Infection/ischaemia/amputation: how to build a multidisciplinary center for limb salvage

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Disclosure

Roberto Ferraresi, MD

I have the following potential conflicts of interest to report: consulting, travel reimbursement, teaching courses, training, proctoring:

Medtronic, Boston Scientific, Abbott, LimFlow, Terumo, Cook, Biotronik, Asahi, Shire, Kardia, Orbus
Infection/ischaemia/amputation: how to build a multidisciplinary center for limb salvage

1. The big bag of CLI
2. Multidisciplinary team
3. People & protocols

1. Medical team
2. Toe team
3. Flow team
Recommendation 16. Clinical definition of critical limb ischemia (CLI)

- The term critical limb ischemia should be used for all patients with chronic ischemic rest pain, ulcers or gangrene attributable to objectively proven arterial occlusive disease. The term CLI implies chronicity and is to be distinguished from acute limb ischemia [C].

Critical limb ischemia is a “bag” in which we put every patient with PAD and foot suffering
CLI is a complex disorder. We can treat it only pursuing a patient-centric approach in a multidisciplinary team.
1. The big bag of CLI

2. Multidisciplinary team

3. People & protocols

- 1. Medical team
- 2. Toe team
- 3. Flow team
1° “Medical team”

Internal medicine expertise

- Proper management of comorbidities

The prevalence of CLI in ESRD-HD pts ranges between 4-17%

In our CLI pts:
- 30% are ESRD-HD

In our CLI pts >70% have a history of CAD and >30% cerebro-vascular disease
Internal medicine expertise

- Proper management of comorbidities:
- Proper clinical, life expectancy & QoL evaluation

Overall survival remains poor in CLI pts regardless of the procedure-related success.

Patients do not always experience significant gains in their QoL after limb salvage interventions, despite reasonable graft patency, amputation-free survival, and limb salvage rates.

We should maximize patient-centered outcomes.
The medical team plays a pivotal role in CLI treatment guiding us in tailoring every treatment on the patient.
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Foot surgical & orthopedic management

- **Infection surgery**: wet gangrene, abscess, phlegmon.

- **Curative surgery**
  - Debridement
  - Negative wound pressure therapy
  - Dermal Substitute
  - Skin graft
  - Fasciocutaneous graft
  - Flaps

- **Corrective surgery of deformities**

- **Charcot foot surgery**
A strong “toe team”, able to use every type of wound treatment, is essential in achieving success.
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Nutrition, Metabolism and Cardiovascular Diseases

Available online 24 December 2013

In Press, Accepted Manuscript — Note to users

Treatment of peripheral arterial disease in diabetes a consensus of the italian societies of diabetes (sid, amd), radiology (sirm) and vascular endovascular surgery (sicve)

Antimo Aiello\textsuperscript{a}, Roberto Anichini\textsuperscript{b}, Enrico Brocco\textsuperscript{c}, Carlo Caravaggi\textsuperscript{d}, Agatina Chiavetta\textsuperscript{e}, Roberto Cioni\textsuperscript{f}, Roberto Da Ros\textsuperscript{g}, M. Eugenio De Feo\textsuperscript{h}, Roberto Ferraresi\textsuperscript{i}, Francesco Florio\textsuperscript{j}, Mauro Gargiulo\textsuperscript{k}, Giuseppe Galzerano\textsuperscript{l}, Roberto Gandini\textsuperscript{m}, Laura Giurato\textsuperscript{n}, Lanfroi Graziani\textsuperscript{o}, Lorena Mancini\textsuperscript{p}, Marco Manzi\textsuperscript{q}, Piero Modugno\textsuperscript{r}, Carlo Setacci\textsuperscript{s}, Luigi Uccioli\textsuperscript{t}
Long lesions

Short lesions

Angioplasty first strategy

Bypass feasibility

4 Y

≥1 N

Bypass first strategy
Open & Endo approaches are complementary and must be chosen according to a patient-centered strategy.
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1. Medical team
2. Toe team
3. Flow team
Multidisciplinary team

1° “Medical team”
- Diabetologist
- Nephrologist
- Cardiologist
- Infectivologist
- Neurologist

2° “Toe team”
- Foot surgeon
- Orthopedic
- Plastic surgeon
- Podiatrist

3° “Flow team”
- Interventional radiologist
- Interventional cardiologist
- Vascular surgeon

Inpatient & outpatient foot clinic

ENDO & OPEN revascularization
It doesn’t matter what is the label of a physician, matters what he/she is able to do!
How to organize the multidisciplinary team work?
Protocols for infection treatment

1° “Medical team”
Diabetologist
Nephrologist
Cardiologist
Infectivologist
Neurologist

2° “Toe team”
Foot surgeon
Orthopedic
Plastic surgeon
Vascular surgeon
Podiatrist

3° “Flow team”
Vascular surgeon
Interventional radiologist
Interventional cardiologist

1° INFECTION TREATMENT
• ULCER DEBRIDEMENT & URGENT SURGERY
  (GANGRENE/ABSCESS/PHLEGMON)
• METABOLIC & CARDIOLOGIC TREATMENT
• PRE-MEDICATIONS

2° REvascularization
PTA/Bypass are not the first line therapy in Texas D wounds
(infection+ischemia)

3° FINAL Treatment
• MEDICAL
• SURGICAL
• ORTHOPEDIC
• REHABILITATION
Protocols for non-infected lesion: the philosophy of cross referral

1° "Medical team"
- Diabetologist
- Nephrologist
- Cardiologist
- Infectivologist
- Neurologist

2° "Toe team"
- Foot surgeon
- Orthopedic
- Plastic surgeon
- Vascular surgeon
- Podiatrist

3° "Flow team"
- Vascular surgeon
- Interventional radiologist
- Interventional cardiologist

Probability of healing based on toe pressures

- Flow adequate: "Toe" team takes primacy
- Flow inadequate: "Flow" team takes primacy

When flow is adequate, the podiatry team manages wound healing, offloading, reconstruction, prevention.
The vascular team improves flow and pushes the wound up the curve.
Cross-talking between the teams: Matching revascularization with wound care and amputation strategies

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3° “Flow team”
- Vascular surgeon
- Interventional radiologist
- Interventional cardiologist

- Male, 75 yy
- Type 2 DM
- Forefoot gangrene
Impossible to open PT neither antegrade nor retrograde.
Flow-guided surgery: what is the best forefoot amputation for this patient? Consider 3 key points

<table>
<thead>
<tr>
<th>Type</th>
<th>Tissue</th>
<th>Flow</th>
<th>Biomechanical needs</th>
</tr>
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<tbody>
<tr>
<td>Distal TMA</td>
<td>-</td>
<td>+++</td>
<td>-</td>
</tr>
<tr>
<td>Proximal TMA</td>
<td>++</td>
<td>++/---</td>
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<td>Trans-cuneiform</td>
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<td>Lisfranc</td>
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</tbody>
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- Proximal open TMA with accurate sparing of pedal-plantar loop vessel
- Bone coverage by Hyalomatrix application
- Skin graft
Multidisciplinary team means daily collaboration between vascular operators and foot operators.
To treat CLI we need a chain, however…

1° Medical therapy
   • Metabolic balance
   • Anemia correction
   • Heart evaluation
   • Renal function evaluation & protection

2° Infection Treatment
   • Ulcer debridement & urgent surgery for gangrene, abscess, phlegmon
   • Identification of bacterial strains → appropriate antimicrobial therapy

3° Revascularization
   PTA/Bypass are not the first line therapy in Texas D wounds

4° Reconstruct a stable foot
   • Skin integrity
   • Structural stability
   • Suitability for prosthesis.
   • Ability to walk

5° Follow up
   • Medical
   • Podologist
   • Vascular
The strength of a chain is the strength of the weakest ring, not the one of the strongest.
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