When Limb Occlusion Occurs After An EVAR, Endovascular Solutions Are The Way To Go: Technical Tips To Make Them Safe And Effective

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Invited speaker for Gore and GE Medical


There is no evidence in the literature regarding superiority of one treatment option over the other, and the treatment strategy can thus be decided individually

Endovascular treatment of iliac limb occlusions Hammond et al. 2018

Methods of Treatment: Endovascular 21%

Endovascular 37 (15%)
Thrombolysis 3 (2%)
Balloon angioplasty/stenting 9 (4%)
Thrombolysis plus balloon angioplasty/stenting 20 (8%)
Not specified endovascular 3 (1%)

Hybrid 18 (7%)
Thrombectomy plus balloon angioplasty/stenting 15 (6%)
Not specified hybrid 3 (1%)

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So why is endo not the treatment of choice?

- Long-term patency?
  - Loss of limb diameter if residual thrombotic material

- Embolization?
  - Distal
  - HA
  - Conventional

- Difficulty to cross the occlusion?
  - Limit dislocation if forceful Balloon thrombectomy?
  - An additional stent may cause "frictional forces" that could damage the graft material

Endovascular treatment options for iliac limb occlusion after EVAR

Acute

- Thrombolysis

Chronic

- Percutaneous stenting +/- thrombectomy
- Open Fogarthy thrombectomy +/- stenting
- Percutaneous large bore sheath and Fogarthy thrombectomy +/- stenting

May need relining into body

Left Iliac limb occlusion
84 yo male 5 months left IC
2 years post op EVAR in 2007

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Our experience
15 (one-redo)
Endovascular cases

Failed entry into occlusion
Unable to re-enter
? Angle
? Not-enough pushability
Fem – fem crossover
Patent at 6 years

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Progressive kinking over three years

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Percutaneous stenting for chronic occlusion
73 yo female 4 years post-op occlusion
Intermittent claudication and left buttock IC since 3 years

Percutaneous stent graft re-lining like a TASC D iliac CTO
Kissing V12 Atriums/BeGrafts
Patent at 11 months FU

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78 yo male iliac branch graft external Iliac limb occlusion 2 months after EVAR
acute CLI at presentation

Open thrombectomy over the wire 5.5 Fr Fogarthy
Post thrombectomy stent insertion

Follow up CT image patent at 9 year follow up

Open thrombectomy and stenting

Stent graft re-lining

• V32 Atrium stent grafts extended to beyond the thrombus layer
• The organized thrombus supports the stent grafts
Open thrombectomy and stenting (acute case)
78 yo male 4 months after EVAR right limb occlusion with 1 month chronic and acute CLI

Over wire thrombectomy

Post-thrombectomy

Inflation of stents in the occluded limb

Patent at 8 year follow up at 8

67 male right limb occlusion h/o 6 months IC
7 years post EVAR (chronic)

- Femoral endarterectomy and stenting of IMA occlusion
- Contralateral limb revascularisation and angioplasty
Stenting with V12 Atriums

High re-entry due to thrombus

Completion imaging

Right Limb re-occluded 2 months later

Percutaneous re-relining

Viabahn Gore 8 x 150mm

Balloon dilated distal and proximal to trap loose material
AVE Balloon expandable to support Viabahn proximally

Viabahn Gore 8 x 150mm

Viabahn Gore 8 x 150mm Proximal AVE Balloon-expandable stent

Cook Zilver stent EIA

USS FU patent at one year
67 yo male 6 years post EVAR and 2 month 100 IC right limb occlusion (Semi-acute)

Percutaneous thrombectomy and stent

Right limb

Percutaneous approach

1st pass of Fogarty catheter

22 Fr Dry-seal Gore sheath and 5.5 Fr 0.035" Fogarty wedged into occluded stent (closure Proglide)

2nd pass of Fogarty catheter

Embolus in the IIA

Complicated by embolus in the IIA Origin after stent inflation

Suction embolectomy: Balloon inflation in the limb and suction from the sheath

Final run after embolectomy

Two Visipro Medtronic balloon expandable stent and 1 V12 Atrium

Follow up at 9 months patent

81 yo male, chronic worsening CLI for 9 months post EVAR right limb occlusion, treated at 8 months 9 (chronic)

EVAR Cook Zenith old limbs 2008 Bilateral OA extension

IIA
Difficult re-entry
“Centering balloon” with back end of Terumo 0.035”

84 yo female  fEVAR 1 year post-op. 5 weeks acute and chronic worsening CLI, occlusion of left limb of bifurcated distal body (not-spiral)

67 yo male 5 week h/o 100 yard IC right 15 months post EVAR (acute)

Over the wire fusion guided thrombectomy

Open cutdown and stenting using 2D/3D fusion guidance

Follow up at 2 years patent

Thrombectomy and stenting 10x80mm fluency and two Bard Luminex 10x80mm

GE Discovery 730

LATERAL

TERUMO BALLOON

Stent relined limb 10x80mm

Occluded limb of distal bifurcated body

left occluded side

2D/3D fusion - to facilitate the crossing of the long iliac occlusion
Outcome of endovascular treatment

- 19 occlusions
  - 4 conservative treated (one patient presented late with irreversible limb ischaemia required AKA)
  - 15 attempted as endo (one re-do)
  - 11 open 4 percutaneous
  - 1 failed fem-fem bypass
  - 1 re-recanalization at 3 months again percutaneous endo
  - 1 IIA embolization treated by suction embolotherapy
  - 1 infected Ax to fem after AUI occlusion explanted open thrombectomy, stent and vein fem-fem AKA after vein graft failure and ligation of CFA - but patent graft at 3 years

- 9 died during follow up
  - 1 death 3 months post-op EVAR and thrombectomy due to MI in hospital
  - 1 death post-op LA thrombectomy and stent 10 days at home of a MI

Results

Occlusions by EVAR grafts with iliac limbs used 2006 – 2019

<table>
<thead>
<tr>
<th>EVAR abdominal</th>
<th>All</th>
<th>475</th>
<th>Limb occlusion</th>
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<tbody>
<tr>
<td>Cook Zenith</td>
<td>392</td>
<td>16*</td>
<td></td>
</tr>
<tr>
<td>Cook Fen/branch</td>
<td>19</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cook Alpha abd</td>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cook LP</td>
<td>16</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cook Zenith AUI</td>
<td>14</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Gore c3</td>
<td>15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Medtronic</td>
<td>24</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Vascutec</td>
<td>1</td>
<td>1</td>
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* 14 old limbs used until 2011 since spiral limbs 2 occlusions

Patency rates after endovascular limb occlusion treatment

<table>
<thead>
<tr>
<th>Patency primary of successful treated limbs</th>
<th>Month</th>
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<tbody>
<tr>
<td>Range</td>
<td>0.3 - 106</td>
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<tr>
<td>Mean (average)</td>
<td>13</td>
</tr>
<tr>
<td>Median</td>
<td>23</td>
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<tr>
<td>One failed ends not included</td>
<td>4</td>
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</tbody>
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</thead>
<tbody>
<tr>
<td>Range</td>
<td>1 - 106</td>
</tr>
<tr>
<td>Mean (average)</td>
<td>31.1</td>
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<tr>
<td>Median</td>
<td>11</td>
</tr>
<tr>
<td>One failed ends not included and including one re-stenting</td>
<td>9</td>
</tr>
</tbody>
</table>

All limbs patent at last follow up
Only one re-occlusion re-stented still patent

Limitations:
Wide range (1-120 months)
9 out of 15 patients died during follow up (2007 to 2019)
Conclusions

• Endovascular treatment has a high success rate
• Appears to be safe
• Can have excellent long-term patency

But our series is small and no RCT data published