CURRENT MANAGEMENT OF POPLITEAL ANEURYSMS

Joseph Habib, MD, FACS
Assistant Professor

Department of Surgery
Division of Vascular and Endovascular Surgery
University of Florida
Jacksonville, FL
OBJECTIVES

• Indications for repair of popliteal aneurysms
• Open repair of popliteal aneurysms
• Endovascular repair of popliteal aneurysms
• Open vs. endovascular repair of popliteal aneurysms
EPIDEMIOLOGY

- Normal diameter of a popliteal artery
  - 5mm - 11mm
- Popliteal aneurysm
  - Greater than 1.5 cm
- Almost exclusively found in males
- Most common peripheral aneurysm (75%)
- 1% prevalence
- Prevalence in those evaluated for AAA ~ 10%
- ~50% bilateral
- ~50% will have AAA
INDICATIONS FOR REPAIR

- Symptomatic popliteal aneurysms (any size)
  - Acute or chronic ischemia (most common)
  - Compression causing pain, leg swelling, DVT
  - Blue toe syndrome
  - Rupture (2%)
- Asymptomatic greater than 2 cm
DIAGNOSIS

- Suspected during exam when prominent pulse is felt behind the knee
- Duplex US (1st line test)
- Formal angiogram vs. CTA (may aid in planning)
OPEN REPAIR

• Ligation (performed first in 1785 – John Hunter)
• Arterial bypass with ligation or interposition grafting (gold standard)
• Approach (medial, posterior)
• Conduit choice
MEDIAL APPROACH

Combined supra and infra-geniculate incision on the medial leg

Conduit of choice is used

Bypass graft is performed (end to side or end to end)

Aneurysm is ligated proximally and distally

Mazzaccaro et al.
MEDIAL APPROACH

• End to side (size discrepancy) vs. end to end
• Vein - reversed, non-reversed, in-situ
• prosthetics, biologics (typically 6 to 8 mm)
• Advantage - need exposure further proximally or distally
• Disadvantage – usually more difficult to expose and ligate collaterals that are feeding the sac
POSTERIOR APPROACH

Patient prone

S shaped incision

Small saphenous vein, sural nerve identified

Popliteal space is entered

Proximal and distal segments of the artery are isolated and controlled

Aneurysm is opened

Side branches are ligated

Interposition graft is performed

Mazzaccaro et al.
POSTERIOR APPROACH

• Useful for large aneurysms confined to popliteal space that are causing compression
• Not able to expose as far proximally or distally
• Sometimes difficult to harvest vein with patient prone (GSV vs. LSV or basilic vein)
• Easy to expose and ligate collaterals that come into the aneurysm sac
• Should not be used in aneurysms that extend proximal to the adductor hiatus

Beseth et al.
ACUTE ISCHEMIA AND ROLE OF THROMBOLYTICS

- Approximately 30% of patients will present with acute ischemia on initial evaluation
- Will generally have lower limb salvage rates
- If aneurysm is occluded and distal outflow target present - perform bypass to the best outflow vessel
- If no outflow consider thrombolytics vs. open thrombectomy (consider viability of limb)
THROMBOLYSIS

• Thrombolysis significantly improves runoff
  • Swedish vascular registry (235 acutely ischemic limbs)
    • 87% showed improved runoff after thrombolysis
• Thrombolysis may reduce amputation rate
  • Mayo clinic group 74 patients 34 underwent thrombolysis
    • Preoperative thrombolysis reduced amputation rate from 96% to 69%
OPEN REPAIR (WHICH CONDUIT?)

- vein advantageous in patients who are most compromised and have suboptimal outflow
- 2445 popliteal aneurysms 5 year patency (review article - Dawson et al)
  - 77-100% for SVG
  - 29-74% for prosthetic
- Mayo clinic group secondary patency at 5 years
  - 94% SVG
  - 63% PTFE
OPEN REPAIR (WHICH APPROACH?)

- 77 aneurysms (Mazzaccarro et al.)
- 43 (posterior approach) 34 (medial approach)
- Included both acute and chronic ischemia
- Vein and prosthetic conduits used
- 5 year primary and secondary patency rates were not statistically different
- Limb salvage at 10 years - not statistically different
ENDOVASCULAR REPAIR

• Viabahn (W.L. Gore) - useful for endovascular repair
  • Made of PTFE with nitinol exoskeleton
  • only stent graft that has FDA approval to be placed into the P1 segment of the popliteal artery (indication is for arterial occlusive disease)
  • no FDA indication for being placed across the knee or for use in popliteal artery aneurysm repair
ENDOVASCULAR REPAIR

• Anatomic selection
  • Need 2 cm of proximal and distal landing zones
  • Avoid large aneurysms
  • Avoid extensive tortuosity or calcification
  • Avoid in people who frequently flex their knees
  • Need to be maintained on anti-platelets
  • People with single vessel runoff shown to have higher rates of thrombosis
ENDOVASCULAR REPAIR

• Cut-down or percutaneous
• 0.018 or 0.035 wires
• Oversize device by 10 to 15%
• Up to an 8mm device can be delivered through a 7F sheath and 9 to 13mm devices through 9 to 12F sheath
• Start distal, build proximal
• Avoid more than 1 mm size differential between grafts
• Try to get at least 2 cm overlap between grafts
• Post dilate and do completion angiogram (including one with the knee bent)
Figure 1 - Angiography showing aspect before and after the procedure.
OPEN VS. ENDOVASCULAR REPAIR

• Only one randomized controlled trial (Antonello 2005)
  • 30 patients (15 in each group)
  • No difference in patency or limb salvage out to 4 years
ENDOVASCULAR REPAIR (EPAR) VS. OPEN REPAIR (OPAR)

- Meta-Analysis (14 studies)
  - Including the 1 RCT
- 4880 repairs (3915 OPAR vs. 1210 EPAR)
- OPAR were younger and had inferior runoff
- OPAR had more wound complications and less thrombotic complications
- OPAR had longer length of hospital stay and fewer re-interventions

Leake et al.
PATENCY

- Primary Patency 1 year (significant)
  - 88.3% (OPAR) vs. 81.2% (EPAR)
- Primary Patency 3 years (significant)
  - 79.4% (OPAR) vs. 68.2% (EPAR)
- Secondary Patency 1 year (not significant)
  - 92.3% (OPAR) vs. 86.3% (EPAR)
- Secondary Patency 3 years (not significant)
  - 86.6% (OPAR) vs. 80.0% (EPAR)

Leake et al.
CONCLUSION

• EPAR –
  • Wound complications lower
  • shorter hospital stay

• OPAR –
  • higher primary patency at 1 and 3 years
  • secondary patency similar to EPAR out to 3 years
IN CONCLUSION

- Popliteal aneurysms are a relatively uncommon entity
- Repair should be performed in any symptomatic aneurysms and all those > 2 cm
- EPAR is associated with less perioperative morbidity and shorter LOS but results are varied in terms of durability
- Choice of Repair should be individualized based on patient co-morbidities, anatomy, available conduit, runoff and patient preference
JACKSONVILLE AND JACKSONVILLE BEACH