All Patients with Acute Limb Ischemia Should Be Treated Endovascularly: A Strategy for Doing So Including Mechanical Thrombectomy: Which Device is Currently Best

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Disclosure
- Consultant Medtronic, Boston Scientific, Cardinal Health, Volcano

Veith 2015

 Dictionary: unspecified number or amount

Most Patients with Acute Limb Ischemia Should Be Treated Endovascularly

- Advance Endovascular skills
- Appropriate endovascular Tools/Devices
- Must achieve adequate arterial flow to the foot
- Certain cases need open surgery: Thrombosed Pop. A. Aneurysm

Vascular Disease: A Generalized and Progressive Process

Adapted from Libby P. Circulation. 2001;104:365-372.
Peripheral Arterial Occlusion (PAO)
1. Acute → Acute Limb Ischemia (ALI) < 14 days
2. “Subacute”
3. Chronic > 14 days

Acute Limb Ischemia (ALI)
- Sudden onset (<14 days) of symptoms
- Embolic vs. Thrombotic
- High risk of limb loss
- Traditional open operative intervention is associated with increase risk of wound infection and high cardiopulmonary M&M, esp in Elderly

TREATMENT
ACUTE LIMB ISCHEMIA
- Surgery
- Thrombectomy
- Embolectomy
- Bypass
- Angiogram
- Endovascular Intervention (Angiojet/Thrombolytic/PTA/Sent)
- Surgery and IntraOp thrombolytic

Limb Ischemia Duration of treatment (N=397)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>≤ 6 Hrs</td>
<td>229 (58%)</td>
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<tr>
<td>&gt; 6 Hrs &amp; ≤ 12 Hrs</td>
<td>17 (4%)</td>
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<tr>
<td>&gt;12 Hrs &amp; ≤ 24 Hrs</td>
<td>72 (18%)</td>
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<tr>
<td>&gt;24 Hrs</td>
<td>79 (20%)</td>
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</tbody>
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58% completed in ≤ 6 hrs
80% completed in ≤ 24 hrs

PEARL Angiographic Results by Onset of Symptoms
Goal of Treatment
1. Removal of Clot
2. Re-establish Perfusion
3. Minimize Clot Reformation
4. Treatment of the underlying Lesion/Culprit

Endovascular Intervention
I. Antiplatelet Therapy (ASA/Plavix)
II. Thrombolytic therapy/Mechanical Thrombectomy
III. Anticoagulation
IV. Angioplasty/Stent/Atherectomy

Acute Limb Ischemia (ALI)
- Percutaneous Thrombolysis & Thrombectomy provides a minimally invasive alternative to restore perfusion to the symptomatic lower extremity with minimal Morbidity & Mortality
- Native Artery
- Bypass Graft

Native Arterial Occlusion
- Combination of a Fresh Thrombus superimposed on chronic atherosclerotic disease (stenosis) segment.
- Removing the thrombus allows visualization of the underlying occult lesion(s) causing the Occlusion.

Occluded Arterial Segment
- Endovascular Intervention allows Visualization, Assessment, and Treatment of the
  1) Inflow
  2) Occluded Segment
  3) Outflow
  in a percutaneous fashion without major M & M

Benefits
- Converting the patient from Acute state to their baseline Chronic state
- Convert an urgent surgical intervention to an elective revascularization
- Lyse thrombi in the distal artery, restoring patency to the outflow arteries
- Re-establish patency of an occluded but non-diseased inflow source for possible subsequent bypass
Benefits

- Prevent arterial intimal injury from balloon catheter thrombectomy by avoiding operative thromboembolectomy.
- Reduce the level of amputation in patients in whom complete success can not be achieved.

Tool Box

- Antiplatelet Drugs
  1) ASA
  2) Plavix
  3) Ib/IIa inhibitors (Integrillin, ReoPro)
- Anticoagulant
  1) Heparin
  2) Bilirudin (Angiomax)

Tool Box

- Thrombolytic Agents
  1) tPA
  2) rPA
- Mechanical Thrombectomy catheter
- Infusion Catheter

Mechanical Thrombectomy

- Power Pulse with t-PA (10 mg/50-100 cc saline)
- Extract clot
- Decreases both Volume and Duration of t-PA infusion

Tool Box (Techniques)

- Contralateral Approach (Inflow, Occluded segment, Outflow)
- 6 Fr Sheath: perform various type of EVI
- Guidewire Traversal Test (GTT) predicts endoluminal success
- Native Occlusion: .018 St. hydrophilic wire
- Graft Occlusion: .035 hydrophilic wire (Glide W.)

Native Arterial Occlusion

- Can not distinguish between Thrombus and Atheroma “Occluded”
- Atheroma contains the Culprit Lesion (s)
- Key: Pass wire thru the Thrombus and Atheroma without subintimal dissection
- Use 0.018 hydrophilic straight tip wire
- Allows using Percutaneous Thrombectomy and Thrombolytics
82 yr old female with right foot pain and ulceration for 2-3 weeks. patient was admitted because of increase pain, redness

- PMH: chronic Atrial fibrillation, off Coumadin secondary to subdural hematoma 6 weeks ago, HTN, COPD, Renal insufficiency, CHF
- Social Hx: no smoking
- Medication: Lasix, BP meds

Physical Exam:

- Abdomen: very obese
- Ext: absent right femoral and pedal pulse. palpable left femoral pulse. dependent rubor with ulcer in right foot.
- ABI 0.3 on the right
- Duplex scan: patent R common femoral Artery and SFA, with significant inflow disease.
- ** Hydrated with Bicarb/Foley inserted.. No change in post procedure Cr level

L CFA access: R Ext iliac Occlusion

Unable to get a sheath and access Occlusion from the left side
R CFA puncture, Retrograde Access

6 Fr. sheath, 4 Fr. Vertebral Catheter, .035 Glidewire

Catheter and Wire passed toward Right Common Iliac Artery

Wire and Catheter in True Lumen

DVX: Power Pulse TPA from Distal to Proximal

Aspirate with DVX, Proximal to Distal
Arteriogram after Angiojet
R Ext. Iliac is diseased with partial patency

Stenting of the Right External Iliac Artery

Post Stent Angioplasty

Completion Arteriogram

Case presentation:
Acute Limb Ischemia (ALI)
- 58 yr Old female with history of claudication B/L LE
- Increase pain Left leg over past 2 weeks; now has rest pain
- PMH: HTN, NIDDM, Cholesterol, Ex. smoker
- No DP or PT left leg, ABI .2
Antegrade Puncture Left Groin

4 Fr. Catheter

.014 Wire passed without difficulty

AngioJet Catheter
Summary

- Majority of patients with Acute Limb Ischemia can be treated effectively with percutaneous Thrombectomy/thrombolysis and endovascular techniques.
- Advance endovascular techniques/experience and appropriate tools are essential to accomplish this goal

Thank You

“Pull out, Betty! Pull out!...You’ve hit an artery!”