Lymphatic system response to severe lower limb trauma

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Disclosure of relevant financial interests

All authors have nothing to disclose
BACKGROUND & OBJECTIVE

Severe compound lower limb trauma requiring complex soft tissue reconstruction may lead to lymphoedema of the distal extremity.

To demonstrate the lymphatic response after soft tissue reconstruction for Gustilo IIIB fractures of the lower limb.
LYMPHATIC IMAGING

- Indocyanine Green (ICG)
  - Pulsion® Medical Systems
- Fluorescence properties – less invasive imaging for superficial lymphatic system
- Intradermal injection, dorsal side foot [0.1mL-0.2mL]

- Near Infra-Red (NIR) imaging camera
- Custom made imaging camera with 780nm laser torches as excitation light
## SUMMARY TABLE  20 PARTICIPANTS

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<tr>
<td>Age (mean ± SD)</td>
<td>47.5 ±16.99</td>
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<td>Male : Female (N)</td>
<td>17 : 3</td>
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<td>BMI (mean ± SD)</td>
<td>29.65 ±4.69</td>
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<td>Leg affected (L:R)</td>
<td>10:10</td>
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<td>Hospital stay (mean ±SD)</td>
<td>26.8 ±19.99</td>
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<td>Soft tissue infection N (%)</td>
<td>4 (20%)</td>
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<td>Osteomyelitis N (%)</td>
<td>7 (35%)</td>
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<td>Visible oedema N (%)</td>
<td>11 (55%)</td>
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<td>Difference volume in L (mean ± SD)</td>
<td>415.09 ± 552.53</td>
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ICG IMAGING

- Free muscle flap did not show functioning superficial lymphatic vessels.

- Scar tissue restricted continuation of lymphatic flow.

- There was a notable difference in lymphatic flow speed between affected and non-affected leg.
PATTERNS OF ICG LYMPHATIC IMAGING

Mapping of the superficial lymphatic system with ICG:
“Splash & Stardust” pattern = Reduction in flow or dermal backflow
“Diffuse” pattern = Non-functioning system (lymphostasis)

Male – MVA 2009 – LD free flap and multiple grafts-oedema
ICG LYMPHATIC IMAGING

Male – MVA 2010 – ALT free flap - oedema
CONCLUSION

• Extensive soft tissue loss is a risk for lymphoedema
• We have demonstrated objective changes in the lymphatic system following Gustilo 3b trauma
• ICG imaging is a less invasive lymphatic imaging technique
• Early recognition and early intervention will prevent progression of lymphoedema