Is No-Option CLTI Ever Real: Yes, But Rarely: How To Decrease The Major Amputation Rate: Open Bypasses Have A Role

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Disclosure
• No commercial conflict of interest
• Clinical bias against major amputation

Major Amputation; 30-days mortality rate
• 10-30%, Cutson et al, J Am Geriatr Soc, 1997
• 16.8%, Moxey et al, BJIS, 2010
• 17.4%, Lower Limb Amputation: Working Together, 2014

“Quality of life following infra-genicular bypass and lower limb amputation”

Conclusion: Quality of life after successful femoro-distal bypass is higher than after primary or secondary amputation. To attain the maximum quality of life in patients with critical ischaemia, femoro-distal bypass should be performed wherever feasible.


“Cost-effectiveness in the contemporary management of critical limb ischemia with tissue loss”

• Markov model for analysis; 6 different treatment strategies
• Surgical bypass with subsequent endovascular revision(s) most cost-effective alternative to wound care alone
• Endovascular strategies achieved comparable clinical outcomes but at higher cost
• Endovascular management is only cost-effective when initial wound closure rate was >37% or procedural costs decreased by >42%
• Primary amputation least cost-effective

Barshes et al, JVS, 2012
NCEPOD Lower Limb Amputation National Audit

Table 4.7 Five of angiography and Duplex ultrasound (Clinical questionnaire data)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiography</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>Duplex ultrasound</td>
<td>178</td>
<td></td>
</tr>
<tr>
<td>Angiography and duplex ultrasound</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Total undergoing formal vascular assessment</td>
<td>378</td>
<td></td>
</tr>
<tr>
<td>No vascular imaging</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>622</td>
<td></td>
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</tbody>
</table>

39.2%

Lower Limb Amputation: Working Together (2014)

Attempted revascularization

Table 4.11 Limb salvage surgery attempted prior to amputation (Doctors’ opinion)

<table>
<thead>
<tr>
<th>Attempted</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>174</td>
<td>33.8</td>
</tr>
<tr>
<td>No</td>
<td>341</td>
<td>66.2</td>
</tr>
<tr>
<td>Subtotal</td>
<td>515</td>
<td></td>
</tr>
<tr>
<td>Unable to answer</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Not answered</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>529</td>
<td></td>
</tr>
</tbody>
</table>

Lower Limb Amputation: Working Together (2014)

“No-option for treatment” CLTI: quality of foot imaging

- Digital subtraction angiography (DSA)
- Magnetic resonance angiography (MRA)
- Computed tomography angiography (CTA)
- Duplex ultrasound

Dorsalis pedis duplex

“Decade of experience with dorsalis pedis artery bypass: Analysis of outcome in more than 1000 cases”

“A decade of experience with dorsalis pedis artery bypass: Analysis of outcome in more than 1000 cases”

“Blind” exploration of a DP artery, not seen on angiography but thought to be patent on the basis of an audible Doppler signal heard in the foot, was performed when appropriate, although this was done much less frequently in the later years of this study because of improvements in radiographic equipment and the experience of our radiologists in imaging foot vessels.

Pomposelli et al, JVS 2003
"No-option for treatment" CLTI

Foot tissue loss
Disease of crural + pedal/plantar arteries
Treatment should be at pedal level

"Ultra-hybrid" revascularization; + pedal-planter loop angioplasty

Courtesy of Dr Dean Huang, Kings College Hospital, London, UK

"Distal versus ultra-distal bypass grafts: amputation-free survival and patency rates in patients with critical leg ischaemia"

• 230 bypasses, 179 (78%) distal and 51 (22%) ultra-distal
• 30-day mortality rate was 1.7% (4/230)

Slim, Rashid et al, EJVES, 2011

"Infra-inguinal bypass is associated with lower peri-operative mortality than major amputation in high-risk surgical candidates"

• Major amputation (n = 792) Vs infrainguinal bypass (n = 780)
• Bypass 30-day mortality lower than amputation (6.54% Vs 9.97%; P = 0.0347)
• No difference in hospital length of stay

Barshes et al, JVS, 2011

Limiting factors for bypass; major amputation indications

• “Dead foot”
• Extensive tissue necrosis involving the sole of the foot
• Open infected ankle joint
• Limited venous conduit
• No-option of pedal revascularization

Hybrid revascularization strategies

Definition: “planned combined angioplasty and bypass performed in stages or synchronously”

Rational: Ideal for CLTI with multilevel extensive disease unsuitable for one modality reduce length of graft and fewer joints crossed

Classification:
• Hybrid-I: inflow angioplasty + bypass
• Hybrid-II: bypass + outflow angioplasty
• Hybrid-III: angioplasty + bypass + angioplasty

"Ultra-hybrid" revascularization; + pedal-plantar loop angioplasty

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Reducing major amputation

- Peripheral vascular disease accredited centres (high volume revascularization)
- Early referral (second opinion prior to amputation)
- Networks; hub and spoke model
- Root cause analysis for all major amputations

“Regional intensity of vascular care and lower extremity amputation rates”. Goodney et al. JVS, 2013

Level I evidence in support of bypass-first using GSV in infra-popliteal disease

2017 ESC Guidelines on the Diagnosis and Treatment of Peripheral Arterial Diseases, in collaboration with the European Society for Vascular Surgery (EVS)

Endovascular pedal veins arterialization

“Surgical and endovascular venous arterialization: ready to take the “desert” by storm?”

Up to 20% of patients with CLI are not suitable candidates for a vascular intervention because of extensive occlusions of the outflow in the crural and pedal vessels (desert foot)

Schreve et al. / Cardiovasc Surg (Torino), 2017

Conclusions

- No-option CLTI rarely exists in patient undergoing amputation
- Revascularization at pedal level is possible in most patients
- Hybrid revascularization strategies is invaluable in complex cases
- “Unfitness” to undergo revascularization doesn’t justify amputation
- Major amputation should only be offered to unsalvageable legs
- Open bypass surgery is still the superior modality in severe CLTI