Arterial Aneurysms: Peripheral Arterial Aneurysms

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Disclosure

• I have no relationships to disclose.

• I will make reference to unlabeled uses of stent devices in my presentation.

Carotid Aneurysms

• Very rare, less than 4% of peripheral artery aneurysms.

• CCA > ICA > ECA

• Male: Female ratio 2:1

• Average age 62

Carotid Artery Aneurysms - Etiology

• Degenerative

• Infection

• Fibromuscular Dysplasia

• Trauma

• Previous Carotid Surgery

Carotid Artery Aneurysms - Presentation

• Embolism most common presentation
  – 36% incidence of TIA
  – 12% incidence of CVA

• Cranial nerve compression incidence 15%.

• Rupture occurs in < 4% of carotid aneurysms.
Carotid Artery Aneurysms - Treatment

- Open resection with interposition grafting.
  - Risk of stroke 4%
  - Up to 44% cranial nerve injury
- Small case series suggest good early and intermediate results with endovascular exclusion.
  - High-risk anatomy
  - Severe medical co-morbidities

Ruptured Carotid Aneurysm

Subclavian-Axillary Aneurysms

<table>
<thead>
<tr>
<th>Proximal</th>
<th>Distal</th>
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</thead>
<tbody>
<tr>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>Degenerative</td>
<td>Bony Abnormality</td>
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<tr>
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<td>Cervical Ribs</td>
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<td>Mean age &gt;60 y.o.</td>
<td>Mean age 47 y.o.</td>
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Subclavian-Axillary Aneurysms - Presentation

- 90% of patients are symptomatic.
- Embolization primary complication (68%).
- Thrombosis & rupture rare.

Subclavian-Axillary Aneurysms – Treatment (Proximal)

- Open resection with prosthetic graft
  - Supraclavicular approach common
  - May need median sternotomy or thoracotomy for proximal control
  - Must know status of both vertebral arteries
  - Significant morbidity & mortality in an older, sicker population
- High-risk Patients
  - Ligation with ax-ax bypass
  - Endografts

Subclavian-Axillary Aneurysms

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Subclavian-Axillary Aneurysms – Treatment (Proximal)

Endografts

- Brachial or Femoral approach
- Initial data promising (80-100% patency at 7-29 months) but is primarily from small series involving acute injuries.
- Compression, fracture, and occlusion have also been described and may limit utility of this therapy.


Subclavian-Axillary Aneurysms – Treatment (Distal)

- Thoracic outlet decompression with graft placement
- Axillary vs Supraclavicular Approach
- May need infraclavicular access for axillary involvement

Brachial-Radial-Ulnar Aneurysms

- Rare
- Vast majority trauma-related
- Symptoms include pain or nerve-compression; can see thrombosis or embolization with subsequent hand ischemia

Hypothenar Hammer Syndrome

- Medial degeneration from repetitive trauma
- May cause secondary Raynaud’s phenomenon
- Causes painful ulnar nerve compression
- Microresection with reconstruction optimal treatment

Femoral Aneurysms

- 2nd most common peripheral aneurysm; femoral & popliteal account for 90%
- Mean age 65, smokers, HTN
- Male:Female ratio 30:1

Femoral Aneurysms - Classification

- Type I: CFA only (44%)
- Type II: involves profunda (56%)

Femoral Aneurysms - Etiology

• Degenerative
  • Trauma
  • Behçet’s Syndrome
  • Acromegaly
  • Arteriomegaly

Femoral Aneurysms - Etiology

• Patients with femoral aneurysm:
  – 95% have a second aneurysm
  – 92% have aortoiliac aneurysm
  – 59% have bilateral femoral aneurysms

• Patients with AAA & lower extremity aneurysm all men

Femoral Aneurysms - Presentation

• 30% asymptomatic pulsatile mass
• 20% isolated pain from femoral nerve compression
• 50% with major complication at presentation, usually manifest as ischemia
  – 32% thrombosis
  – 10% rupture
  – 5-10% embolism

Femoral Aneurysms - Treatment

Type I

Type II

Popliteal Aneurysms

• Most common peripheral aneurysm
• 97% male, usually 5th-6th decade
• 54% bilateral
• 51% with have or develop AAA

Popliteal Aneurysms
Popliteal Aneurysms - Etiology

- Degenerative
- Trauma
- Cystic Degeneration
- Entrapment
- Infection

Popliteal Aneurysms - Presentation

- 40% asymptomatic
  - No pulses: 86% develop symptoms in next 3 years
  - Pulsed: 34% develop symptoms in next 3 years
- 39% chronic ischemia
- 21% acute ischemia
- Mean 2.9 cm diameter

Popliteal Aneurysms – Elective Treatment

Most Aneurysms

Symptomatic Aneurysms

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Popliteal Aneurysms – Urgent Treatment

Endovascular Repair (EPAR)

- Best for focal aneurysms in high-risk patients
- Larger sheath sizes require adequate access arteries
- Screening essential; inability to follow-up considered relative contraindication
Endovascular Repair (EPAR) - Results

- No long-term data available
- Lovegrove et al meta-analysis:
  - Decreased overall length of stay
  - 30-day graft thrombosis (OR 5.05) and reintervention (OR 18.8) more likely with EPAR
- Antonello et al: only prospective RCT to date.
  - 1 Yr patency: 100% open, 86.7% endo.
  - 4 Yr patency: 80% open, 80% endo.
  - Small sample, excluded unfavorable anatomy & poor runoff.


Tibial Aneurysms

- Majority are related to trauma
  - Injuries
  - Catheter-based injury (Fogarty)
- Most asymptomatic
  - Pain or calf swelling most common
- Poor runoff – consider vein bypass
- Quality runoff – surgical ligation vs embolization

Mycotic Aneurysms

- Occur in all peripheral arteries, usually traumatic or iatrogenic
- Infection-mediated destruction of arterial wall
  - Streptococcus, Staphylococcus, Salmonella, E. coli, Mycobacterium
- Mainstay of treatment is antibiotics and surgical excision +/- revascularization

Location | Type of Peripheral Aneurysms | Etiology | Indication for Repair | Common Modality
--- | --- | --- | --- | ---
Carotid | 3-4% | Degenerative | Discovery | Open Resection
Subclavian - Axillary | 1% | 25% Degenerative 75% TOS | Discovery Symptomatic | Decompression
Distal Arm | Unknown | Trauma | Discovery Symptomatic >2.5 cm Symptomatic | Vein Bypass
Femoral | 20% | Degenerative | Discovery Symptomatic | Open Interposition or Bypass
Popliteal | 70% | Degenerative | Discovery Symptomatic | Vein Bypass
Distal Leg | Unknown | Trauma | Symptomatic | Embolization Vein Bypass
Mycotic | Unknown | Trauma Endocarditis | Discovery | Excision

Summary

- Central aneurysms typically degenerative, peripheral aneurysms likely secondary to trauma
- Lower extremity aneurysms are a disease of men
- Early intervention is better, especially in the lower extremity.