Fenestration and stenting in the era of the endograft: Knife in the era of the Cuisinart

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Disclosures
- Boston Scientific, Medical Advisory Board
- WL Gore & Associates, Consultant

Is it time to get rid of the paring knife?

What fenestration does
- Improves flow across dissection flap
- Creates or enlarges holes in the flap separating the false and true lumens
- Raises pressure in the true lumen
- Promotes flow in the false lumen

What fenestration does not do
- Does not stabilize the false lumen
- Does not reduce pressure in the false lumen
- Does not decompress the false lumen
- Does not modify the risk of acute aortic rupture in type A dissections
- Does not reduce long-term aneurysmal degeneration of the false lumen

Acute type B dissection with paraplegia
Patient CR

- 46 y/o with h/o HTN, acute type B AD
- Managed with BP control at OSH, discharged home
- 6 weeks later presents to OSH with abdominal pain, anuria, and paraplegia
- Transferred to UM for management of his symptomatic Type B Aortic dissection
- PE: flaccid paralysis of his bilateral lower extremities, Cr 12.4

Type B AD with paraplegia
Initial management

- Spinal canal drain
- Run BP systolics in the 120-130's
- Systemically heparinize

Goals of treatment

- Arrest false lumen thrombosis
- Restore flow and perfusion pressure

Baseline Aortic Manometry

<table>
<thead>
<tr>
<th>True lumen</th>
<th>Pressure</th>
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<tbody>
<tr>
<td>T4</td>
<td>113/60 mmHg</td>
</tr>
<tr>
<td>T12</td>
<td>38/34 mmHg, gr 75</td>
</tr>
</tbody>
</table>

Baseline IVUS Exam
Final Aortic Manometry
True lumen T4  90/49 (65)
True lumen T12  71/47 (57), gr 21

Follow-up
• 8 months s/p aortic fenestration for dissection
• Creatinine 0.9 without dialysis
• Ambulates with aid of walker
• No symptoms of gut ischemia

Acute type A dissection with prolonged malperfusion

Patient RS
• 77 y.o. male, history of AVR and quadruple bypass
• onset severe abdominal pain 0230
• CT 9 hrs later: acute dissection with left renal malperfusion
• MRA 12 hours after symptom onset: type A AD
• Transferred to UMMC 60 hours after symptom onset
• Presented in our ED with bloody vomiting and bloody diarrhea
Acute type A aortic dissection with malperfusion persisting after open repair

Presentation

- 36 y.o. man with onset of chest pain 02:00 12/29/2011
- BP 185/106 at ED, with CT showing acute type B aortic dissection and occluded left common iliac artery. Left femoral pulse not palpable, but leg motor and sensory exam normal.
- IVUS showed dissection extending into left common iliac artery without reentry. Treatment with single self-expanding gradient reduced aortofemoral gradient from 27 mm Hg to 9.
- IVUS also showed dissection extended proximally into arch between LCC and innominate artery origins.

TREATMENT

- Fenestration at celiac and infrarenal levels
- Supramesenteric 18x60 self-expanding stent in aortic TL
- Right renal artery stent
- Aortoiliac stents
- No GI surgery necessary
- 1 month later, replacement of ascending aorta and hemiarch with HCA, reimplantation of bypasses

BASELINE IVUS

MANOMETRY
AORTIC ROOT – BRANCH ARTERY

- ROOT 132/58 (87) LRA 118/55 (77)
- ROOT 131/58 (87) SMA 34/29 (25)
- ROOT 131/58 (87) LEIA 98/56 (74)
- ROOT 126/60 (87) REIA 115/58 (81)
- ROOT 95/49 (67) dRRA 78/46 (59)

FINAL IVUS

Acute type A aortic dissection with malperfusion persisting after open repair
Early follow-up

- 6 days later had exacerbation of his chest pain, and CT showed retrograde extension of dissection to the aortic root and all 3 arch branches
- Immediate open reconstruction of ascending aorta, bypasses to all three arch branches
- At end of procedure the left femoral pulse had disappeared, so fem-fem bypass was contructed.
- Post-operative mesenteric malperfusion with worsening leg malperfusion; AST 8000, ALT 10000, lactate 8.0

Endovascular treatment

- Bilateral femoral artery access
- Suprareiac fenestration
- Self-expanding stents in suprareiac and infrarenal true lumen

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Final</th>
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<tbody>
<tr>
<td>SMA</td>
<td>63/40 (50) gr 56,</td>
<td>97/56 (70) gr 24</td>
</tr>
<tr>
<td>RLE</td>
<td>78/39 (54) gr 43,</td>
<td>97/54 (70) gr 24</td>
</tr>
<tr>
<td>LLE</td>
<td>68/34 (49) gr 53,</td>
<td>97/54 (70) gr 24</td>
</tr>
</tbody>
</table>
Mid-term follow-up

- No loss of limb or gut function
- Temporary dialysis discontinued 2 wks after repair
- BP inconsistently controlled, with systolics in 160's
- Stable aortic repair and arch branch bypass grafts at last f/u 3 years later

Presentation

- 60 y.o. male, poorly controlled hypertension, history of type A aortic dissection with proximal aortic reconstruction in 12/8/2008
- Enlarging arch and proximal descending aorta reaching 5.5 cm; DTAR 6/24/2009, treating down to T8 level
- CT in May 2014 showed marked elongation and growth of the descending aorta with kinking of the DTAR graft

Perfuse visceral branches excluded by EG treatment of thoracic aorta
So, can we get rid of the knife?

Cuisinart: tool for the pile of slices
CONCLUSIONS

- We need the Cuisinart and the paring knife
- Fenestration and bare stents are essential tools to correct branch artery malperfusion in the endograft era
- Clinical use depends on anatomic features of dissection
  - Acute type A with prolonged malperfusion
  - Acute type A with post-op malperfusion
  - Acute type B with no suitable entry tear
  - Malperfusion persisting after endograft Rx
  - Chronic dissection with malperfusion
  - Adjunct to EG treatment