Heel Ulcers
Do They Have a Chance to Heal?

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Epidemiology and Cost

- Cost of pressure ulcers exceed $55B
- Tx of pressure ulcers = $1.3 to 3.6 billion annually in all hospitalized patients
- Estimated 1 in 5 hospitalized patient
- Most common in ICU, and nursing homes

Incidence

- 2nd most common location is the heel
- 19-32% of PU’s
- 60% develop in a acute setting (ICU)
- Most ulcers detected at stage 2 (~54%)

Anatomy of heel

- “Heel padding”—18mm thick
- No sebaceous glands

Baumgarten M et.al.: J Gerontol A Biomed Sci 2008 Apr; 63(4)
Benbow M: British J of Nursing 2008, 17(13)
Risks factors

- PAD
- Age
- Pressure
- Friction
- Shear
- Immobility
- Diabetes*
- Edema
- CVA
- Neuropathy
- Hip fractures
- Low serum albumin*
- Low Braden score*

*Walsh J: Poster Adv. Wound Care, April 2006

Pathophysiology

- Skin breakdown
- Deep tissue injury (DTI)
- “Reperfusion hyperemia”
- Tissue Hypoxia
- Increase Pressure, Shear, and Friction

Classification

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-blanching erythema/purple hue of skin, changes in temperature and sensation</td>
</tr>
<tr>
<td>2</td>
<td>Partial thickness skin loss i.e. blister or shallow crater</td>
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<tr>
<td>3</td>
<td>Full thickness skin loss involving necrosis of subcutaneous tissue</td>
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<tr>
<td>4</td>
<td>Full thickness skin loss with extensive necrosis to tendon, muscle, bone, or joint</td>
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<tr>
<td>*Unstageable</td>
<td>Ulcer with eschar-wound base can’t be assess</td>
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<tr>
<td>*DTI</td>
<td>Purple non blanchable area of intact skin which demarcates between 24-48 hours due to deep tissue destruction.</td>
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</tbody>
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Adapted from National PU Advisory panel (NPUAP) 2007
Two Types of Heel Ulcers

- Plantar ulcers
  - Not decubitus in etiology
  - Occur in ambulatory/younger individuals
  - Heel walkers
  - Frequently occurs after a failed Achilles lengthening procedure
  - Typically have adequate arterial perfusion

- Non-plantar ulcers
  - Low pressure over long period of time (decubitus)
  - Bedbound/older patients
  - Typically have poor arterial perfusion

Management

- Offloading is a must - in ALL stages
- Blood Flow has to be assessed
- Stage 1-2 foam, hydrocolloid dressings
- Stage 3-4-Know when to debride, controversial
- Nutritional assessment
- DM related to poor outcomes

Offloading

- Prevent drop foot
- Reduce heel pressure below 32mmHg
- Meticulous skin care

Farid KJ: Ostomy Wound Manag 2007; 53(4)

Langemo D: Advances in Skin & Wound Care 2008, Heel Pressure Ulcers: Stand Guard
**Offloading Plantar heel ulcers**

**Results**
- Meta-analysis
- 1457 subjects/104 studies
- Pressure relieving surfaces were associated with significantly lower incidence of heel ulcers when compared with standard mattress
- Insufficient research to conclude heel protective devices prevent heel ulcers.

Langemo D: Advances in Skin & Wound Care 2008

**Adjunctive Therapy**
- NPWT*
- Bioengineered tissue**

**Main Reasons For Failure**
- Lack of Arterial Perfusion
- Can’t adequately offload
- Osteomyelitis
Surgical Approach

• Is the patient able to ambulate or transfer?
• Is there adequate arterial perfusion?
  – Revascularization if needed
• Surgical debridement
  – In office/clinic vs Operating Room
• Partial vs. Total Calcanectomy

When to debride?

Yes

No
Literature Review

• Systematic review of literature for partial and total calcanectomies. Reviewed 26 publications that met the following criteria

• Inclusion Criteria:
  – Calcaneal osteomyelitis
  – Partial or total calcanectomy
  – Ambulatory pre-operatively
  – Follow up of at least 12 mos

Schade V., JAPMA 2012

Results

• 60% of patients had no complications
• 85% maintained ambulatory status post operatively
• 83% returned to ambulation with the use of normal or custom shoes with or without custom orthotics
• Patients with DM had nearly 5 times greater risk of major lower extremity amputation compared to patients without DM.

Schade V., JAPMA 2012
Post-OP Management

Conclusion:

• Systematic approach to heel ulcers should include:
  – Ambulation assessment
  – Vascular assessment
  – Infection assessment

• If conservative therapy fails, surgical approach is warranted in the appropriate patients
• Partial and/or Total Calcanectomy is a viable alternative to BKA.

Thank You!

Minor exostectomy
Results

• Randomized clinical trial (level 2 evidence)
• 338 adults, 3 pressure-reduction devices
• 12 heel ulcers developed
  – Bunny boot=3.9%
  – Egg crate=4.6%
  – Foot waffle=6.6%
• No statistical significance

Gilcreast DM et.al.: J Wound Ostomy Continence 2005; 32

When to debride?

CS

Initial presentation | 3 weeks

3 months | 4 months

Yes | No
Partial calcanectomy

Results

- Review 50 cases
- 52-83% failure rate
- To evaluate factors that affects healing
  - MRSA
  - PAD
  - Albumin levels
  - Ulcer stage

- Review 9 feet (8 pts)
- 2/9 procedures = BKA
- Ambulatory patients prior to surgery remained ambulatory
  Randall D et al.: JAPMA 2005 July/Aug: 95(4)

- 20 PC, 11 TC during 10 year period
- 18 DM pts-Primary healing only in 4 pts
- 65% Overall failure in DM
  Crandall, Wagner: JBJS Am 1981, 63(1)

Cook J et al.: JFAS 2007, 46(4)
HPI

- 45 y/o HF, DM2 x 15 years presents to ED c/o painful left heel ulcer x 2 weeks. Began as a blister 2nd to shoe rub, that progressed to ulceration. She received tx in Mexico consisting of Cipro and local wound care. She was d/c from care in Mexico 3 days prior to ED visit. She noticed increased pain, swelling, redness and drainage.

Admission

- Nausea, vomiting, fever and chills x 2 days
- WBC 20.5
- A1C=12.2
- Vasc: palp pulses except L PT (edema)
- Neuro: decreased protective sensation

Hospital course

- Zosyn 4.5 q 8H
- Evening of admission- I&D with removal of all necrotic tissue
Culture results

- Tissue from 1st I&D
  - Staph aureus
  - Strep B
  - Viridans

Clinical Picture
Post-op day 4

Clinical Picture
Post-op day 5
Post op day 10

Post Ostectomy Day 2

Wound vac placed immediately after 2nd I&D

Post debridement day 1
Hosp course on readmission

- Debridement of necrotic tendon, application of wound vac
- Plastics did fasciocutaneous flap from calf and 2 STSG from thigh

Case-BH

- 64 y/o F with heel ulcer, LE bypass by vascular surgeon
- Stagnant for 2 months
- DM, HTN, CAD
- Heavy smoker
- Caregiver

Case-BH

Application

Case-BH

1 week post-application
Case-BH
2 week post-application

Case-BH
4 week post-application