The Angiosome Concept Has Little Value: Never Deny A Patient With CLI A Revascularization For Limb Salvage Based On It

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Disclosures

✓ I have the following potential conflicts of interest to report:
✓ Receipt of grants/research support
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Medtronic, Abbott Vascular, Cordis, Bard, W.L. Gore, Terumo, Boston Scientific
✓ Participation in a company sponsored speakers' bureau
✓ Employment in industry
✓ Shareholder in a healthcare company
✓ Owner of a healthcare company
✓ I do not have any potential conflict of interest

Revascularization of a Specific Angiosome for Limb Salvage: Does the Target Artery Matter?

Richard F. Veule,1 Christopher F. Armstrong1 Evan J. Salem1 Vivek Bhargava1 Michael Thomson2 and Anne N. Valdes2
Washington, D.C.

- 52 wounds in 48 patients
- Open revascularisation
- 51% Direct Revascularisation
- 49% Indirect Revascularisation
- Wound healing:
  - DR: 91%
  - IR: 62%
- Amputation
  - DR: 9%
  - IR: 38%

Angiosome concept is worthless. Why?

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The vascular territories (angiosomes) of the body: experimental study and clinical applications

S. I. Taylor and J. H. Palmer

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Ann Vasc Surg 2009

- 369 limbs in 329 patients
- Endovascular treatment
- 200 DR; 169 IR
- Mean FU: 18 mths
- LS rate: 82 vs 68% @ 4 y (p=0.02)
- AFS: 49 vs 29% @ 4 y (p=0.002)
- Freedom from MALE
  - DR: 51 vs 28% @ 4 y (p=0.008)
QUESTIONS
• Should we take the angiosome concept into account in our revascularisation strategy?
• How often do we really have the choice?
• How important is direct revascularisation as a prognostic factor for wound healing, limb salvage and survival.
• Should we still perform indirect revascularisations?

GEAR – Open surgery
• 201 femorocrural bypasses for non-healing wounds

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Direct (DCR)</th>
<th>Indirect (ICR)</th>
<th>Patency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Number</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Femoral</td>
<td>109</td>
<td>58</td>
<td>51</td>
<td>0.93</td>
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<tr>
<td>Brachial</td>
<td>14</td>
<td>8</td>
<td>6</td>
<td>0.92</td>
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<tr>
<td>Post.</td>
<td>42</td>
<td>21</td>
<td>21</td>
<td>0.97</td>
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<tr>
<td>Proxim.</td>
<td>36</td>
<td>18</td>
<td>18</td>
<td>0.94</td>
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<tr>
<td>Distal</td>
<td>73</td>
<td>32</td>
<td>41</td>
<td>0.93</td>
</tr>
<tr>
<td>Total</td>
<td>201</td>
<td>99</td>
<td>102</td>
<td>0.93</td>
</tr>
</tbody>
</table>

No influence of direct or indirect revascularisation on patency.
GEAR – Open surgery

• Healing rate

Grafts with best patency also yield best healing rates

Healing rate: DR – IR
85% vs. 79% at 12 months (P = 0.481)
Mean healing time: 7 months

Amputation and mortality

Major amputation rate:
DR: 17.3% vs IR: 28.5% (NS)
Mortality:
DR: 36.8% vs IR: 41.3% (NS)

Correlation between patency and wound healing

Correlation between patency and wound healing esp in early phase
Shorter wound healing time when revascularisation is patent

GEAR – Endovascular

• 126 patients (84 DR – 42 IR)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>DR</th>
<th>IR</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>73 (11)</td>
<td>72.5 (13)</td>
<td>0.246</td>
</tr>
<tr>
<td>Male</td>
<td>89 (70.6)</td>
<td>60 (71.4)</td>
<td>0.782</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>88 (69.8)</td>
<td>59 (70.2)</td>
<td>0.891</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>77 (61.6)</td>
<td>48 (57.8)</td>
<td>0.223</td>
</tr>
<tr>
<td>Hypertension</td>
<td>106 (85.5)</td>
<td>69 (83.1)</td>
<td>0.290</td>
</tr>
<tr>
<td>Smoker (ex- or active)</td>
<td>63 (59.4)</td>
<td>42 (58.3)</td>
<td>0.737</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>61 (48.4)</td>
<td>42 (50.0)</td>
<td>0.614</td>
</tr>
<tr>
<td>Cerebrovascular event</td>
<td>26 (20.8)</td>
<td>20 (24.1)</td>
<td>0.202</td>
</tr>
<tr>
<td>ESRD</td>
<td>23 (19.0)</td>
<td>14 (17.7)</td>
<td>0.621</td>
</tr>
<tr>
<td>History of vascular procedure</td>
<td>68 (54.4)</td>
<td>40 (48.2)</td>
<td>0.050</td>
</tr>
<tr>
<td>History of minor amputation</td>
<td>35 (28.0)</td>
<td>22 (26.5)</td>
<td>0.601</td>
</tr>
<tr>
<td>History of major amputation</td>
<td>10 (8.0)</td>
<td>5 (6.0)</td>
<td>0.252</td>
</tr>
<tr>
<td>Obesity</td>
<td>42 (35.3)</td>
<td>30 (38.5)</td>
<td>0.319</td>
</tr>
</tbody>
</table>

Limb salvage

Survival

DR 86% vs IR 87% (NS)
@ 1 yr: DR 73% vs IR 69% (NS)
@ 3 yr: DR 69% vs IR 62% (NS)

Wound healing rate

- Wound healing rate
  - @ 6mths: 38% vs 17% (p<0.08)
  - @ 12 mths: 49% vs 33% (p<0.07)
- Median time to healing
  6 mth vs 10 mth (p < 0.19)
- Risk factors
  - Plantar and heal ulcers
  - History of amputation
  - ESRD
- not: Diabetes
Conclusions

No difference in wound healing rate, limb salvage or survival between DR and IR according to the angiosome concept. Only speed of healing might be influenced. In most cases there is no choice in blood vessel that can be revascularised. Patency seems more important than angiosome

- In endovascular treatment try to open as many vessels as possible.
- In open treatment choose the vessel with the best outflow.

106 limbs in 97 pts
- Open revascularisation
- 54 DR – 52 IR
- More complete healing and shorter healing time in DR
- No influence on amputation rate

250 Limbs in 226 patients
- All diabetic foot ulcers
- 48% DR – 52% IR
- Healing rate @12 mths:
  - DR: 72% vs IR 45% (p<0.001)
- Limb salvage
  - DR: 86% vs IR 77% (NS)
- Amputation free survival
  - DR: 65% vs IR 61% (NS)

NEVER DENY A REVASCULARISATION BECAUSE ONLY INDIRECT REVASCULARISATION IS POSSIBLE