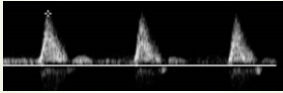


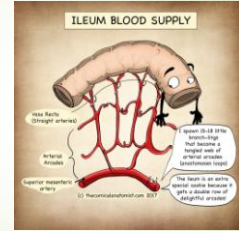
Mesenteric Artery Duplex

Nghi Jong



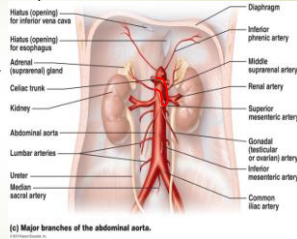
Overview

- Mesenteric artery anatomy
- Clinical indications
- U/S technique & method
- Mesenteric artery waveforms
- Stenosis guidelines
- Common pathologies



Vascular Anatomy

- Aorta
- Diaphragm
- **Coeliac axis** – hepatic and splenic artery
- Renal arteries
- **SMA**
- **IMA**



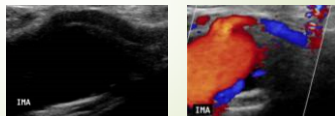
Clinical indications



- Post prandial pain – most common
- Rapid weight loss – ‘fear of eating’ (Kalkman & Geelkerken, 2017)
- U/S correlation (patient had a recent CT showing pathology)
- F/U for patency of mesenteric stents

Technique

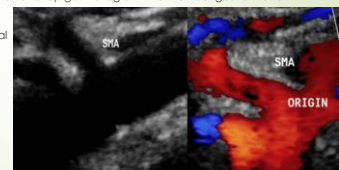
- 6-8 hour fast
- Vascular protocol
- Low frequency curvilinear probe (C5-1)
- High frequency linear probe (L9-3) – low BMI patients



Method

- Patient supine
- Sustained graded compression over epigastric region – wait for the gas to move
- **Optimise image**
- Window - Trans or longitudinal
- SD at origin and distal

B-mode - ↓ dynamic range, ↓ sector width, ↑ penetration
 Colour - ↑ colour gain, ↑ penetration
 Spectral - ↑ spectral gain, ↑ sweep speed, adjust scale



Waveforms appearances

- Pre-prandial
 - CA has continuous forward flow = low resistance required in the hepatic and splenic artery circulation
 - SMA and IMA has a short reversal flow in end systole = high resistance
- Post-prandial
- Stenotic vessel

U/S Diagnosis

- Normal
- Fixed stenosis – main cause is atherosclerosis
- Median arcuate ligament syndrome

Other pathologies

- In-stent stenosis/occlusion

Stenosis guidelines

- SMA >70% stenosis PSV >270cm/s
- CA >70% stenosis PSV > 200cm/s
 - Perform SD with inspiration, expiration and erect position
- IMA >70% stenosis PSV > 200cm/s

Mesenteric ischemia to occur – significant disease in at least 2 vessels with (Kokman & Geelkerken 2017)

Fixed stenosis

- Plaque commonly deposited at the Origin
 - Narrowed lumen on B-mode
 - Colour Doppler focal aliasing
 - Elevated velocities >200cm/s
 - No change in the erect position of CA

Median arcuate ligament syndrome (MALS)

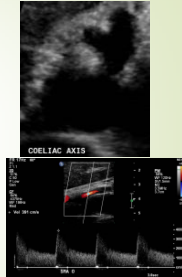
- MALS is a fibrous band that connects the two crura of the diaphragm at the level of L1 (Sunkara et al. 2017)
 - Typically it passes superior to the CA origin as the CA migrates caudally during embryogenesis
- MALS – ligament is situated low causing compression of the proximal CA
 - Three characteristics (Kuruvilla et al. 2017)
 - Postprandial abdominal pain
 - Weight loss
 - Abdominal bruit
 - Difficult diagnosis – asymptomatic

U/S features of MALS syndrome

- Deep expiration
 - Compression of CA
 - Elevated velocities of >200cm/s
- Erect position
 - Decompression of CA

Take home messages

- Are there evidence of mesenteric artery stenosis?
 - $>270\text{cm/s}$ for SMA
 - $>200\text{cm/s}$ CA and IMA
 - Fixed stenosis or MAL syndrome
 - Normalised in PSV in erect position – MAL syndrome
- Graded compression and optimize image
- Normal mesenteric artery examination– consider a routine upper abdomen ultrasound



References

- Kolkman J.J., & Geelkerken R, 2017, 'Diagnosis and treatment of chronic mesenteric ischemia: An update, 31:49-57'
- Kuruvilla A, Murtuza G, Cheema A, Arshad H, 2017, 'Median Arcuate Ligament Syndrome: It is not always gastritis.' *Journal of Investigative Medicine High Impact Case Reports*
- Sunkara T, Caughey M, Zhen K, Chuiong B & Gaduputi V, 2017, 'Dunbar Syndrome – A Rare Cause of Foregut Ischemia.' *Journal of Clinical and Diagnostic Research*, 11(7): 13-14