Endovascular Repair of Popliteal Aneurysms: Indications, Imaging, Tips, and Tricks

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Disclosures

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PAA’s

- Most common peripheral aneurysm — 1% of population, mostly men, freq HTN
- 40-50% bilateral
- Associated with arteria magna (arteriomegaly)
  - Coexistent AAA, iliac aneurysms, CFA aneurysms
- High rate of symptoms with observation
  - Up to 40% risk of “trash foot”
  - Up to 14% risk of amputation
40% of asymptomatic patients with popliteal aneurysms will have absent pedal pulses, which adversely affect the natural history with a likelihood of symptoms developing of 86% at 3 years compared with 34% in asymptomatic patients with intact pulses.

Size not a reliable predictor of events – smaller aneurysms with intraluminal thrombus or aneurysm “distortion” at higher risk of events.
Imaging

LEFT POP A

Thrombosed

Patent
PAA’s mgmt traditionally surgical
Criteria for endovascular therapy

- Symptomatic
  - ALLI, blue toe syndrome

- Asymptomatic
  - > 2cm, < 2cm with thrombus

- NO nerve or vein compression

- >50 years old

- Appropriate anatomy
  - At least one cm of seal at prox and distal ends
  - Ability to place grafts sequentially
Endograft sizing

- Preop planning with CTA or Duplex
- Intraprocedural marker catheters in all cases
- IVUS potentially useful for measuring thrombus free landing zone diameters
- Overlap grafts 2-3 cm → devices
- 1-3 cm prox and distal landing zones
- Oversize by no more than 1 cm
  - Nested devices if large variation in size prox to distal
  - Size to larger diameter landing zone if single device
- Distal end at least one cm from ant tibial origin?
Important points

- Do not mismatch wire and graft
- Assure sufficient overlap as well as prox and distal landing lengths
- Account for “bowing” of graft in aneurysm
• 76 y.o. WM Ischemic Cardiomyopathy EF 35%
• Pulsatile right popliteal mass. No claudication, rest pain, tissue loss, blue toes.
• PMHx CRI, HTN, dyslipidemia, CAE.
Cragg-McNamara Thrombolytic Infusion Catheter and Emboshield Nav6 Filter
6 month follow-up
## Published literature

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>YEAR</th>
<th>REPAIR TYPE</th>
<th>1 YR PATENCY</th>
<th>1 YEAR LIMB SALVAGE</th>
<th>LATE PATENCY</th>
<th>LATE LIMB SALVAGE</th>
<th>LAST F/U YRS</th>
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<tbody>
<tr>
<td>Bellosta, et al</td>
<td>2010</td>
<td>Surgical</td>
<td>86%</td>
<td></td>
<td>60%</td>
<td>92%</td>
<td>3 yrs</td>
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<td>Zimmerman, et al</td>
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<td></td>
<td></td>
<td></td>
<td>2 yrs</td>
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<td>Johnson, et al</td>
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<td>97.6%</td>
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<td>98%</td>
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<td>Davies, et al</td>
<td>2007</td>
<td>Surgical</td>
<td>85%</td>
<td></td>
<td>90%</td>
<td></td>
<td>7.2 yrs</td>
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<td>Ravn, et al</td>
<td>2007</td>
<td>Surgical</td>
<td>100%</td>
<td></td>
<td>71.40%</td>
<td>88.10%</td>
<td>6 yrs</td>
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<td>Antonello, et al</td>
<td>2007</td>
<td>Surgical</td>
<td>80.90%</td>
<td></td>
<td>88.10%</td>
<td>85.90%</td>
<td>6 yrs</td>
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<td>Jung, et al</td>
<td>2010</td>
<td>Endovascular</td>
<td>100%</td>
<td></td>
<td>84.60%</td>
<td>100%</td>
<td>4.5 yrs</td>
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<td>Etezadi, et al</td>
<td>2010</td>
<td>Endovascular</td>
<td>94%</td>
<td></td>
<td>86%</td>
<td></td>
<td>1 yr</td>
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<td>Tielliu, et al    *</td>
<td>2010</td>
<td>Endovascular</td>
<td>80%</td>
<td>90%</td>
<td>78%</td>
<td>87%</td>
<td>4 yrs / 2 yrs</td>
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<td>Midy, et al</td>
<td>2010</td>
<td>Endovascular</td>
<td>85.80%</td>
<td>87.50%</td>
<td>82.30%</td>
<td>87.50%</td>
<td>3 yrs</td>
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<td>Idelchik, et al</td>
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<td>96.90%</td>
<td>84.80%</td>
<td>86.80%</td>
<td>3 yrs</td>
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<td>Tielliu, et al</td>
<td>2007</td>
<td>Endovascular</td>
<td>77%</td>
<td>86%</td>
<td>70%</td>
<td>76%</td>
<td>2 yrs</td>
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<td>Mohan, et al</td>
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<td>96.50%</td>
<td>80%</td>
<td>88.70%</td>
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<td>Gerasimidis, et al</td>
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<td>64%</td>
<td>88%</td>
<td>47%</td>
<td>75%</td>
<td>1 yr</td>
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Endovascular treatment of popliteal artery aneurysms: Results of a prospective cohort study

Ignae F.J. Tielliu, MD, Eric L.G. Verhoovcn, MD, Clark J. Zeebregts, MD, PhD, Ted R. Prins, MD, Mark M. Span, PhD, and Jan J.A.M. van den Dungen, MD, PhD, Groningen, The Netherlands

- N=67 PAA’s, 57 pts
- 10 excluded
- 5 acute thrombosis
- 52 chronic

Criteria

Non-thrombosed:
- at least 3 cm prox and distal landing zones in popliteal
- absent of inflow aneurysmal or stenotic disease

Thrombosed:
- Rutherford category I or IIa
- successful thrombolysis with appropriate anatomy

12 (21%) reoccluded
5/12 within 1 mth
8/12 within 6 mths

Rx ➔ thrombolysis, 1 surgery, 4 conservative

No bypasses or amputation

Clopidogrel (n=18) only predictor of long-term success on both uni- and multivariate analysis
N=26 pts, 30 PAA’s

Primary Patency Rate

- OR: 100%
- Endo: 87%

Secondary Patency Rate

- OR: 91%
- Endo: 100%

Rx Time (min) 155.3 75.4
Hospital (d) 7.7 4.3
Stent fractures

Tielliu, et al. JVS 2010

- 22% @ 5 YR, 27% @ 10 YR
- Younger age
- Multiple overlapping stent
- Fractures at overlap zones and adductor tubercle

No relationship with graft occlusion
Conclusion

• Endovascular repair of PAA’s has similar outcomes out to 5 years as open repair

• Learning curve likely accounts for early failures
  Graft sizing and attention to landing zones critical

• Antiplatelet therapy critical for at least 3 mths

• Stent fractures may represent a late hazard → restrict endovascular repair to older pts!