“Transmetatarsal Amputation: Is It as Good as We Think?”

Charles Andersen MD, FACS, FAPWCA
Clinical Prof of Surgery UW, USUHS
Chief Vascular/Endovascular/ Limb
Preservation Surgery Service
Medical Director Wound Care Clinic
Madigan Army Medical Center
Disclosures

Speaker’s Bureau:
- KCI
- Novadaq

Honorarium:
- KCI
- Novadaq
- Regenesis Biomedical

Consultant:
- KCI
- Novadaq

Stockholder:
- None

Current/Research Support:
- Novadaq
- Regenesis Biomedical

Medical/Scientific Boards:
- Novadaq
- Regenesis Biomedical

Work for US Government and any recommendations are my personal recommendations and not the opinion of the US Government
“Transmetatarsal Amputation: Is It as Good as We Think?”

- Conclusions
  - TMA is a good limb Preserving Amputation
  - TMA has a high incidence of suture line complications resulting in delay of return to full level of function
  - By following a surgical pathway suture line complications can be prevented resulting in a more rapid return to function
Amputations

Although techniques have improved, complications continue to be a significant problem.
TMA - Advantages

- TMA results in a durable and functional limb preserving amputation
- 2% required a higher level of amputation
- Lower mortality rate compared to BKA (1,3 and 5 years)
- Remain unlimited household ambulators (1,3 and 5 years)

Brown et al foot and ankle international 2012 33(9) 707-16
“The surgeon practicing TMA must be prepared to accept some failure and some instances of temporarily incomplete wound healing.”

Young, 1977
TMA - Disadvantages

- Suture Line Complications are a major problem
- Incidence remains similar to those reported over 60 years ago ranging from 40% to 60%.
- Contributing Factors
  Arterial insufficiency, uncontrolled diabetes, malnutrition and vascular compromise of the plantar flap.
Pathway to Decrease Complications

The following suggested pathway outlines specific preoperative, intraoperative, immediate postoperative considerations that can mitigate the risk of incisional necrosis.
Pre operative Considerations

- Noninvasive vascular studies
- Pre op Fluorescence Angiography (IFA)
- Vascular intervention, if necessary, with a focus on enhanced perfusion to the plantar flap
- Optimal medical management Glucose control and nutritional status
Intra operative Considerations

- IFA after flap creation and closure to ensure adequate circulation to the incision line
- Tendon balancing and gastrocnemius release if indicated
- Incisional negative pressure wound therapy
- Immediate post op immobilization
Post operative Considerations

- Immobilization with Bulky dressing and continued Incisional Negative pressure therapy for 2 - 5 days
- Continued Immobilization in a total contact or short leg cast when not contraindicated for 4 weeks
- Suture removal beginning at 4 weeks
- Transition to off loading boot
TMA
Case Study
History

- Severe poorly controlled diabetes
- S/P hallux amputation with severe deformity with recurrent ulceration and cellulitis
- Vascular studies and fluorescent angiography demonstrated adequate perfusion to heal a TMA
- Following medical optimization, elective TMA – 8 June 2015
Pre op

Post Hallux amputation with deformity of residual toes exposed hardware and chronic osteomyelitis
Gastronemius Release
Tendon Transfer
Fluorescent Angiography Assisted Amputations
Suture Line Modification
TMA
Incisional management with *Prevena™*
Intra operative immobilization

Plaster splint with bulky pressure relief dressing
Two days post op

Drain removed, Prevena™ removed and patient placed in a total contact cast and discharged
Ten days post op
Two months post op
A Suggested Perioperative Pathway to Reduce the Most Common Postoperative Complication of Transmetatarsal Amputation to Maximize Limb Salvage and Reduce Healthcare Costs

Charles A Andersen, MD, FACS, FAPWCA; Chief, Vascular/Endovascular Surgery and Medical Director Outpatient Wound Care Clinic

LT Rebecca Omana-Daniels, DPM

"The surgeon practicing TMA must be prepared to accept some failure and some instances of temporarily incomplete wound healing." Young, 1977

TMA has been reported in the literature as a technique for functional limb salvage when the forefoot is compromised. One of the most common complications preventing successful TMA is incisional line necrosis. Rates of incisional necrosis remain similar to those reported over 60 years ago ranging from 40% to 60% with common causes being: arterial insufficiency, uncontrolled diabetes, malnutrition and vascular compromise of the plantar flap. The following suggested pathway outlines specific preoperative, intraoperative, immediate postoperative considerations that can mitigate the risk of incisional necrosis.

### Preoperative Considerations
- Noninvasive/minimally invasive/invasive vascular studies
- Intraoperative Fluorescence Angiography (IFA)
- Vascular intervention, if necessary, with focus on enhanced perfusion to the plantar flap
- Optimal medical management
- Glucose control and nutritional status

### Intraoperative Considerations
- IFA after flap creation and closure to ensure adequate circulation to the incision line
- Incisional negative pressure wound therapy

### Postoperative Considerations
- Immobilization in a total contact or short leg cast when not contraindicated
- Suture removal beginning at 4 weeks (earlier removal only if fully healed)

### Discussion
Current methods of evaluating tissue perfusion preoperatively or intraoperatively are often inconclusive or unobtainable, must be performed with caution in patients with renal insufficiency and only provide anatomic information on circulation. IFA allows visualization of the functional microperfusion directly to the incision site, allowing the surgeon to be assured that the incision line is well perfused pre and post closure of the flap. Incisional negative pressure wound therapy has been shown to be beneficial in orthopedic procedures where the patient and/or procedure is determined to be high risk. These modalities in the optimally medically managed patient allows for the limb to be immobilized in a total contact or short leg cast and retention of sutures until the incision line is fully healed. This suggested pathway thus minimizes the most common immediate postoperative complication of TMA resulting in an increased potential for success.
# Fluorescent Angiography Assisted Amputations

<table>
<thead>
<tr>
<th>Level of Amputation (total #)</th>
<th>Age Range</th>
<th>M/F</th>
<th>Intraoperative Modification</th>
<th>Outcomes</th>
<th>Follow up average in months (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKA – 4</td>
<td>59 – 77</td>
<td>4/0</td>
<td>None – 1 SR – 3</td>
<td>Good – 2 Minor – 2 1 – suture line complications requiring local wound care 1 – suture abscess/cellulitis requiring PO ABX</td>
<td>2.5 (1 – 6)</td>
</tr>
<tr>
<td>BKA – 9</td>
<td>56 – 77</td>
<td>5/4</td>
<td>None – 3 SSR – 5 SR – 5</td>
<td>Good – 8* Minor – 1 1 – suture line complications requiring local wound care</td>
<td>7.3 (0.5 – 19)</td>
</tr>
<tr>
<td>Forefoot – 4</td>
<td>58 – 75</td>
<td>2/2</td>
<td>SSR – 3 SR – 4</td>
<td>Good – 3 Major – 1 1 – BKA</td>
<td>3 (1 – 6)</td>
</tr>
<tr>
<td>Toes – 9</td>
<td>62 – 97</td>
<td>8/1</td>
<td>None – 4 SSR – 2 SR – 4</td>
<td>Good – 7 Minor – 1 1 – suture line complications requiring local wound care Lost to follow up – 1</td>
<td>3.7 (0.5 – 9)</td>
</tr>
</tbody>
</table>

*Publication pending*
Results

- One patient with a TMA left the OR with known perfusion compromise to the extremity and eventually required a BKA which healed uneventfully.

- Good Intraop perfusion
  - No requirement for return to OR or higher level of amputation
  - 4 minor suture line complications
“Transmetatarsal Amputation: Is It as Good as We Think?”

Conclusions

- TMA is a good limb Preserving Amputation
- TMA has a high incidence of suture line complications resulting in delay of return to full level of function
- By following a surgical pathway suture line complications can be prevented resulting in a more rapid return to function
References

- Daveies B, Datta D. Mobility outcome following unilateral lower limb amputation. *Prosthetics and Orthotics International*. 2003;27:186-190
Thank You
Dr. Charles Andersen
cande98752@aol.com
“Transmetatarsal Amputation: Is It as Good as We Think?”

Charles Andersen MD, FACS, FAPWCA
Clinical Prof of Surgery UW, USUHS
Chief Vascular/Endovascular/ Limb
Preservation Surgery Service
Medical Director Wound Care Clinic
Madigan Army Medical Center