Clinical Aspects of Deep Tissue Pressure Injury

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- Pressure Ulcer Consultant to NDNQI, Press Ganey (university subcontract)
- Paid External Consultations:
  - Elderly Health Promotion, Inc
  - Hill-Rom
Objectives

1. Identify **clinical manifestations and management** of pressure and tissue deformation in Deep Tissue Pressure Injury (DTPI).

2. Discuss the results of available **clinical research** on DTPI.

3. Discuss **implications of basic science and clinical research** findings on patient care and future research.
Primary Objective


History of DTPI

- Ulcers could erupt from intact skin (Paget, 1874)
- May be purple or yellow from extravasation of blood. The deeper tissues die, muscles, bones. Sloughing follows in the skin and fat and the place is empty (Paget, 1874)
- Ulcers that started in muscle were malignant (Groth, 1942)
- Closed pressure ulcers (Shea, 1975)
- 2007 NPUAP Staging System

......albeit with difficulty after much prolonged debate. (Smart, 2013)
Deep Tissue Pressure Injury: Persistent non-blanchable deep red, maroon or purple discoloration (NPUAP Slide Set 2016)

Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood filled blister. Pain and temperature change often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface.
Deep Tissue Pressure Injury – continued
(NPUAP Slide Set 2016)

• The wound may evolve rapidly to reveal the actual extent of tissue injury, or may resolve without tissue loss.
• If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle or other underlying structures are visible, this indicates a full thickness pressure injury (Unstageable, Stage 3 or Stage 4).
• Do not use DTPI to describe vascular, traumatic, neuropathic, or dermatologic conditions.
Evolution of Deep Tissue Pressure Injury
(NPUAP Slide Set 2016)

- **Day 1** - Classify intact, discolored skin this pressure as a Deep Tissue Pressure Injury
- **Day 3** - Classify discolored skin with epidermal blistering as a Deep Tissue Pressure Injury
- **Day 10** - If the Deep Tissue Pressure Injury becomes necrotic, classify it as an Unstageable Pressure Injury

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Evolution of DTPI in darkly pigmented skin
(NPUAP Slide Set 2016)

Due to the thickness of the skin, the epidermal separation will remain intact for a longer period of time. This phase can be mistaken for skin tears.

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Do not use Deep Tissue Pressure Injury to describe vascular, traumatic, neuropathic, or dermatologic conditions.
Deep Tissue Pressure Injury Examples
(NPUAP Slide Set 2016)

Buttocks

Lateral Heel
Basic Science Summary

Methods
- MRI
- Mathematical Modeling
- Animal Studies
- Cell Cultures
- Biochemical Assays

Comparisons
- Skin vs. Fat vs. Muscle vs. Scar
- Heel vs. Sacrum
- Different surfaces, dressings
- Variations in intensity and duration of pressure-shear
- Intermittent vs. continuous
- Relative contributions of:
  - tissue deformation
  - ischemia
- Role of reperfusion injury

Xiao, 2014
Basic Science: Etiology of DTPI

1. Tissue Deformation
2. Ischemia
3. Ischemia Reperfusion Injury

(Oomens, et al., 2015)
Clinical Aspects: Epidemiology

• **Prevalence**
  - 9-12% of pressure injuries in national studies
  - 1-2% of patients affected

• **Risk Factors**
  - Older
  - More acutely ill
  - Critical care and surgical units
  - Immobility
  - History of a precipitating event approximately 24-72 hours before DTPI discovery
  - Risk profile similar to other pressure injuries

VanGilder, et al., 2010; Black, et al., 2015; Bergquist-Beringer, et al., 2013;
Clinical Aspects: Epidemiology

• Precipitating Event
  – “Intense and/or prolonged pressure and shear force”
  – “Found down on hard surface”
  – Long OR or procedure time
  – Immobility
  – Periods of poor perfusion
  – Transfer

• Anatomic Distribution
  – Heels (29-41%)
  – Sacrum (19-40%)
  – Buttocks (7-13%)
DTPI Evolution

Precipitating Event
48 hours after admission
(Day 2)
+ 48 hours
(Day 4)
+96 hours
(Day 8)
+48 hours
(Day 10)

Found Down
Time between event and purple skin

- **Black, et al., 2015**
  - 24-72 hours
- **Honaker, et al., 2014**
  - Range: 1-5 days
  - Mean: 2.4 days
- **Farid, et al., 2007**
  - 7 days
Evolving DTPI

Early presentation of purple-maroon tissue at 48 hrs

Blister phase at 72-96 hours

Necrotic phase at 7 days

Slide courtesy of Dr. Joyce Black
Buttocks DTPI from being flat are more on the tissues of buttocks.

Slide courtesy of Dr. Joyce Black.
Sacral DTPI– from HOB up are upside-down heart shaped
Angle/Reposition related Shear/Pressure

Slide courtesy of Dr. Joyce Black
Not all DTPI evolve to full thickness loss!

- **Baharestani, 2013**
  - 1% resolved
  - 4% unchanged
  - 20% partial thickness
  - **71% full thickness**

- **Richbourg, 2011**
  - 5% healed
  - 48% unchanged
  - **43% full-thickness**

- **Sullivan, 2013**
  - 66% resolved/improved
  - 24.2% unchanged
  - 9.3% deteriorated
  - **10% full-thickness**

- **Honaker, 2014**
  - Rate of full-thickness varied by illness
  - Anemia 43.4%
  - Low perfusion 38.8%
Early Detection of DTPI

- Usually by inspection
  - Issues with misidentification

- Ultrasound
  - Aoi, PRS, 2009
  - Aliano, 2014

- Elevated CPK
  - False positives

- Thermography
  - Bhargava, 2014

Slide courtesy of Dr. Joyce Black
Prevention & Treatment

- Relieve pressure completely!
  - Turn
  - KEEP OFF!
  - Support surfaces
  - Elevate heels – boots

- Maintain perfusion

- Maintain nutrition

- Currently under study:
  - Prophylactic dressing
  - Non contact low frequency ultrasound
  - Electrical stimulation
88 year old female with multiple comorbidities. Hip fracture on July 1st. 5 x 5 cm blister on July 11th admission to rehabilitation. TOTAL 24/7 offloading.

Photo series courtesy of Dr. Denis Drennan
Healed with Total Offloading

August 10
Gradual demarcation

August 17
Fully demarcated Eschar – 16 cm²

August 25
Dry borders, no pain

Photo series courtesy of Dr. Denis Drennan
Healed with Total Offloading

- **September 9**: Shrinking eschar
- **September 22**: Edges of eschar loosening 9 cm
- **September 29**: Small crust

*Photo series courtesy of Dr. Denis Drennan*
October 6th
Documentation

- Note time and nature of precipitating event(s).
- What was the patient’s position? On what surface?
- Precise descriptions of tissue changes will help establish time frame.
- Name it: Deep Tissue Pressure Injury.
- Note natural history and possible outcome.
- What measures are you taking to recover whatever tissue may still be viable?
With Deep Tissue Pressure Injury.....

timing is everything
References


References

References


