Type B Aortic Dissection with Malperfusion

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Malperfusion Syndromes
- Associated with early mortality
- Occurs when there is end organ ischemia secondary to aortic branch compromise from dissection
- Can involve one or more vascular beds simultaneously
- Early symptoms can be subtle
- Dynamic vs static obstruction

Malperfusion Syndrome: Dynamic Obstruction
- Compressed true lumen unable to provide adequate volume flow
- Motion of intimal flap within aortic lumen, obstructing orifice of branch vessel

Malperfusion Syndrome: Static Obstruction
- Dissecting process extends into branch vessel, causing narrowing
- Unlikely to resolve with restoration of aortic true lumen flow alone
Malperfusion Syndrome

- Pure dynamic obstruction of visceral vessels
  - Would be expected to respond to exclusion of entry tear or aortic fenestration
- Static obstruction of visceral vessels
  - Needs to be re-assessed after stent-graft placement/fenestration
  - May require branch vessel stenting

Goals of Treatment

- Focus on most minimal/expedient intervention to restore perfusion as soon as possible
- Primary goal: Expansion of true lumen with restoration of flow to visceral vessels/lower extremity
  - Stent-graft repair with coverage of proximal entry tear
  - Fenestration (convert complicated into uncomplicated dissection)
  - Stent open true lumen/branch vessels
- Secondary goal: obliteration of false lumen flow with subsequent complete thrombosis

Treatment Strategy

- Stent-graft repair
  - Advantages: restore true lumen flow; prevent late aneurysm formation; favorable aortic remodeling with lower risk of aortic rupture
  - Disadvantages: paraplegia; retrograde dissection
- Fenestration
  - Advantages: restore true lumen flow; minimal risk of paraplegia
  - Disadvantages: promotes blood flow through false lumen, potentially leading to progressive dilation/aneurysmal degeneration

Treatment: Stent-graft repair

- Minimize aortic coverage (<20cm) to reduce risk of spinal ischemia
- Coverage of left subclavian artery (approximately 50% of the time)
- Re-assess distal perfusion after deployment of stent-graft
- May still have inadequate true lumen flow
  - Consider placement of uncovered distal stent: support true lumen and stabilize dissection flap
  - Largest wallstent 24 mm
- Additional stent placement for visceral branch vessel obstruction
Intravascular Ultrasound

- Anglovasa GS, et al; JEVTA 2011

Angiography

- Long sheath inserted into aortic arch
- "Viscera on a stick"
- Angiography at different levels to verify true lumen position
- Subsequent angiography at different levels
Considerations: Stent-graft Repair

- Avoid aggressive oversizing
- Avoid ballooning of seal zones
- Young patient with tight aortic arch, narrow aortic diameter
- ? Uncovered stent over entry tear
- ? Proximal barbs

Treatment: Fenestration

- Relieve dynamic obstruction by creating flap fenestration to generate large reentry tear
- Flow ensured within false lumen, precluding thrombosis
- Branch vessel compromise (malperfusion) is treated, but not the aorta
- If static obstruction exists, perform branch vessel stent placement
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Fenestration: Technique

- Smaller (true) to larger (false) lumen
- Rosch-Uchida needle, Colopinto needle, or back end of 0.014 wire to create fenestration close to compromised aortic branch
- After needle and stiff wire advanced from true to false lumen, catheter advanced and confirmation by angiography
- Large angioplasty balloon used to create fenestration tear

Fenestration: Re-entry Catheter

- Membrane puncture with needle-based re-entry catheter through transfemoral approach
- Guidewire passed through re-entry catheter and across membrane
- Guidewire snared through contralateral transfemoral access (through and through wire access)
- Cheese-wire maneuver
- Portions of fenestrated membrane can occlude iliac artery – be prepared to stent

Kos S et al. Cardiovasc Intervent Radiol 2010
Fenestration: Re-entry Catheter

Kos S et al; Cardiovasc Intervent Radiol 2010
Stent-graft or Fenestration?

- **Endograft therapy first line of treatment**
  - Aims to restore native aortic anatomy by closure of primary tear

- **Percutaneous fenestration**
  - Aims to increase true lumen perfusion by equalizing pressures in true/false lumens
  - Does not address underlying abnormality of dissection itself
  - Limit to patients who lack suitable proximal landing zone or complex multilumen dissections not easily corrected by closure of primary tear