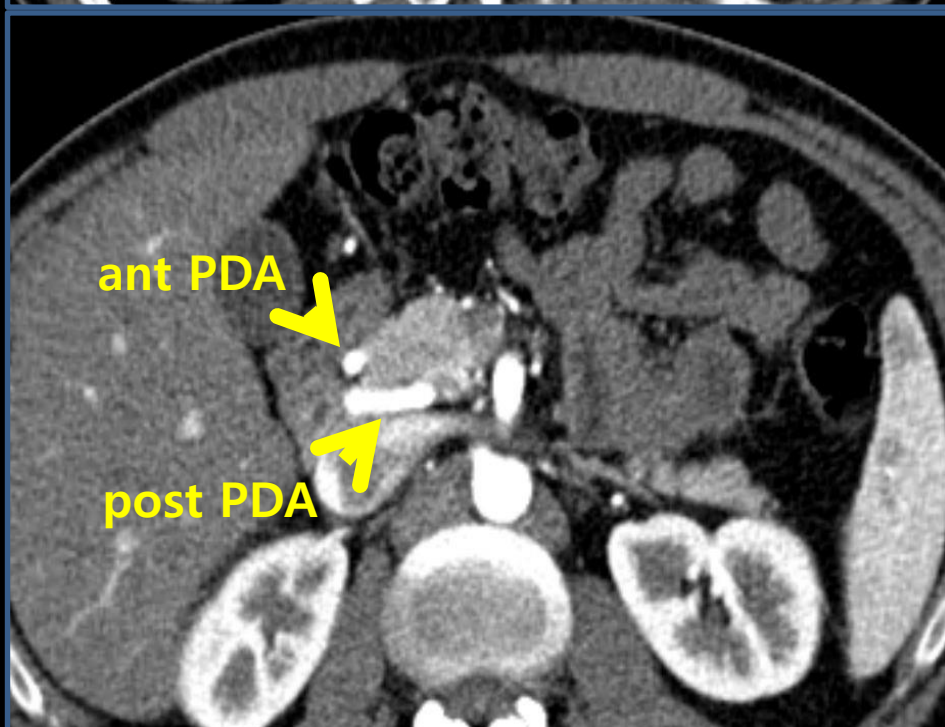
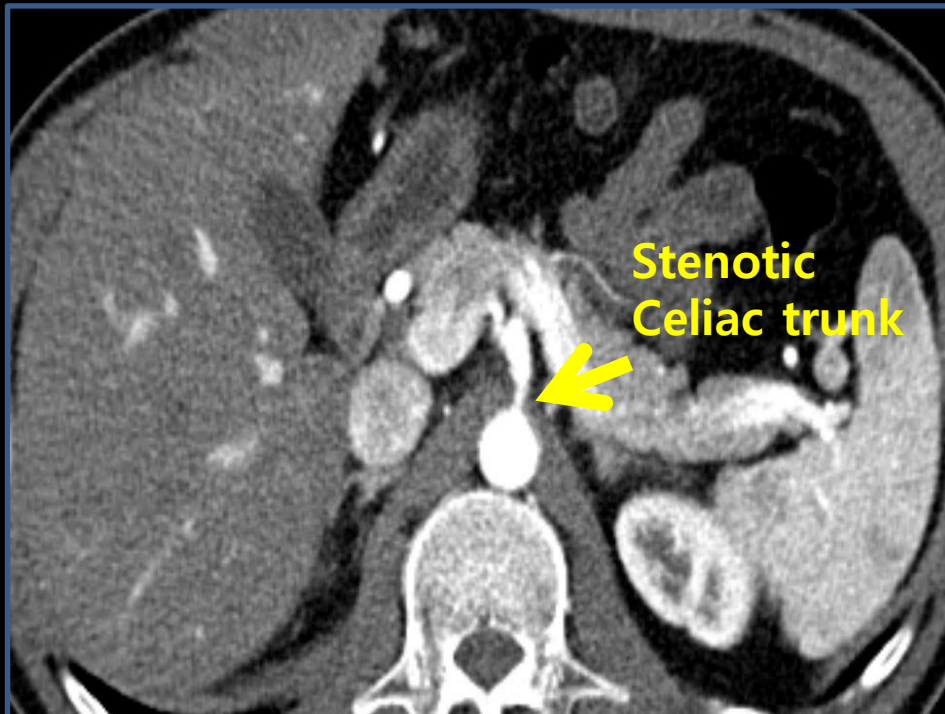
Diaphragm

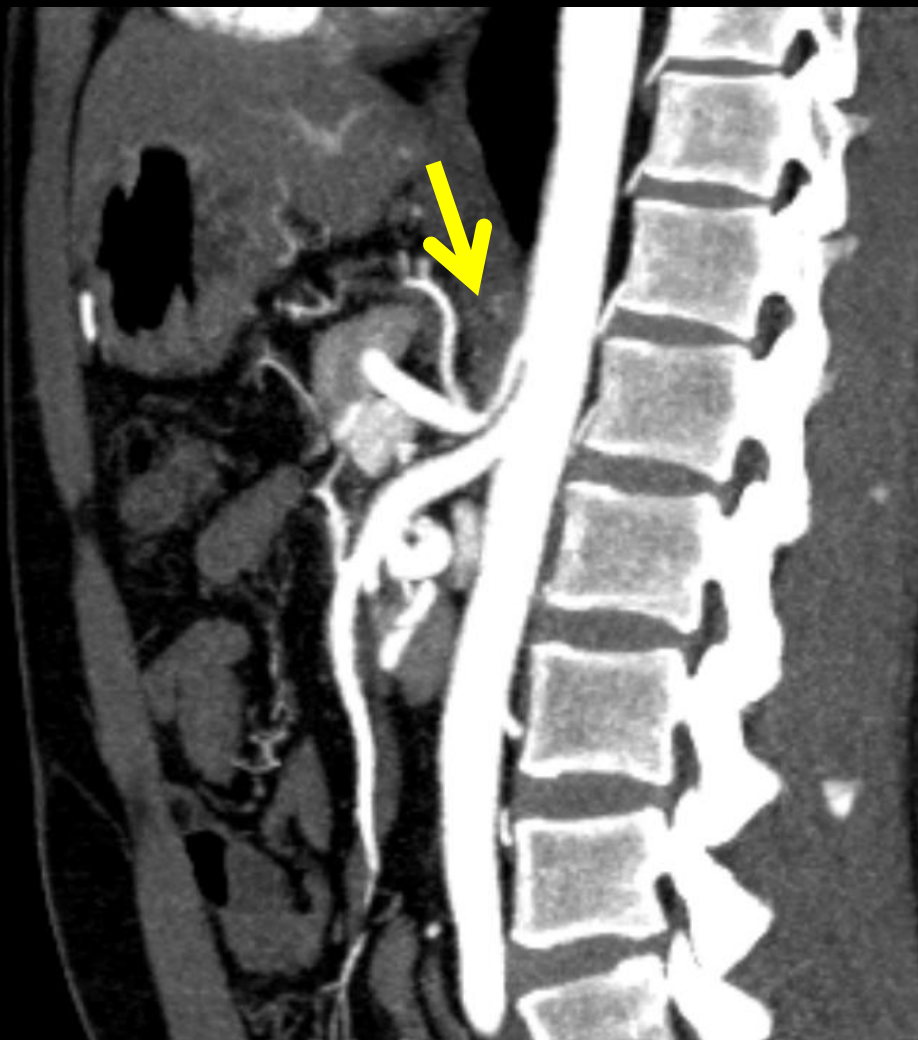


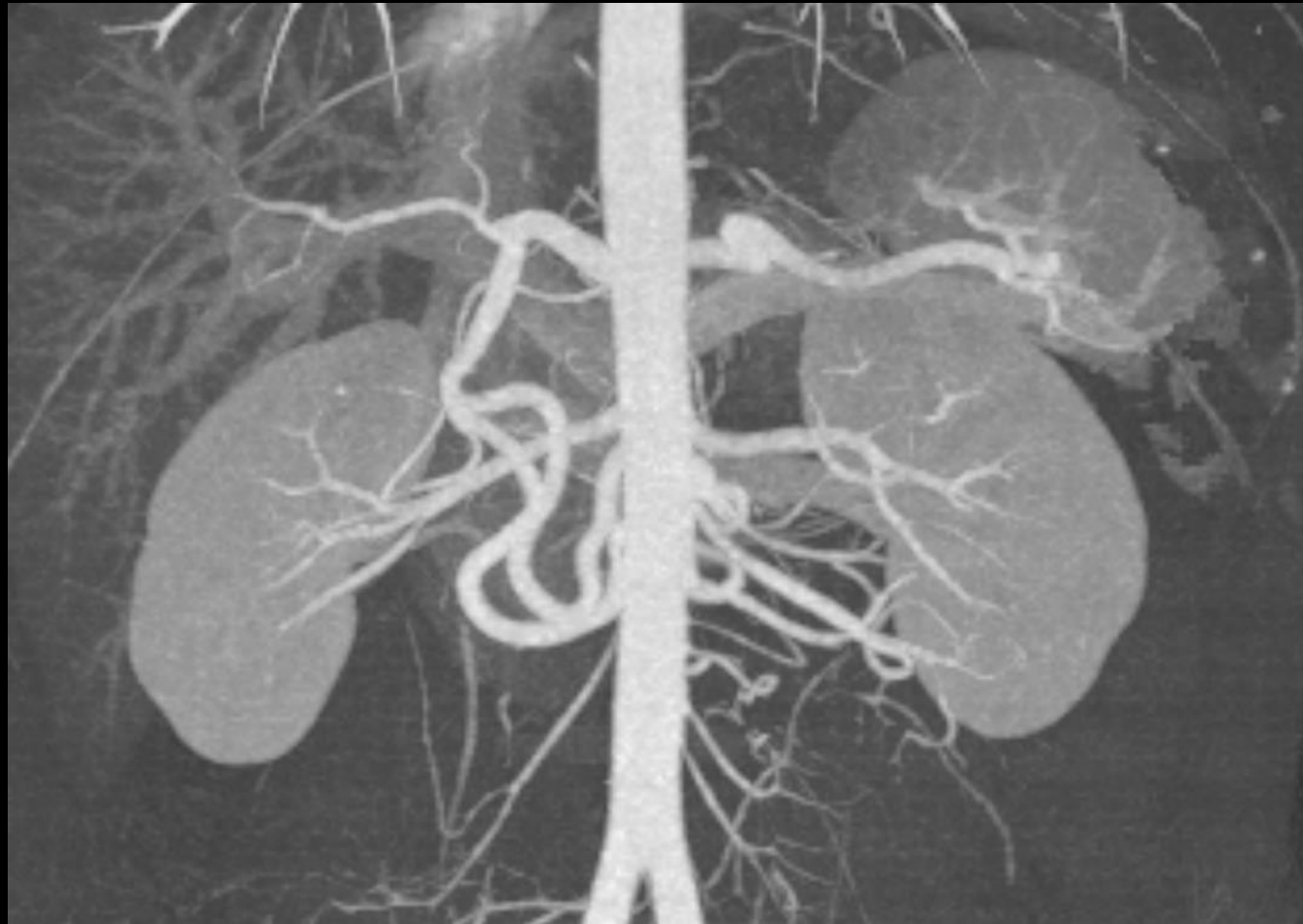
Arcuate ligament











MDCT imaging findings

- ✓ Focal narrowing of the proximal celiac axis
- ✓ Characteristic hooked appearance caused by the inferior displacement of the celiac axis by the median arcuate ligament.
- ✓ Post-stenotic dilatation
- ✓ Collateral vessel formation

Complication of median arcuate ligament syndrome

- ✓ Dilatation of the pancreaticoduodenal collateral pathways
- ✓ Visceral artery aneurysm formation
- ✓ Aneurysm rupture and bleeding

Complication of pancreatic disease

IPDA Aneurysms rupture in pancreatitis patient

53 M Alcohol Abuse Hx.



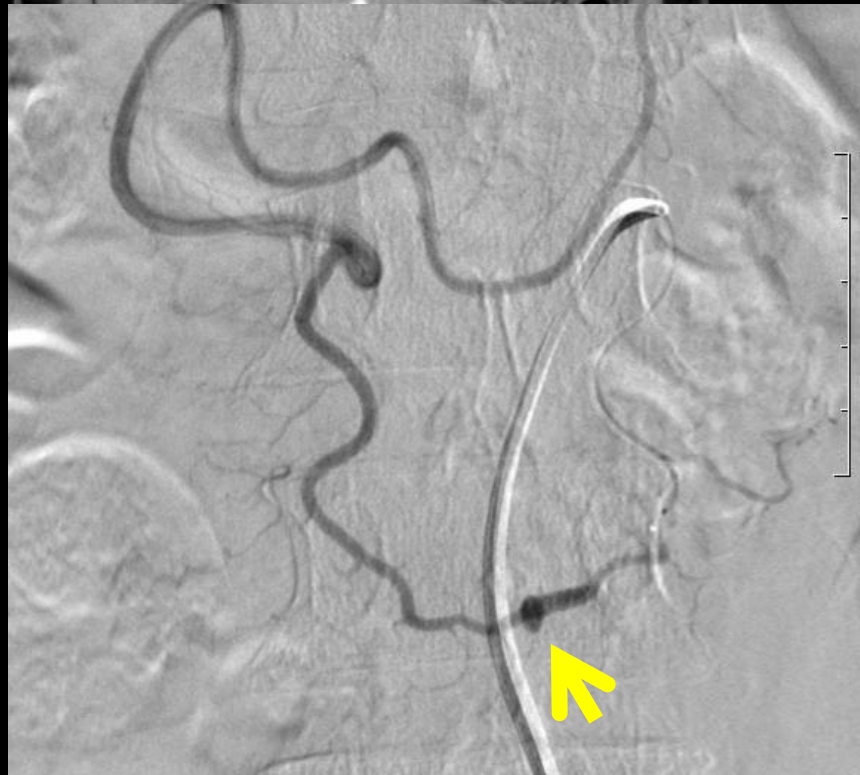
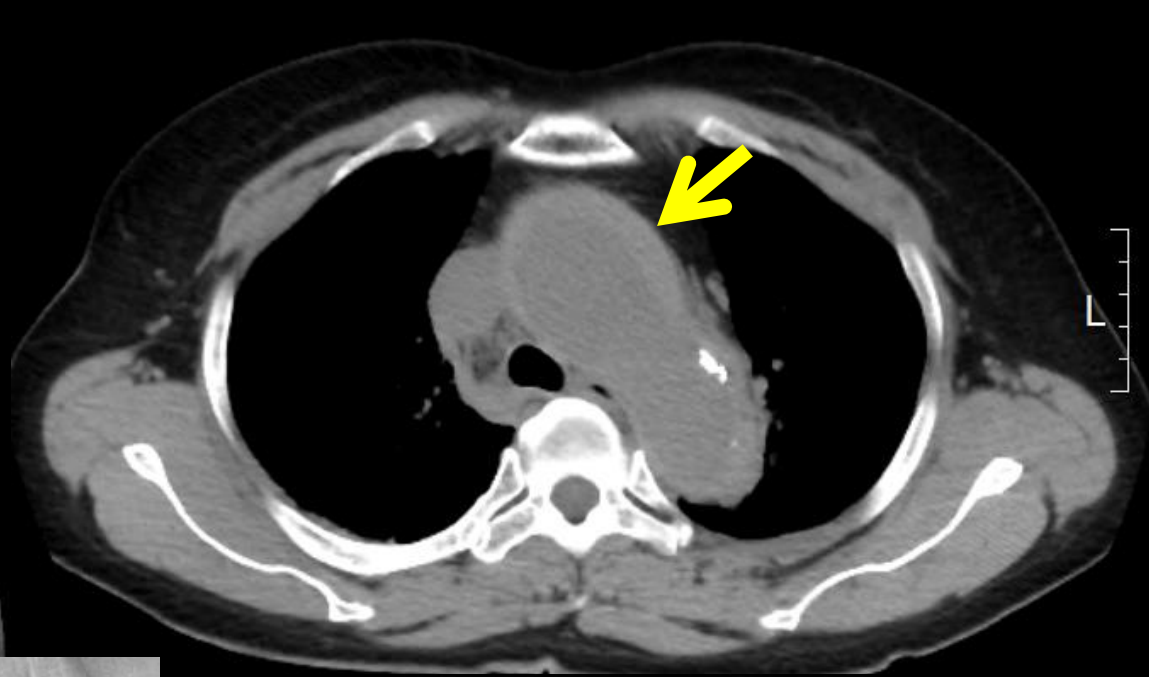
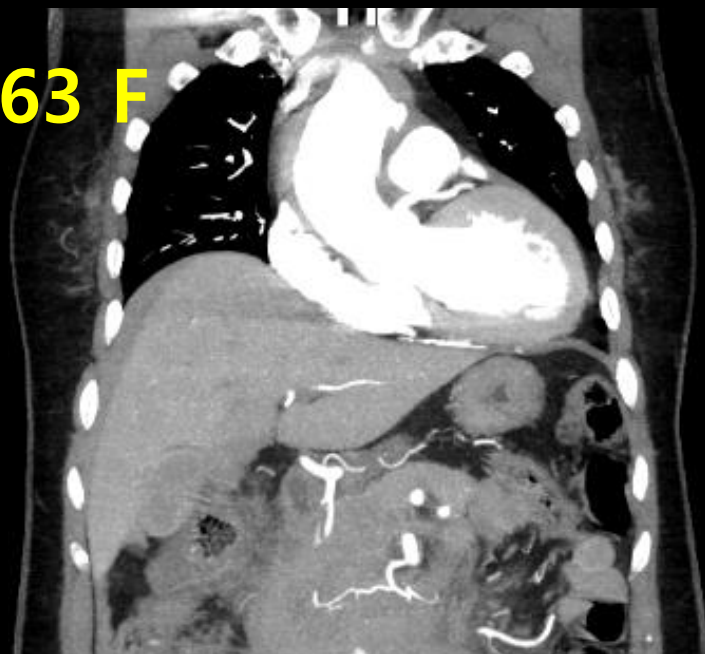
Endovascular embolization

Lipiodol 3cc + NBCA 1cc mixture



**IPDA Aneurysms rupture in
diffuse arterial hematoma**

63 F



Treatment

For Celiac stenosis

- ✓ Revascularization of celiac stenosis - angioplasty or stenting
- ✓ Surgical division of the median arcuate ligament in patients with median arcuate ligament syndrome
- ✓ Bypass graft between the celiac/hepatic artery and the SMA.

For aneurysm or rupture

- ✓ Endovascular therapy - usually preferred due to lower morbidity of the procedure
- ✓ Surgery
- ✓ Combination treatment

Conclusion

- ✓ It is important to know the MDCT and CT angiography finding of the various collateral pathway between celiac axis and SMA.
- ✓ We depict the major medical problems related on the celiac axis and SMA involvement and related collateral pathway formation.