2018 MID-ATLANTIC
CONFERENCE

8th ANNUAL CURRENT CONCEPTS IN
VASCULAR THERAPIES

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Popliteal Artery Aneurysms: Diagnosis and Repair Options

- No Disclosures

Popliteal Artery Aneurysms (PAAs)

- Male Predominanace
- Most common peripheral Aneurysm (70%)
- 30-50% have AAA
- 50% have bilateral PAA
- ~50% develop another aneurysm in 10 years
  - Lifelong surveillance

PAAs

- Rarely Rupture
  - 2%
- Acute/Chronic Ischemia Secondary to embolization and/or thrombosis
- Compressive symptoms
  - Leg swelling, DVT
  - Nerve compression irritation

Natural History of PAAs

- Dawson et al. – 71 PAA/51 patients
- 25 observed
  - Complications
    - 12/21 (57%) asymptomatic
    - 2/4 (50%) symptomatic
  - ↑ 74% at 5 years

Natural History of PAAs

- Szilagy et al –
  - Only 32% of non-treated PAAs remained without LE complications at 5 years

Treatment of PAAs

- PAAs ≥ 2.0 cm
  - 30-40% risk of ischemia
  - High rate of limb loss
- All Symptomatic Patients

Treatment of PAA

- Decision and Technique for repair must be individualized
  - Co-morbidities
  - Anatomy
  - Degree of ischemia

Imaging of PAAs

- CTA or MRA (Abdomen to feet)
  - Extent of disease (AAA?)
  - Anatomy/Size/Tortuosity of vessels/Thrombus
- Digital Subtraction Angiography
  - Runoff vessels
- Duplex Ultrasonography (DUS)

Repair of PAAs

- Acute Threatening Ischemia
  - 3-4 x Mortality; Higher Limb loss
    - Fix PAA before thrombosis or embolization
  - Heparin → CTA→OR
  - Angio/Lysis/Thrombectomy
  - Open or Endovascular Repair

Repair of PAAs

- Asymptomatic/Chronic Ischemia
  - Medical /Cardiac Assessment
  - Imaging – CTA/Angiogram
  - Open vs. Endovascular vs Observation?

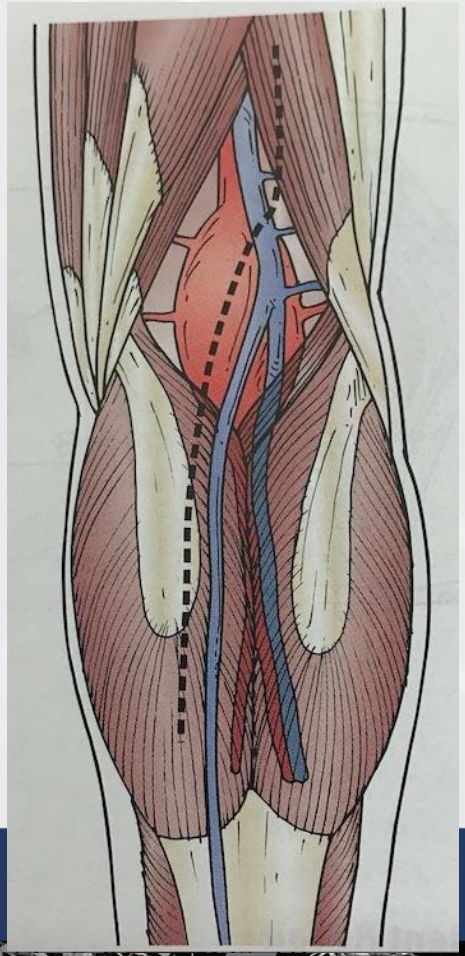
Open Repair of PAAs

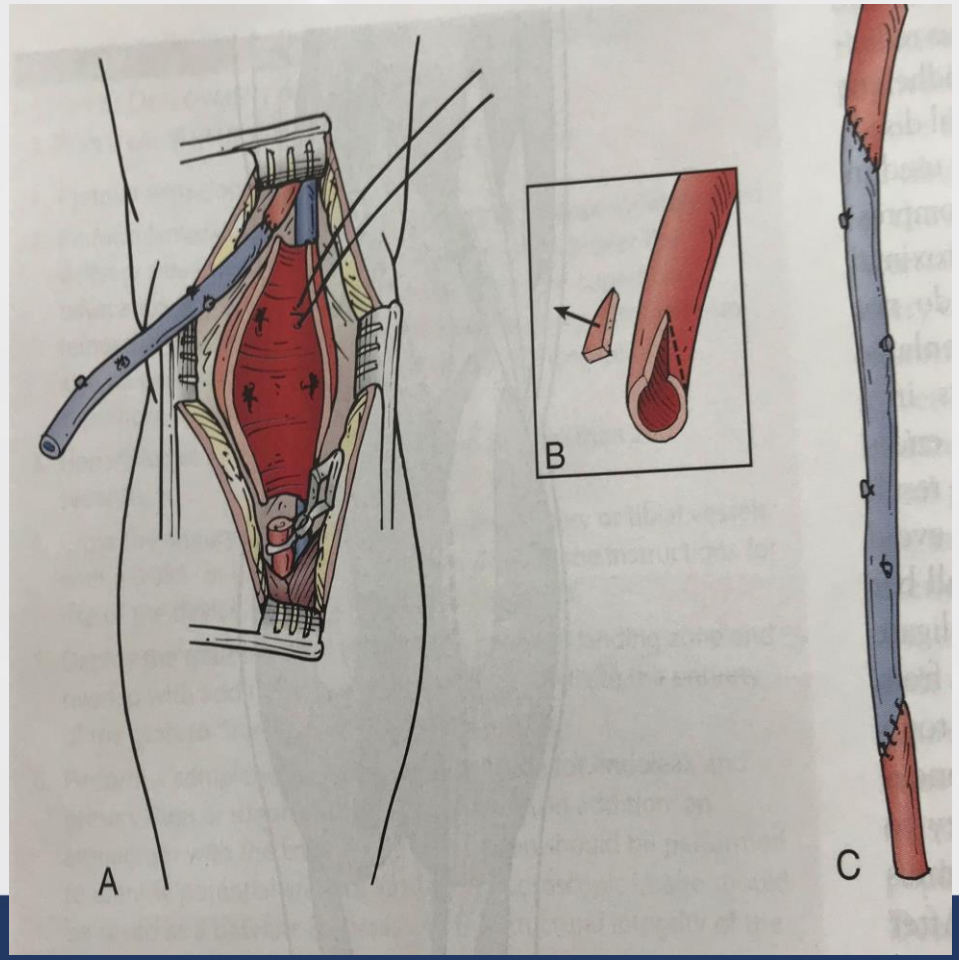
- Requires General Anesthesia
  - Posterior Approach
    - Interposition Graft
  - Medial Approach
    - Exclusion and Bypass

Posterior Approach

- Patient prone
- Relieve compressive symptoms
- Limited proximal/distal dissection
- GSV harvest more difficult
  - Can use SSV if size OK
- Advantage- debulk and ligate collaterals
  - Prevent type 2 leaks

Posterior Approach




A
B
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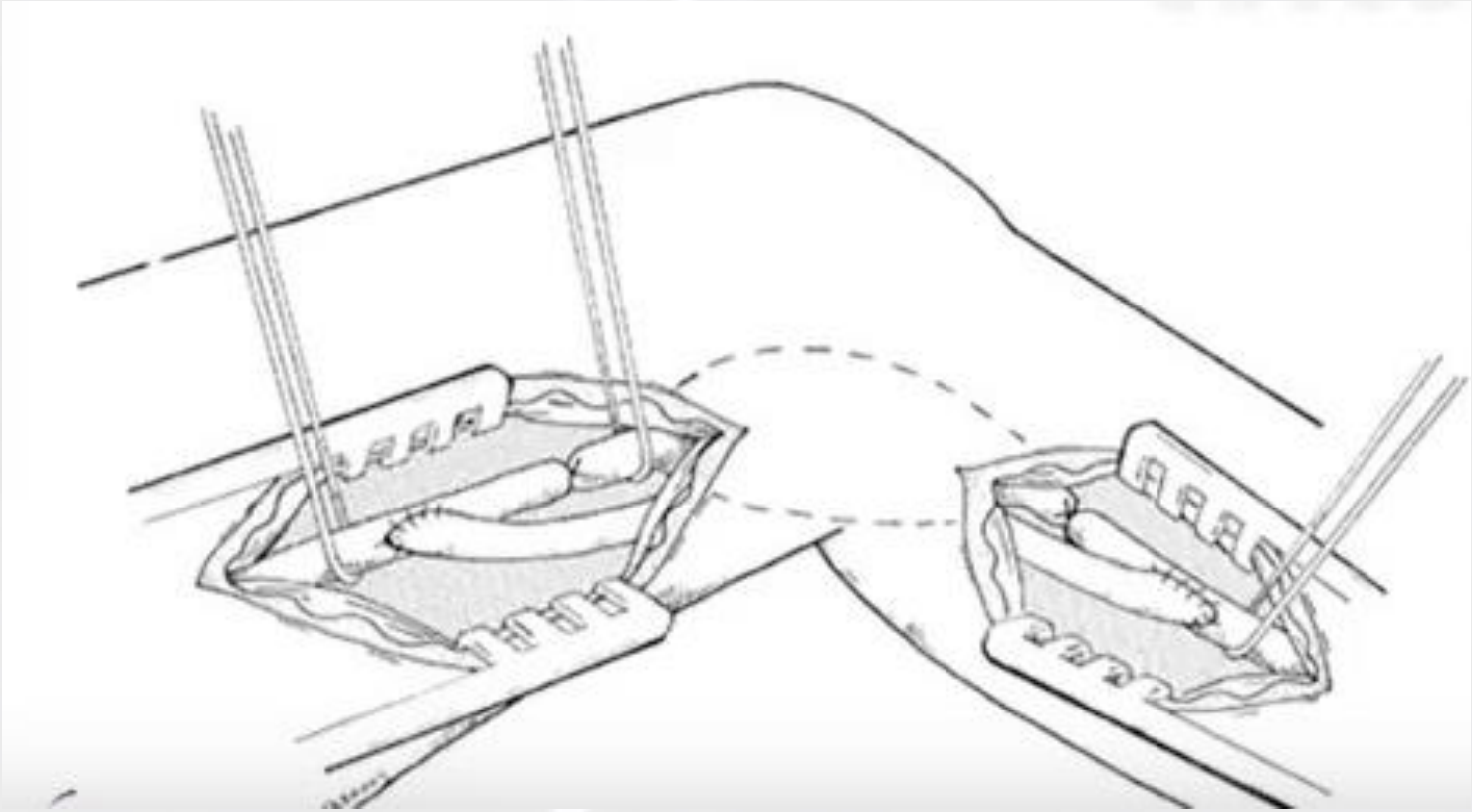
Medial Approach

- Easier GSV harvest
- Can extend proximally and distally (tibial vessels)
- PAA exclusion without collateral ligation – PAA can grow/rupture (Type 2 leak)

Medial Approach

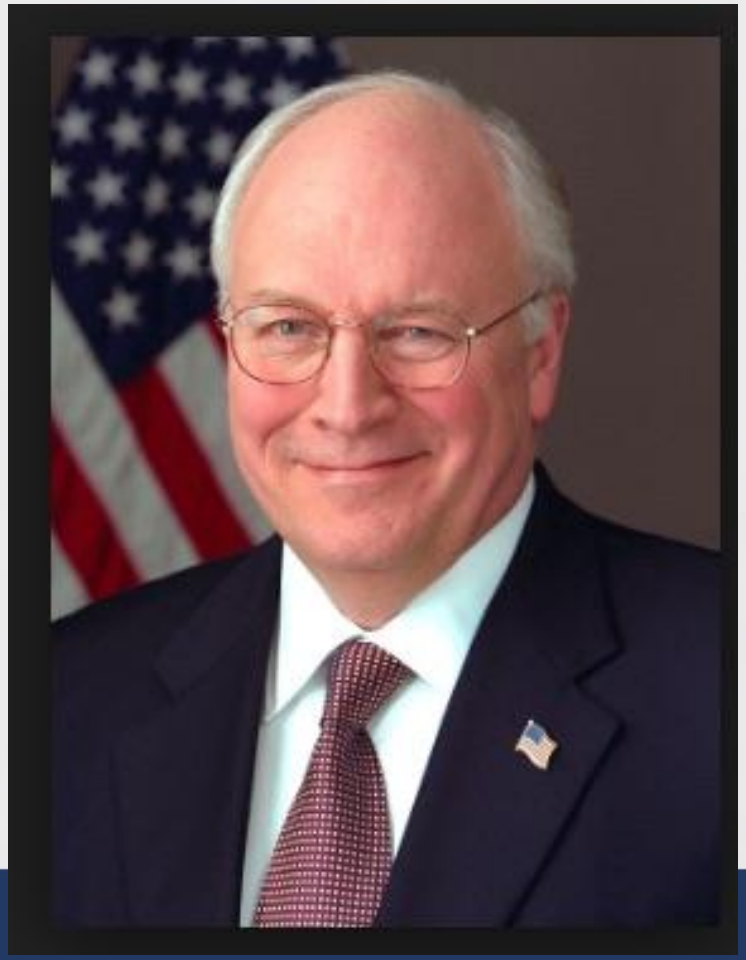


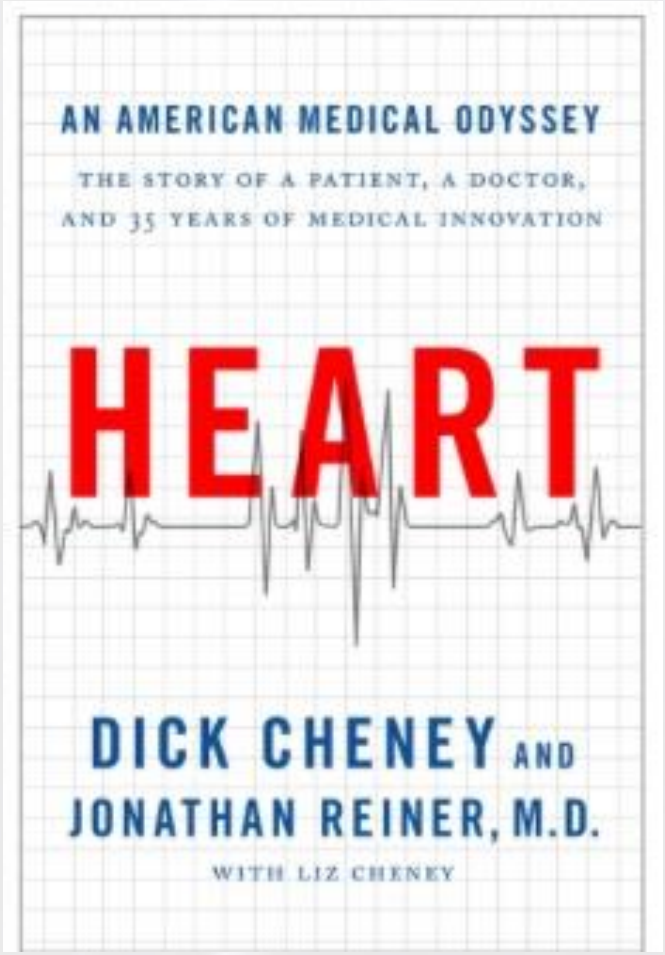
Popliteal Artery Aneurysm Repair
Open Repair - Outcomes

- 5 year Patency (all comers): 64-75%
- Elective
  - Autologous
    - GSV: primary 80%; secondary – 90%
  - Synthetic
    - PTFE: primary – 50%;secondary – 63%

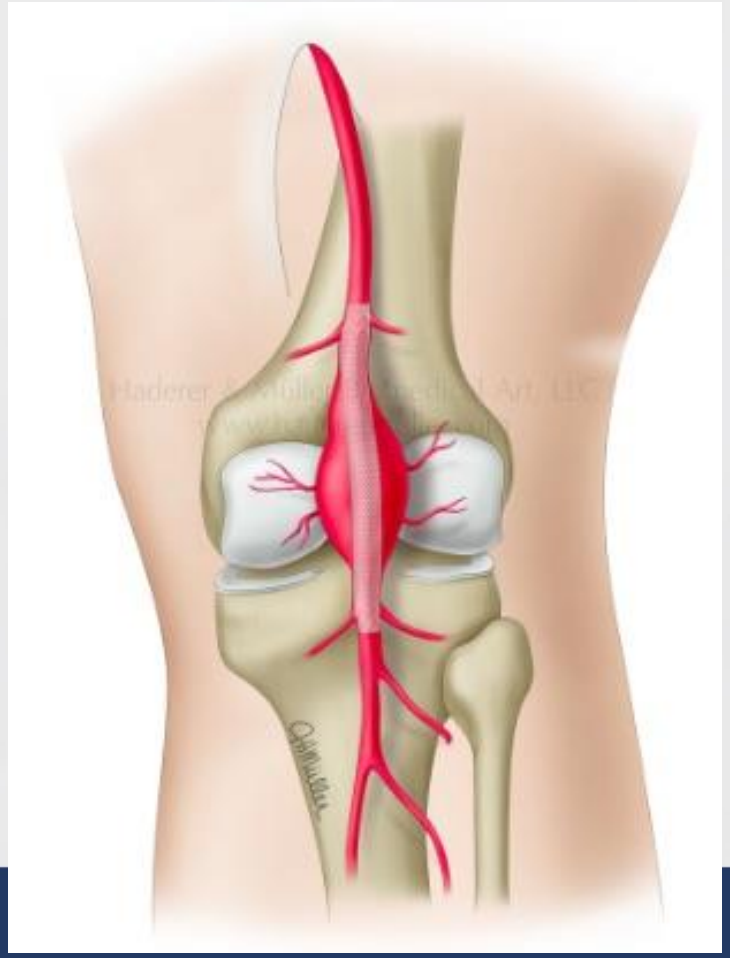
Endovascular Treatment of PAAs (EPAR)

- Alternative to Open Repair
- Local Anesthesia
- “Off-Label use” of Stent Graft




AN AMERICAN MEDICAL ODYSSEY
THE STORY OF A PATIENT, A DOCTOR,
AND 35 YEARS OF MEDICAL INNOVATION
HEART
DICK CHENEY AND
JONATHAN REINER, M.D.
WITH LIZ CHENEY

EPAR



EPAR

- First reported PAA Repair
  - Homemade Graft – Marin, Veith et al 1994 Montefiore

EPAR

- NYU
  - *Garg K et al. Outcome of endovascular repair of popliteal artery aneurysm using Viabahn endoprosthesis. J Vasc Surg 2012:55:1647-53*
  - Retrospective review of consecutive EPAR patients at NYU
  - 26 PAA in 21 patients

Patient/Aneurysm Characteristics

Mean Age (years)	74 ± 9
Male Gender	19/21 (90.5%)
Bilateral Popliteal aneurysms	10/21 (48%)
History of AAA	11/21 (52%)
Median Diameter (cm)	2.89 ± 1.0
Percentage Asymptomatic	16/26 (62%)

Strict Anatomic Selection Criteria

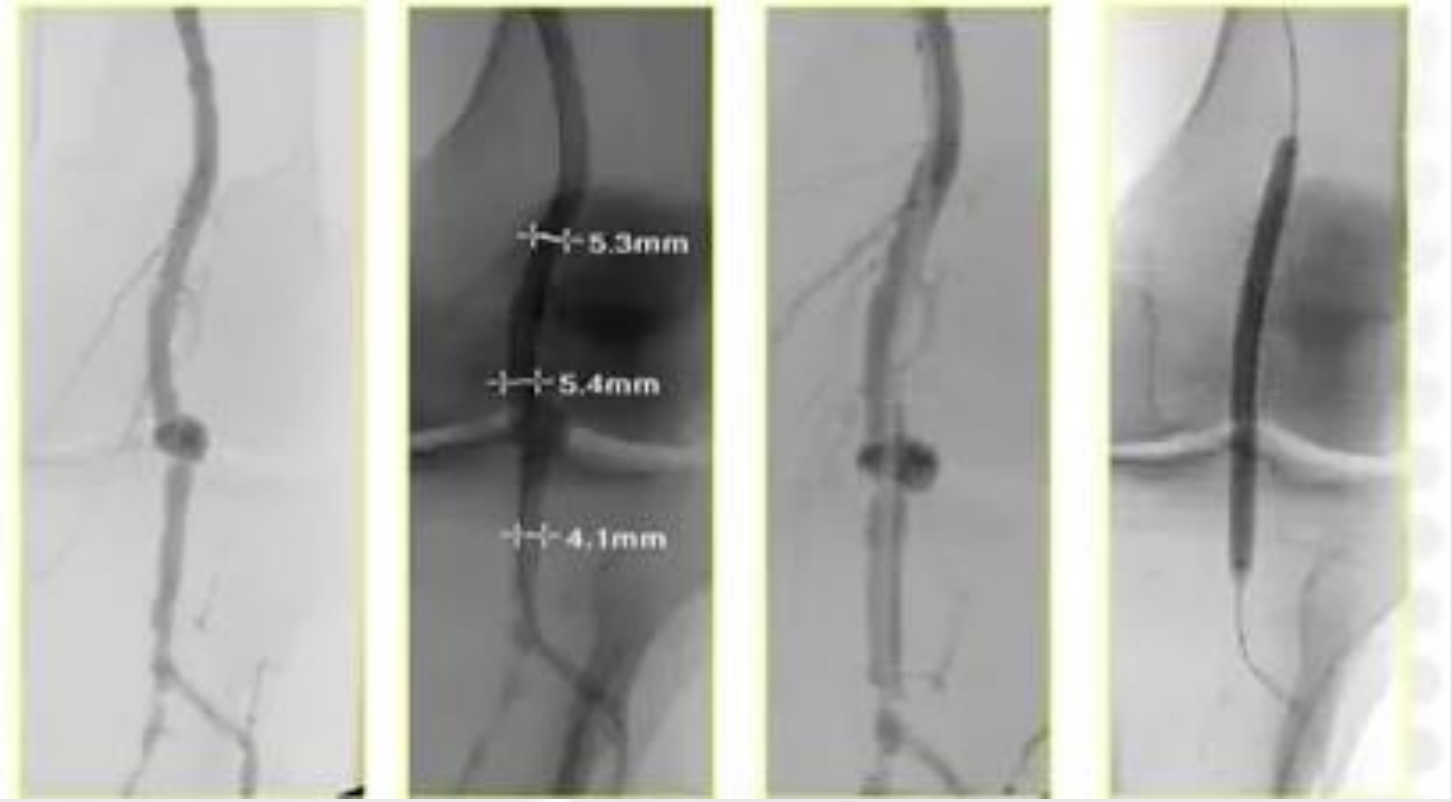
- 2 cm landing zones
- 10-15% luminal oversize
- Minimal proximal/distal size discrepancy
- Lack of extensive vessel tortuosity

Anatomic Selection Criteria

- Knee flexion > 90° (carpenters, gardeners)
- No contraindication to antiplatelet medication
  - Plavix predictor of success
    - Tielliu IF et al. Endovascular treatment of popliteal artery aneurysms: results of a prospective cohort study. J Vasc Surg 2005: 41: 561-4

Local Anesthesia	10/26 (38%)
Technical Success	25/26 (96%)
Crossing Knee Joint	24/25 (96%)
Number of Stents	1.8 ± 1.1
Distal Runoff (mean#)	1.96 ± 0.75
Length of Stay (days)	2.4 ± 2.4
Follow up (months)	22 ± 17
ASA and/or Plavix	26/26 (100%)

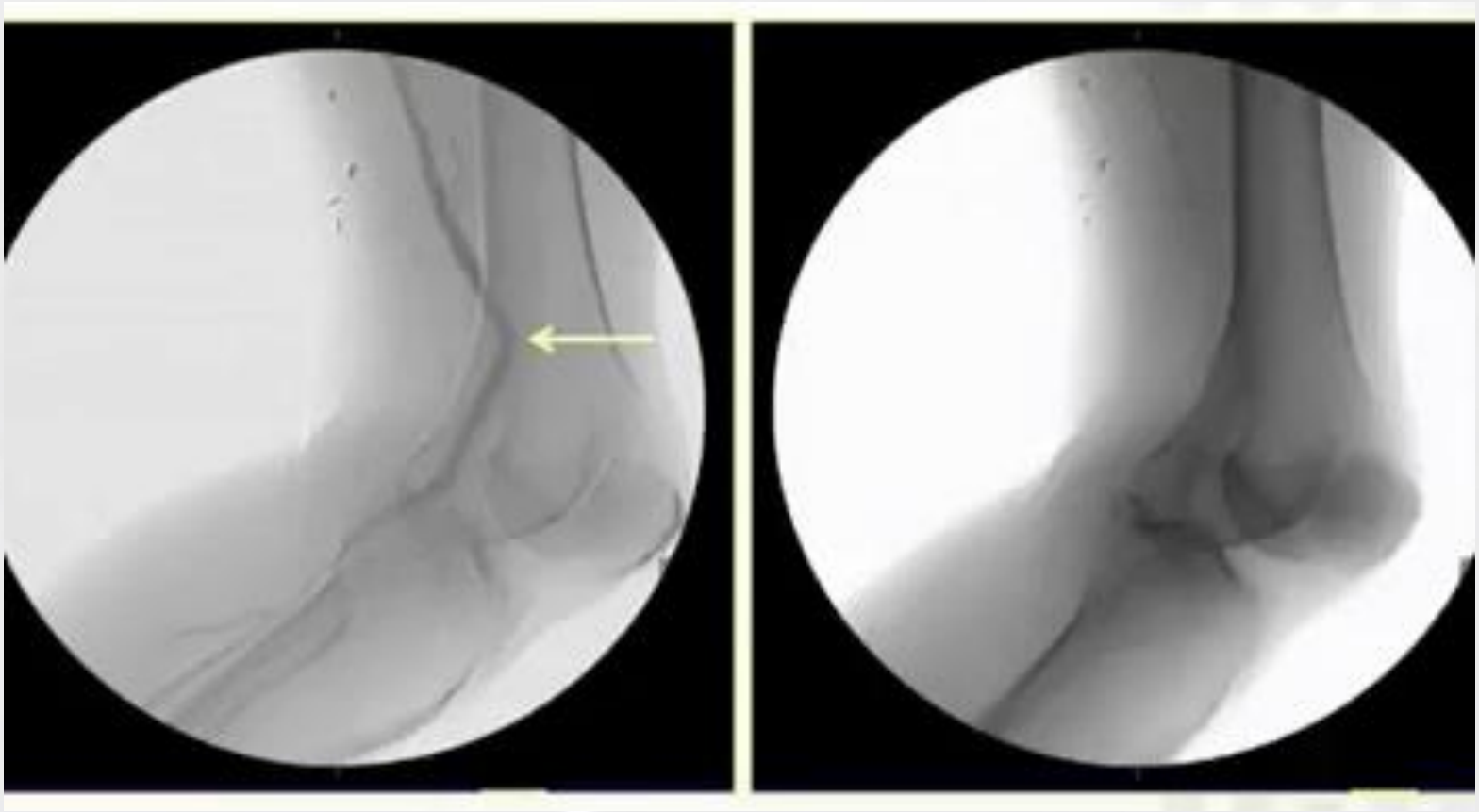
EPAR Procedure



EPAR

- Always do Angiogram to show runoff pre and post stent deployment

Angiogram with Knee Bent



NYU – EPAR Outcomes

- Primary patency
  - 91% at 1 Year
  - 86% at 2 Years
- Secondary patency
  - 91% at 1 Year
  - 91% at 2 Years
- No Limb Loss

NYU- EPAR Outcomes

- 3 occlusions during follow up
  - 4,14 and 26 months
  - All occlusion patients had single vessel runoff

Predictors of Stent graft Occclusion

Predictor	P-value
Gender	NS
Runoff	0.02
Number of stents deployed	NS
Sheath diameter	NS
Indication for repair	NS

Outcomes EPAR

- Maraglingo et al.
  - ***Maralingo et al. Endovascular Treatment of Popliteal Artery Aneurysms: A Word of Caution after Long-Term Follow up. Ann Vasc Surg May 2017 41:62-68***
  - EPAR – 65 PAA in 57 patients
  - Runoff, DM, associated PTA
    - ↓ Patency Rates

Outcomes - EPAR

- Mohan et al.
  - 30 PAA – EPAR
  - 3 yr Primary, Secondary Patency – 75%, 83%
  - Similar to open surgery
  - ***Mohan et al. Endovascular popliteal aneurysm repair. Are the results comparable to open surgery? Eur J Vasc Endovasc Surg 2006. 32: 149-54***

Outcomes - EPAR

- Tielliu et al
  - 73 PAA – EPAR
    - 5 yr Primary and Secondary patency
      - 70%, 76%
    - Primary patency ↑ 80%
      - Experience and Plavix

    - ***Tielliu et al. Endovascular treatment of popliteal artery aneurysms: is the technique a valid alternative to open surgery? J Cardiovasc Surg (Torino) 2007; 48 :275-9***

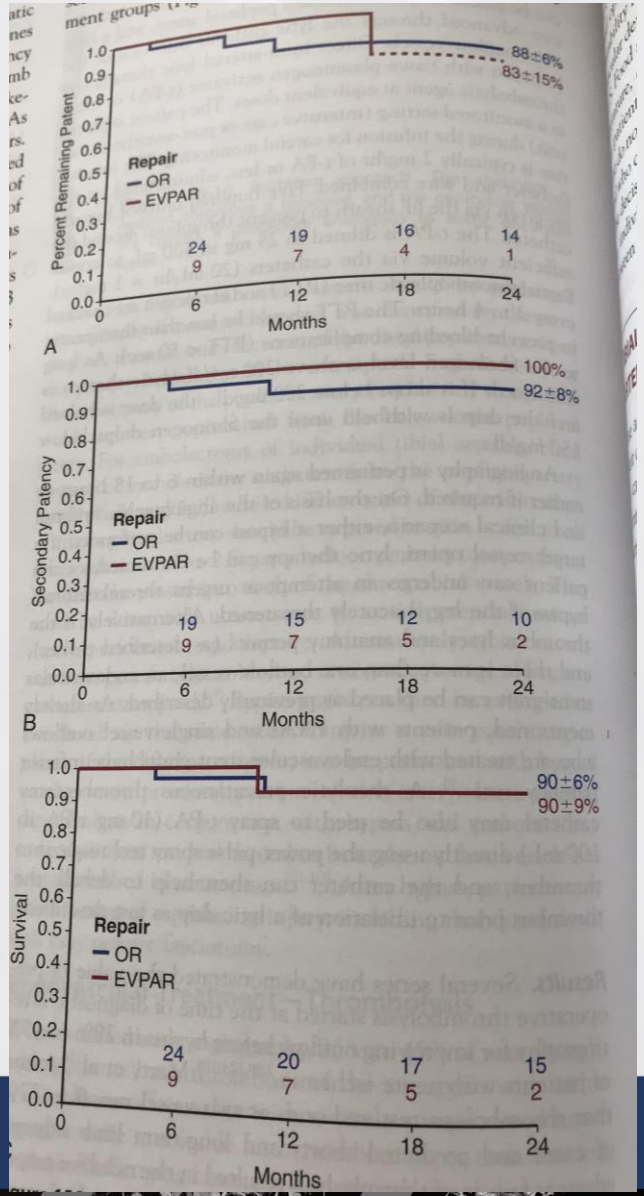
Outcomes - EPAR

- Antonello et al.
  - 30 PAA – Open vs. EPAR
    - PROSPECTIVE RANDOMIZED
      - No difference in limb salvage/patency (4 year)
      - ↓Operative time and LOS – EPAR
      - ***Antonello M, et al. Open repair versus endovascular treatment for asymptomatic popliteal artery aneurysm: results of a prospective randomized study. J Vasc Surg 2005: 42: 185-93***

Outcomes

- Lovegrove et al
  - Meta-analysis – Open versus EPAR
    - No difference in long term patency
    - Decreased operative time, LOS – EPAR
    - EPAR – more likely to have thrombosis/re-intervention at 30 Days

- ***Lovegrove et al. Endovascular and open approaches to non-thrombosed popliteal aneurysm repair: a meta-analysis. Eur J Vasc Endovasc Surg 2008; 38:96-100***



Curi MA Midterm outcome
Of EPAR . J Vasc Surg
45:505-510 2007

56 PAA

Conclusions

- Endovascular repair of PAAs is relatively safe with patency/limb salvage comparable to open repair in patients that have appropriate anatomy

Conclusions

- The decision, timing and technique to perform open or endovascular repair of PAA must be individualized

When to Bypass and When to Stent?

- Anatomy Good – Stent may be first choice
  - Higher operative risk patients
- Poor runoff – Bypass
- Young/ Knee Flex > 90°
  - Bypass
- Compression Symptoms
  - Decompress and Bypass

When to Bypass and When to Stent?

- Contraindication to antiplatelet/Plavix
  - Bypass
- Very High Medical Risk/Very old
  - Stent, local anesthesia or observation

- Questions?
- Thank You.