When does angiosome concept matter: With Open Surgery For Limb Salvage, For Endovascular Treatments or Limb Salvage

How Does Indocyanine Green Imaging Help

Leg salvage

Spillerova et al. 2017

Leg salvage
Overall amputation rate 25%
during the 1st year

Cox proportional hazards:
- hemodialysis
- CRP
- indirect PTA

A prospective trial
To find out the change in perfusion in foot angiosomes after revascularization

>1000 patients

Wound healing
Wound healing 12 mo
Overall 60%

Cox proportional hazards:
- Direct revascularization
- CRP
- Bypass surgery

Wound healing significantly better after angiosome-targeted revascularization being the best after angiosome-targeted bypass and the worst after nontargeted endovascular revascularization

Disclosures
- PI (Finland) in Voyager-trial
**Evaluation of perfusion in ALL FOOT ANGIOSOMES with ICG-FI before and after infrapopliteal endovascular and surgical revascularization**

**74 PATIENTS, 288 ANGIOSOMES, 46 EVT, 24 BYPASS**

ICG-FI changes were analyzed in three groups:

1. Angiosomes that were revascularized DIRECTLY (targeted)
2. Angiosomes that were revascularized THROUGH GOOD COLLATERALS (indirectly targeted)
3. Angiosomes that were NOT REvascularized DIRECTLY NOR THROUGH STRONG COLLATERALS (nontargeted)

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**DIRECTLY REVASCULARIZED ANGIOSOMES**

- **Bypass:** increase 56 au
- **PTA:** increase 39 au

In the angiosomes that were revascularized Directly, perfusion increased significantly after both bypass and pta.

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**Angiosomes that were REVASCULARIZED THROUGH COLLATERALS = indirectly revascularized**

- **Bypass:** increase 61 au
- **PTA:** increase 25 au

In the angiosomes that were revascularized Through collaterals, the increase was also significant, however the increase was lower after pta than after bypass.

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**NOT DIRECTLY REVASCULARIZED, NO COLLATERALS = nontargeted angiosomes**

- **Bypass:** increase 44 au
- **PTA:** increase 15 au

In the angiosomes that were not directly revascularized and there were poor collaterals, the increase in perfusion was significant after bypass, but not significant after pta.

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**So what?**

Does this have any consequences to the outcome?
Wound healed in 56 (75.7%) patients

Outcome of 74 Patients

Mean FU 16.3±4.8 month (median 16.8, IQR 15-19 mo)

P=0.02

9 (12.2%) patients had amputation

Increase of perfusion in the angiosomes where the wound did not heal during the Fu. Was only 13 units compared to 46 units in the angiosomes where the wound healed.

Cutoff: Increase >=19 au predicted wound healing (75-80% s&s, AUC 0.78)

Not directly revascularized, no collaterals

= non targeted angiosomes

Bypass: increase 44 au
Pta: increase 15 au

In the angiosomes that were not directly revascularized and there were poor collaterals, the increase in perfusion after pta 15 units

Bypass: increase 44 au
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In the angiosomes that were not directly revascularized and there were poor collaterals, the increase in perfusion after pta 15 units
When does angiosome concept matter

- With open surgery for limb salvage
  - Do angiosome targeted bypass if good outflow artery. If not, choose the best outflow artery, because the perfusion increases also in the adjacent angiosomes.
  - For endovascular treatments for limb salvage
    - To achieve wound healing, the best choice is to perform angiosome targeted endovascular revascularization
    - We do not recommend nontargeted endovascular revascularization if clear collaterals to the wound angiosome from the treated artery does not exist

How does ICG-FI help

- With ICG-FI the increase in the perfusion can be evaluated
- If not significant after endovascular revascularization, do not wait for a miracle! Do Bypass or a new endovascular revascularization
- However, be aware of DELAY!