Panel Discussion: Multi-Disciplinary Approach to The Diabetic Foot

LINC 2019 – Leipzig Interventional Course
Leipzig, Germany
January 21-25, 2019

Moderator:
Brian DeRubertis, MD, FACS

Panelists:
Roberto Ferraresi. MD; Thomas Zeller, MD; Giacomo Clerici, MD
The Diabetic Foot: Prevalence, Complications, and Impact on Patients and Society

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Brian DeRubertis, MD, FACS
Associate Professor of Surgery
Division of Vascular Surgery
David Geffen School of Medicine at UCLA
Los Angeles, California
Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

<table>
<thead>
<tr>
<th>Company</th>
<th>Affiliation/Financial Relationship</th>
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<tbody>
<tr>
<td>• Abbott Vascular</td>
<td>• Advisory Board</td>
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<td>• Consulting agreement</td>
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<td>• Cook Medical</td>
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BD / Bard
Consulting agreement
Prevalence of PAD Increases with Age

- Rotterdam Study (ABI Test < 0.9)\(^1\)
- San Diego Study (PAD by noninvasive tests)\(^2\)

Patients with PAD (%)

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>55-59</th>
<th>60-64</th>
<th>65-69</th>
<th>70-74</th>
<th>75-79</th>
<th>80-84</th>
<th>85-89</th>
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<tr>
<td>Rotterdam Study</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
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<tr>
<td>San Diego Study</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>50</td>
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ABI, ankle brachial index

Figure adapted from: Creager M, ed. *Management of Peripheral Arterial Disease. Medical, Surgical and Interventional Aspects*. 2000.

**Relative Risk for PAD**

- **Diabetes**: 4.1
- **Smoking**: 2.6
- **Hyperhomocysteinemia**: 2.2
- **Renal Insuff.**: 2.1
- **Race**: 2.1
- **Age**: 1.7
- **Hypertension**: 1.5
- **Hyperlipidemia**: 1.1
- **Gender**: 1.0

* Calculated relative risk increases at 5-year intervals.
† Relative risk is 1.1 per 10 mg/dL increase in total cholesterol.

Prevalence of PAD & Diabetes is High and Increasing

* Includes myocardial infarction and angina pectoris
1. American Heart Association. *Heart Disease and Stroke Statistics—2007 Update*
Special Populations at Risk for PAD: Diabetics

- 1 of every 4 diabetics will face CLI within their lifetime
- Foot ulcers develop in 15% of diabetics
- Approximately 70% of leg amputations in the US are performed on diabetics
- A diabetic patient undergoes an amputation every 30 seconds

Amputation is often the final outcome for patients with CLI, and especially those with diabetes, and this is generally due to the complexity of these patients and the low margin for error in management.

Allie, D.E et al. 24-carat gold, 14-carat gold, or platinum standards in the treatment of critical limb ischemia: bypass surgery or endovascular intervention? J Endovasc Ther 16 Suppl 1, I134-146.
Multidisciplinary Management of the Diabetic Foot

Special Populations at Risk for PAD: Diabetics
Impact of CLI on Patients Diagnosed with PAD

- 25% dead
- 30% amputated
- 20% Continuing CLI
- 25% CLI resolved
- QOL indices similar to patients with terminal cancer

At One Year…

Annual cost of care for amputee is $50,000 vs $1,000 for limb salvaged patient

15-20% of amputees require permanent nursing home care at $70-100,000 annually

30 day mortality is 5%-10% after BKA

30 day mortality is 15%-20% after AKA

2 of the top 5 hospital procedures with the highest mortality

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Management of PAD and Diabetic Foot is Two-Pronged

Treatment of Symptoms

- **Objective**
  - Reduce symptoms to increase mobility, exercise tolerance, and functional capacity
- **Exercise**
- **Pharmacologic therapy**
  - Cilostazol
- **Revascularization (for CLI or claudication)**

Long-term Risk Reduction

- **Objective**
  - Reduce the risk of atherothrombotic events
- **Control of risk factors**
  - Smoking
  - Diabetes
  - Hypertension
  - Dyslipidemia
  - Exercise / diet
- **Antiplatelet therapy**
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Management of PAD and Diabetic Foot is Two-Pronged

- **Revascularization**
  - Careful, expert intervention
  - Surgical & endovascular
  - Includes tibial/pedal level
  - Associated foot surgery
  - Implications of failure

- **Medical Optimization**
  - Multi-disciplinary needs
  - Infection control
  - Wound care
  - Acute medical issues
  - Long-term cardiac risk modification
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Management of PAD and Diabetic Foot is Two-Pronged

Revascularization

- Careful, expert intervention
- Surgical & endovascular
- Includes tibial/pedal level
- Associated foot surgery
- Implications of failure

Increase amputation & decreased survival without revascularization

Management of PAD and Diabetic Foot is Two-Pronged

- **Revascularization**
  - Careful, expert intervention
  - Surgical & endovascular
  - Includes tibial/pedal level
  - Associated foot surgery
  - Implications of failure

- Over 50% of amputations occur without a vascular evaluation\(^1\)
- In US Medicare population in 2012, 54% of amputations were done without prior vascular procedure, including diagnostic angiography\(^2\)

Open Surgical Revascularization

- Femoral endarterectomy & profundaplasty
- Femoropopliteal bypass
- Femorotibial / pedal bypass
- Popliteal-tibial bypass
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Endovascular Revascularization
### Recent Shift Toward Endovascular Reconstruction

#### Percentage of Vascular Procedures by Year*

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>Endovascular revascularization (%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.6</td>
<td>12.5</td>
<td>32.9</td>
<td>52.9</td>
<td>75.3</td>
<td>86.3</td>
<td>88.3</td>
<td>87.7</td>
</tr>
<tr>
<td>Open revascularization (%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98.4</td>
<td>87.5</td>
<td>67.1</td>
<td>47.1</td>
<td>24.7</td>
<td>13.7</td>
<td>11.7</td>
<td>12.3</td>
</tr>
<tr>
<td>Amputation (%)</td>
<td>32.3</td>
<td>25</td>
<td>27</td>
<td>18.2</td>
<td>28.4</td>
<td>20</td>
<td>15</td>
<td>9.1</td>
<td>8.2</td>
<td>3.8</td>
<td>7.2</td>
</tr>
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Management of PAD and Diabetic Foot is Two-Pronged

- **Revascularization**
  - Careful, expert intervention
  - Surgical & endovascular
  - Includes tibial/pedal level
  - Associated foot surgery
  - Implications of failure

- **Medical Optimization**
  - Multi-disciplinary needs
  - Infection control
  - Wound care
  - Acute medical issues
  - Long-term cardiac risk modification

Brian G. DeRubertis, MD, FACS
Multidisciplinary Management of the Diabetic Foot

Podiatry
Geriatrics
Wound Care
General Cardiology
Hyperbaric Medicine
Primary Care / Internal Medicine
Vascular Surgery
Endocrinology
Clinical Psychology
Interventional Cardiology
Interventional Radiology
Visiting Nurse Services
Infectious Disease

Comprehensive Diabetic Foot Clinic
Panel Discussion: Multi-Disciplinary Approach to The Diabetic Foot

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Topics for Discussion:

I. Definition and Organization of the Diabetic Foot Clinic
II. Benefits of a Multi-Disciplinary Diabetic Foot Clinic
III. Case Examples of Patients Managed within this Framework
IV. Pathways / Algorithms for Diabetic Foot Care
Multidisciplinary Management of the Diabetic Foot

Topics for Discussion:

I. Definition and Organization of the Diabetic Foot Clinic
   • Is multidisciplinary involvement necessary
   • Who are the participants, what skills do they bring
   • What is the organizational structure
   • Differences from a Limb Preservation Center (if any)
   • Barriers to establishment of a clinic
   • Barriers to ongoing success

II. Benefits of a Multi-Disciplinary Diabetic Foot Clinic

III. Case Examples of Patients Managed within this Framework

IV. Pathways / Algorithms for Diabetic Foot Care
Topics for Discussion:

I. Definition and Organization of the Diabetic Foot Clinic

II. Benefits of a Multi-Disciplinary Diabetic Foot Clinic
   - Patients
   - Physicians
   - Hospitals / Healthcare Systems

III. Case Examples of Patients Managed within this Framework

IV. Pathways / Algorithms for Diabetic Foot Care
Multidisciplinary Management of the Diabetic Foot

Topics for Discussion:

I. Definition and Organization of the Diabetic Foot Clinic

II. Benefits of a Multi-Disciplinary Diabetic Foot Clinic

III. Case Examples of Patients Managed within this Framework
   • Case Presentations
   • What are the needs of the specific patient
   • How are those needs addressed by the clinic structure
   • What is the referral pattern and patient workflow
   • How does the clinic affect long-term outcome

IV. Pathways / Algorithms for Diabetic Foot Care
Multidisciplinary Management of the Diabetic Foot

Topics for Discussion:

I. Definition and Organization of the Diabetic Foot Clinic

II. Benefits of a Multi-Disciplinary Diabetic Foot Clinic

III. Case Examples of Patients Managed within this Framework

IV. Pathways / Algorithms for Diabetic Foot Care
   - Standardization and protocol-driven care
   - Outcome assessment & quality metrics
   - Identifiers of patients at risk
46 yo with IDDM and gangrene of right foot

• Presentation
  – Fit and avid cyclist until current issue
  – PMH of NIDDM and gout
  – Diabetes diagnosed 1 year ago, progressed to IDDM in last 2 months and has been relatively non-compliant with medical treatment
  – Underwent podiatric surgery for gouty tophus which hurt when wearing cycling shoes
  – Had dehiscence of surgical wound, which became necrotic, leaving exposed tendon and bone over right 1st metatarsal / phalanx.
  – Underwent debridement & VAC dressing placement, which subsequently caused large necrotic wound on lateral foot.

• PMH
  – Gout
  – HgB A1C >9 recently
Pre Procedure Evaluation

• Exam:
  • Right - No palpable DP/PT
  • Left - 2+ DP / 1+ PT

• ABI
  • Resting: Noncompressible bilaterally
  • TBI: R – 0.25; L – 0.35

• Ultrasound (right leg)
  • No evidence of inflow disease
  • Widely patent SFA/pop
  • Normal waveforms to ankle level in DP / PT
  • (dressing not removed during ABIs / duplex)

Anything to do in this scenario???
- Discontinuous AT to DP transition
- Discontinuous PT, with preferential flow in PT from the peroneal
Standard 014 balloons wouldn’t cross. Switched to 014 Armada XT
Excisional atherectomy with ES+ SilverHawk following predilatation

Post-dilated with 3x60 Armada 14

Completion
ES+ wouldn’t pass even after predilatation. Treated with angioplasty alone with 3x60mm
Patient Follow Up

- Improved granulation tissue on metatarsal wound after 3-4 weeks
- Scheduled for operative debridement and umbilical cell tissue graft
- Considering TMA dependent upon patency of intervention, tissue appearance over time

Examination:
- Exam: Strongly palpable 2+ right DP (1mo)
- ABI
  - Resting: Noncompressible bilaterally
- Ultrasound (right leg)
  - Biphasic waveforms to ankle level in DP and PT
  - No residual lesions identified
Key Points

• Technique in distal / proximal tibials
• Strong, but not absolute or dogmatic, reliance on non-invasive imaging.
• No amputation without angio and consideration of revascularization attempt
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