Role of Mechanical Thrombectomy and Thrombolysis in Acute Limb Ischemia: Technical Tips: When is Open Operation Indicated

ALI AMIN, MD, FACS, FACC, RVT
CHIEF OF ENDOVASCULAR INTERVENTIONS
READING HEALTH SYSTEM
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Veith 2016

Consultant Medtronic, Boston Scientific, Cardinal Health, Volcano

We Stand United

All Patients with Acute Limb Ischemia Should Be Treated Endovascularly

Dr. Mills “Some Patients With ALI Need Open Surgical Techniques”

Dictionary: unspecified number or amount

Most Patients with Acute Limb Ischemia Can 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. Aneruysm

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>&lt; 6 hrs</td>
<td>229 (58%)</td>
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<tr>
<td>&gt; 6 hrs &amp; &lt; 12 hrs</td>
<td>17 (4%)</td>
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<tr>
<td>&gt;12 hrs &amp; &lt; 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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- 58% completed in < 6 hrs
- 80% completed in < 24 hrs

**PEARL Angiographic Results**

by Onset of Symptoms

- Acute (≤ 14 Days)
  - N=397
  - p<0.0001
- Chronic (>14 Days)
  - N=302
  - p<0.0001
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/IIIa inhibitor (Integrillin, ReoPro)
- Anticoagulant
  1) Heparin
  2) Bilvalirudin (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

R Groin: Contralateral Access
Antegrade Puncture Left Groin

4 Fr. Catheter

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!”