Time is tissue in critical limb ischemia

Prof. Carlo Setacci
Chief of Vascular Surgery
University of Siena - Italy
Speaker name: Prof. Carlo Setacci

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
Ideal Revascularization

Single operation

Relief of symptoms

Prompt wound healing

No perioperative complications

No need for further interventions
The reality

- Diabetic Foot Complications
- Diabetes is diagnosed once every 17 seconds!
- Up to 70% of the lower extremity amputations in the world are associated with diabetes
- Every 20 seconds, somewhere in the world, a lower extremity is amputated in a patient with diabetes

EVERY 20 SECONDS!
Chapter V: Diabetic Foot

M. Lepääntalo\textsuperscript{a,b,*}, J. Apelqvist\textsuperscript{c,d}, C. Setacci\textsuperscript{e}, J.-B. Ricco\textsuperscript{f}, G. de Donato\textsuperscript{g}, F. Becker\textsuperscript{g}, H. Robert-Ebadi\textsuperscript{h}, P. Cao\textsuperscript{h}, H.H. Eckstein\textsuperscript{i}, P. De Rango\textsuperscript{k}, N. Diehm\textsuperscript{i}, J. Schmidli\textsuperscript{m}, M. Teraa\textsuperscript{n,o}, F.L. Moll\textsuperscript{n}, F. Dick\textsuperscript{m}, A.H. Davies\textsuperscript{p}

\textsuperscript{a}Department of Vascular Surgery, Helsinki University Central Hospital, Helsinki, Finland
\textsuperscript{b}Institute of Clinical Medicine, Faculty of Medicine, University of Helsinki, Helsinki, Finland
\textsuperscript{c}The Diabetic Foot Center at the Department of Endocrinology, Skåne University Hospital, Malmö, Sweden
\textsuperscript{d}Division for Clinical Sciences, University of Lund, Lund, Sweden
\textsuperscript{e}Department of Surgery, Unit of Vascular and Endovascular Surgery, University of Siena, Siena, Italy
\textsuperscript{f}Department of Vascular Surgery, University Hospital of Poitiers, Poitiers, France
\textsuperscript{g}Division of Angiology and Hemostasis, Geneva University Hospitals, Geneva, Switzerland
\textsuperscript{h}Unit of Vascular Surgery, Department of Cardiosciences, Hospital S. Camillo-Forlanini, Rome, Italy
\textsuperscript{i}Clinic for Vascular Surgery, Klinikum rechts der Isar, Technische Universität München, Munich, Germany
\textsuperscript{j}Unit of Vascular and Endovascular Surgery, Hospital S. M. Misericordia, Loc. S. Andrea delle Fratte, Perugia, Italy
\textsuperscript{k}Clinical and Interventional Angiology, Swiss Cardiovascular Centre, University Hospital Berne, Berne, Switzerland
\textsuperscript{l}Department of Cardiovascular Surgery, Swiss Cardiovascular Centre, University Hospital Berne, Berne, Switzerland
\textsuperscript{m}Department of Vascular Surgery, University Medical Center Utrecht, Utrecht, The Netherlands
\textsuperscript{n}Department of Nephrology & Hypertension, University Medical Center Utrecht, Utrecht, The Netherlands
\textsuperscript{o}Academic Section of Vascular Surgery, Imperial College School of Medicine, Charing Cross Hospital, London, United Kingdom
ESVS Guidelines for CLI
Surgical Treatment

C. Setacci, G. de Donato, M. Teraa, F. Moll
& JB Ricco

Department of Vascular and Endovascular Surgery,
University of Siena, Italy
Treatment options

- Pharmacological:
  - Prostanoids

- Surgical:
  - Endarterectomy
  - Bypass

- Endovascular:
  - PTA
  - PTA with stent or stent graft

- Hybrid

- Non-reconstructive

**Choice based on:**
- Affected arterial segment
- Length of diseased segment
- Patient characteristics
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, Roberto Anichini, Enrico Brocco, Carlo Caravaggi, Agatina Chiavetta, Roberto Cioni, Roberto Da Ros, M. Eugenio De Feo, Roberto Ferraresi, Francesco Florio, Mauro Gargiulo, Giuseppe Galzerano, Roberto Gandini, Laura Giurato, Lanfroi Graziani, Lorena Mancini, Marco Manzi, Piero Modugno, Carlo Setacci, Luigi Ucciol
PATIENT CLINICAL STATUS
Is the patient a good candidate for bypass surgery? Consider:
- age/comorbidities/life expectancy
- type of anesthesia/type of bypass

FOOT EVALUATION
Are foot conditions suitable for bypass surgery? Consider:
- tissue lesion/infection (Rutherford, Texas)
- anastomosis site involvement
- planned foot surgical procedure

BY PASS CONDUIT
Has the patient a suitable vein? Consider:
- type of bypass
- vein availability: total body veins evaluation

OUTFLOW VESSEL
Has the patient an outflow vessel suitable for distal bypass anastomosis? Consider:
- target vessel diameter/disease/calcification
- small outflow arteries disease
- wound related artery concept

Endovascular first strategy can be used in the majority of pts with extensive FEM-POP-BTK.
Moreover they are often unfit for Open.
Foot Circle

Concept of wound healing and wound related artery
ANGIOSOMES

Teamwork is needed

Early referral
Early diagnosis
Early intervention and infection control.
The effectiveness of tissue preservation for the diabetic foot

The mainstays of successful diabetic foot surgery include:

- radical debridement and lavage of all devitalized tissue with preservation of viable structures,
- insurance of adequate blood supply,
- use of tissue transfers when necessary,
- protection of tissues from post-surgical shear and pressure,
- and antibiosis through the use of topical, oral, and parenteral antibiotics.
Limited, early amputation

Any discussion of the diabetic foot requires introduction of the concept of function-preserving amputation surgery.

Partial anterior foot amputations frequently are necessary as treatment for infection or gangrene.

If a surgical or endovascular revascularization is performed
Limited, early amputation

The major value of partial foot amputation *(combined or after a endovascular revascularization)* is the potential for retention of plantar load-bearing tissues, which are uniquely capable of tolerating the forces involved in weightbearing.
Limited, early amputation

Function-preserving amputation surgery

The goal of treatment is preservation of function, not just preservation of tissue.

Limited, early amputation surgery should be the first step in the rehabilitation of the patient.
PHYSICIAN INVOLVED

DIABETOLOGIST
- Metabolic control
- Prevention

CARDIOLOGIST
CAD & CHF diagnosis & treatment

NEUROLOGIST
Cerebral vasculopathy diagnosis & treatment

PODOLOGIST
Foot care

PHYSIOTHERAPY
- Rehabilitation

PALLIATIVE CARE
- Pain control

ORTHOPEDIC
- Correction of foot deformity
- Treatment of joint instability

MICROBIOLOGY
- Bacterial culture

HEMODINAMIST
- Cardiologist
- Radiologist
- Vascular surgeon

SURGEON
- Vascular surgery
- Foot surgery
- Plastic surgery

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Cross-disciplinary collaboration

Amputation

Infection

Vascular disease

Ulceration

Neuropathy

Diabetes

STAIRWAY TO AMPUTATION

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### Texas wound classification

*Lavery L.A. et al Foot Ankle Surg. 1996*

<table>
<thead>
<tr>
<th>Stage A</th>
<th>Stage B</th>
<th>Stage C</th>
<th>Stage D</th>
</tr>
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<tbody>
<tr>
<td>Heal ulcer</td>
<td>+ infection</td>
<td>+ ischemia</td>
<td>+ ischemia and infection</td>
</tr>
<tr>
<td>Superficial ulcer</td>
<td>+ infection</td>
<td>+ ischemia</td>
<td>+ ischemia and infection</td>
</tr>
<tr>
<td>Deep ulcer</td>
<td>+ infection</td>
<td>+ ischemia</td>
<td>+ ischemia and infection</td>
</tr>
<tr>
<td>Deep ulcer to bone or joint</td>
<td>+ infection</td>
<td>+ ischemia</td>
<td>+ ischemia and infection</td>
</tr>
</tbody>
</table>
SVS

Lower Extremity Threatened Limb Classification

WIFI Index

- **Wound**: extent and depth
- **Ischemia**: perfusion/flow
- **Foot Infection**: presence and extent
we had to assume that any infection, if present, had been controlled.
Clinical Study

Diabetic Foot: Surgical Approach in Emergency

C. Setacci,¹ P. Sirignano,¹ G. Mazzitelli,¹ F. Setacci,¹ G. Messina,²
G. Galzerano,¹ and G. de Donato¹

¹ Vascular and Endovascular Surgery Unit, Department of Medicine, Surgery and Neurological Sciences,
University of Siena, Viale Bracci 1, 53100 Siena, Italy
² Area of Public Health, Department of Molecular and Developmental Medicine, University of Siena, Siena, Italy
Study Design
Setacci et al. IJVM 2013

- January 2007 – December 2011 (two groups: A until 2009 and B from 2009 to nowadays)
- 375 Pt with Diabetic foot and CLI

Protocol for all patients admitted from 2009 (183 pt)

1. early diagnosis with a 24h on call DF team. All the members of the team should be able to perform a duplex scan and to identify an infective disease, if present;
2. urgent treatment of severe foot infection with an aggressive surgical debridement;
3. early revascularization within 24 hours. In all cases the first line approach should be represented by endovascular procedures (PTA ± stenting);
4. definitive treatment: wound healing, reconstructive surgery, and orthesis.
## Table 1: Demographic characteristics of the two study groups.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>75.6</td>
<td>76.7</td>
</tr>
<tr>
<td>Male</td>
<td>81.7%</td>
<td>78.6%</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>63%</td>
<td>64.4%</td>
</tr>
<tr>
<td>COPD</td>
<td>35.9%</td>
<td>38.7%</td>
</tr>
<tr>
<td>Renal failure</td>
<td>57.8%</td>
<td>58.4%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>88.5%</td>
<td>91.8%</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>75.5%</td>
<td>78.6%</td>
</tr>
</tbody>
</table>
Estimated amputation rate at 6 years

Setacci et al. IJVM 2013
Despite the benefits of pharmacologic therapy, **arterial** revascularization remains a mainstay in the management of CLI.
By the way, control of any local sepsis through appropriate use of surgical (debridement, drainage, and even amputation) and medical (antibiotics) modalities is always the immediate priority in DF management.
In our experience many different professional skills should work together 24 h–365 d to reach the goal to avoid major amputations in patients with DF.
CASE 1

- Phlegmon of the sole of the foot fistulised on the back and on the heel bone (ostomyelitic)

Aggressive drainage of the phlegmon with hemi-calcanectomy (arrow) + revascularization
CASE 1

Recanalization and stenting of peroneal artery

healing of the calcaneus (arrow) covered by a muscle flap (sural m.)
CASE 2

Wet gangrene of the foot and of the lower third of the leg with cellulitis up to the middle third
Patient in septic shock
Sent with urgent indication for thigh amputation
CASE 2

- Transluminal re-vascularisation (PTA) up to foot
CASE 2

After the revascularization and limited amputation

radical debridement and lavage of all devitalized tissue with preservation of viable structures

after skin graft taken from thigh

Result at 6th month
CASE 3

- Ischemic diabetic foot with medial, dorsal and lateral ulcers and bone and tendon exposure

Transluminal re-vascularisation (PTA) up to foot
CASE 3

Anterior and posterior balloon angioplasty

Healing with muscle flap (great dorsal m.)
CASE 4

abscess to the forefoot

surgically drainage

Endovascular treatment

Result at 6th month

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PRIMARY AMPUTATION

extended gangrene over the ankle: indication to major amputation?

- Angiography
  - Attempted endovascular revascularization
  - Amputation
TAKE-AWAY message

Remember that time is money.

(Benjamin Franklin)
TAKE-AWAY message

Remember that time is tissue

Carlo Setacci

THANKS FOR THE ATTENTION
Time is tissue in critical limb ischemia

Leipzig Interventional Course | January 24 – 27, 2017 | Leipzig, Germany

Prof. Carlo Setacci
Chief of Vascular Surgery
University of Siena - Italy