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WOUNDS: The OT Perspective

Nora Barrett, MS, OTR/L, CHT
Bend, OR

Learning Outcomes

- Identify wound characteristics to document status, select appropriate dressing and determine a treatment plan to promote wound closure.
- Recognize human factors that contribute to wound healing; identify wounds that need higher level medical care.
- List complications associated with delayed or chronic wound healing and functional implications.
Disclosures

- Nothing to disclose

Wound Healing Phases

- Hemostasis: initial response to wound
  - Vessels contract then dilate
- Inflammation: day 4-6
  - Leukocytes and macrophages
- Proliferation: day 7-21
  - Fibroblasts, re-epithelialization
- Maturation: day 21-2 years
  - 80% strength in remodeled tissue
Key Principles
Wound Bed Preparation & Management

- “TIME”
  - Tissue management - remove necrotic tissue overlying wound base
    - Promotes bacterial growth
    - Obscures local wound infection signs
  - Inflammation and infection control - reduce bacterial burden
  - Moisture balance - avoid eschar formation, promote re-epithelialization and formation granulation tissue
  - Edges - avoid maceration at wound edges

Wound Assessment

- Location: Exposed tendon, joint or bone
- Size: dimensions (cm), include depth
- Color
- Drainage: type, amount
- Blisters
Human Factors Affecting Wound Healing

- Age
- Presence of chronic or systemic disease
- Immunosuppression
- Nutrition
- Edema
- Smoking
- Occupation

Wound Bioburden Cycle

- Contamination
  - Bacteria in wound without host reaction
- Colonization
  - Bacteria in wound, host reaction initiated
- Critical colonization
  - Bacteria multiplication causing delay in wound healing with no overt host reaction, pain possible
- Infection
  - Deposition and multiplication of bacteria in wound with associated host reaction
Superficial Infection:
Early stages, not yet critical colonization

- “NERDS”
  - Nonhealing
  - Exudative
  - Red and bleeding surface
  - Debris (yellow or black necrotic tissue)
  - Smell

Deep Infection:
Host response to tissue damage

- “STONES”
  - Size larger
  - Temperature increased
  - probe or exposed bone
  - New areas of breakdown
  - Exudate/erythema/edema
  - foul Smell
Conditions that limit expression of inflammation

- Neuropathy, ischemia, venous insufficiency
- Infection defined by secondary symptoms in these populations
  - Non-purulent exudate
  - Discolored or friable granulation tissue
  - Breakdown or pocketing at wound base
  - Abnormally foul odor

Clinical Infectious Diseases 2009

Antibiotics

- Cost effectiveness of topical vs. antibiotic resistance
- CDC: 30% prescribed Abx in US unnecessary, leading to resistance [cdc.gov](http://cdc.gov)
ER/Provider Referral

- Infection
- Exposed bone
- Exposed tendon
- Deep dermal/full thickness injury
  - Burn

Choosing the Optimal Dressing

- “NICE”
  - Necrotic
  - Infection
  - Characteristics/Color
  - Exudate

- “STAR”
  - not Systemic
  - not tissue Toxic
  - not Allergy inducing
  - not associated with Resistance
Dressing Options

- Product selection based on goal of healing wound, treating infection and optimizing function
  - Debridement
  - Antimicrobial agents
  - Moisture control
  - Least restrictive

Petrolatum based ointment

- Clean dry wounds
- Inexpensive, available OTC, small amount needed
- Can be used under compression and edema management sleeves, gloves or wraps
Non-adherent coverage

- Designed to preserve injured epithelium
- Several design options:
  - Impregnated fine mesh gauze
  - Coated fabric with formulated emulsion
  - Sheet based coverage that adheres to intact skin, perforated to allow drainage
- Antimicrobials can be added
- Allows relative mobility

Transparent films

- No absorption
- Semi-permeable
- Wound visible
- Protection from outside environment
Hydrocolloids

- Impermeable to gases and water vapors
- Provides acidic environment
- No absorption
- Can be used over exposed tendon
- Can stay on wound several days

Foams

- Used on any size area
- Can be left in place 4-7 days
- Easy application and removal
- Polyurethane base
- Highly absorptive for moderate draining wounds
- Comes with antimicrobial agents added
Active Leptospermum

- Decreases edema
- Increases autolytic debridement
- Used on wounds with slough and necrotic tissue
- Decreases bacterial burden and associated with lack of adapted resistance
- Effective against MDROs - J Trauma Acute Care Surg 2014

Abandon ship!!

- Hydrogen peroxide (H2O2: antiseptic)
  - “May cause cell death.. should be avoided” - Ann Plast Surg 2002
  - “...infrequently used for infected wounds.... limited bactericidal and deriding activity.. more likely to cause cell damage and have no demonstrated benefit over saline irrigation” - Clin Infect Dis 2009
  - “No beneficial effect in promoting wound healing has been seen in literature... inherent risk of fatal oxygen embolism formation... likely to result in tissue injury and associated with increased susceptibility to diseases due to unbalanced redox homeostasis” - Med Princ Pract 2017
Abandon ship!!

- Epsom salts (Epsomite: magnesium sulfate compound)
  - “Little research exists as to the actual curative and palliative qualities of minerals” - J Environ Res Public Health 2006
  - Can dry out skin, can worsen some infections due to hot water soak mixed with salt and does not cure infection but may help draw out, work in combo with prescribed meds - 4/2/18 healthline.com
- Wet to dry dressings
  - Painful, physiologically impede wound healing, allows wound base to dry and healing cells to desiccate within the wound, linked to less than optimal outcomes - J Home Care Hosp Prof 2011

Cases

- Identify wound characteristics and how to document
- What does the dressing need to achieve to promote wound closure efficiently for optimal function?
- Are there any limitations or special considerations?
- Assess wound status over time with each case
- What is the end result?
Pilot fingertip amps

- RHD pilot, R MF/RF tips amputated in lawnmower
- DOI 9/5/18, referred 9/10/18 for Lalonde protocol
  - Indication: fingertip amp distal to DIP
  - Less restrictive, lower flexion contracture rate then V-Y advancement flap

Pilot fingertip amps

- 9/20/18
Pilot fingertip amps

- 10/3/18

- Grasp II: R 80# L 95#
Pilot fingertip amps

- 10/29/18
  - Holding, gripping controls

Pilot fingertip amps

- 11/26/18
  - Soreness radial MF pressure
  - Initial contact sensitivity, FM manipulation limited
Pilot fingertip amps
- 12/10/18 discharge
- MF pressure at fingernail
- RF “back to normal”

Open laceration, PIP UCL sprain
- 48 yo F
- Financial planner, very active outdoors
- Lives Alaska and Bend, OR
- DOI 9/26/18 visiting San Diego
- Mechanism: bike crash, finger caught?
- Sutured, injection and po Abx in ED
- Returned to Bend, dressing x4 days- macerated, open
- Saw MD in Bend, diagnosed with unstable PIP UCL at complex lac site. Referred for WC, oval-8 orthotic
Open laceration, PIP UCL sprain

- 10/14/18
- PIP AROM
  - 20/50
- DIP AROM
  - 0/10

Lateral view R IF

Volar view R IF

Open laceration, PIP UCL sprain

- 10/19/18
Open laceration, PIP UCL sprain

- 10/23/18
- PIP AROM 15/50
- DIP AROM 0/20
- Cont dorsal orthotic, IP flexion to palm, extension to orthotic

Open laceration, PIP UCL sprain

- 12/18/18
- PIP AROM
  - 30/80
- DIP AROM
  - 0/35
- Sensibility normal (SWM, static 2pd)
- Following for ROM, scar, return to sport
Pseudomonas finger

- Mallet injury, casted, placed gel under cast
- Did not return in prescribed timeframe
- Smell of pseudomonas, new open areas

Cellulitis post-Dupuytren’s release

- h/o Waldenstrom macroglobulinemia, pre-op Abx
- DOS 10/9/18, onset cellulitis 10/22/18 MD follow-up, Abx changed
- OT 10/23/18
- 11/1/18 cleared
- 11/16/18 full ROM
Dog bite—> necrotizing fasciitis

- DOI 6/23/18 in Tucson, AZ; puncture R dorsal MCP
- Allowed to close on own, healed “in a few days”
- 7/8/18 painful swelling
- OR for I&D 7/8/18-7/13/18
- 3 total Abx, 1 vaccine
- 1st therapy visit 7/16/18
- 1 follow-up 7/20/18
- Returned to Tucson
OT Documentation/Reimbursement

- Senate Bill Report SSB 5018 (2011)
- Medicare: subject to local coverage determinations
  - Wound Care (code) can only be charged if shares debridement of eschar
  - Suture removal, dressing changes, removal of scans or clean drainage NOT BILLABLE
  - Local Coverage Determination for Wound Care (L34587): list of ICD-10 codes supporting medical necessity
- Private insurers: contact in advance

References:

- cdc.gov
References (cont):


Questions?

- barnora@gmail.com