ROTATIONAL FLAPS IN COMPLICATED PARTIAL FOOT AMPUTATION: A RETROSPECTIVE REVIEW TO ASSESS INITIAL HEALING AND FLAP SURVIVAL

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I have no financial disclosures and will not discuss off label or investigative use of products or devices
VALUE OF ROTATIONAL FLAPS

- Large plantar wound deficits lead to residual wound or extensive loss of foot function with amputation.
- Rotational flaps allow a more desirable level of amputation with complete wound closure.
LITERATURE REVIEW

- **Challenging micro-environment**\(^1\)
  - Tissue ischemia
  - Immune impairment
  - Biomechanical derangement
  - Peripheral neuropathy

- **Non-healing nature of diabetes-related plantar neuropathic ulcers** does not preclude successful incorporation of rotational flaps\(^2\)

1. Rodrigues, Plast Reconstr Glob Open 2017
2. Boffeli & Peterson, JFAS 2013
Full-thickness flap is the most successful approach for plantar foot wounds due to mobility, sensation, and tissue thickness

- Immediate coverage of osseous structures and soft tissue defects
- Prompt healing by primary intention
- Limb preservation: avoid or delay proximal amputation
- Improve delivery of antibiotic therapy

3. Park et al, JFAS 1997
Complicated wounds requiring nontraditional closure

Delay flap until osteomyelitis but intervene before abscess or necrosis

Plan for flap failure: incisions that don’t preclude future amputation

PMMA beads when necessary

Raise full-thickness flaps
  - Limited-touch or no-touch technique with skin hooks
  - Hug contours of bone to minimize neurovascular compromise
FIRST RAY AMPUTATION FLAP

Boffeli & Peterson, JFAS 2013
V → T TMA FLAP

Medial Plantar Artery Angiosome + Lateral Plantar Artery Angiosome

Boffeli & Waverly, JFAS 2015
STATEMENT OF PURPOSE

- Assess initial flap healing & intermediate term survival of common pedal flaps when incorporated into partial foot amputation
- Assess prevalence & influence of common comorbidities
- Hypothesis: A high percentage of rotational flaps heal successfully despite comorbid conditions
Level 3 retrospective

Consecutive cases identified by CPT billing history
- 1st ray (20)
- 5th ray (26)
- Medial/lateral plantar artery (37)

Single surgeon (TJB)
2011 – 2015
Minimum 2-year follow-up to assess longevity
- Exclusion criteria: digital flap, trauma etiology, tumor etiology, deceased, insufficient follow-up
103 total flaps were reviewed

- 83 flaps met inclusion criteria
- 71 patients (M = 55, F = 16)
  - Age: $62.5 \pm 1.2$ years (range 38-94)
- 77 feet (L = 46, R = 31)

<table>
<thead>
<tr>
<th>Flap Type</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>1\textsuperscript{st} ray</td>
<td>20</td>
</tr>
<tr>
<td>5\textsuperscript{th} ray</td>
<td>26</td>
</tr>
<tr>
<td>MPA TMA</td>
<td>13</td>
</tr>
<tr>
<td>LPA TMA</td>
<td>16</td>
</tr>
<tr>
<td>MPA &amp; LPA</td>
<td>8</td>
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## COMORBID CONDITIONS

<table>
<thead>
<tr>
<th>Comorbid Condition</th>
<th>Prevalence</th>
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<tbody>
<tr>
<td>Diabetes</td>
<td>86.7%</td>
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<tr>
<td>Peripheral Neuropathy</td>
<td>95.2%</td>
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<tr>
<td>Osteomyelitis</td>
<td>95.2%</td>
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<tr>
<td>Obese</td>
<td>50.6%</td>
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<tr>
<td>Peripheral Vascular Disease</td>
<td>47.0%</td>
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<tr>
<td>Overweight</td>
<td>25.3%</td>
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<tr>
<td>Gangrene</td>
<td>33.7%</td>
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<tr>
<td>Heterotopic Ossification</td>
<td>45.8%</td>
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<tr>
<td>Charcot</td>
<td>4.8%</td>
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</tbody>
</table>
- 54/83 (65.1%) were completely healed by 6 weeks
- 15 more healed after 6 weeks without further surgery
- 6 more healed following local revision surgery for an overall success rate of 75/83 (90.4%)
- 8/83 (9.6%) did not heal
  - 6 required more proximal amputation
  - 2 passed due to unrelated conditions

Average time to healing after revision = 12.5 weeks
21/82 (25.3%) required more proximal amputation within 2 years

- TMA (11)
- BKA (8)
- AKA (2)
**CONCLUSIONS**

- High percentage of rotational flaps heal successfully despite comorbid conditions
  - 69/82 (83.1%) healed uneventfully
  - 75/82 (90.3%) healed with revision

- Diabetes and peripheral neuropathy were the most prevalent comorbid conditions

- Immediate flap coverage for complicated amputations avoids excessive costs associated with chronic bone exposure, long-term Vac therapy, and recurrent osteomyelitis.
THANK YOU!

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