Wound Healing for the Plastic Surgery Nurse: Wound Healing 101

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Course Objectives

- Describe principles of wound healing
- Develop a plan of care based on wound assessment
- Develop a framework for product selection that is goal based and patient centered.
Wounds

- Typically classified as either acute or chronic
- Surgical wounds are often considered acute wounds but can develop into chronic wounds
Normal Wound Healing Stages

Injury

Platelets release growth factors & cytokines

Macrophages & neutrophils attracted into the wound

Neutrophils & macrophages engulf bacteria; release growth factors, cytokines and proteases

Fibroblasts, epithelial cells and endothelial cells attracted into the wound

Epithelial cells, fibroblasts & endothelial cells produce growth factors

Synthesis of ECM & new capillaries

Fibroblasts orchestrate the remodelling of the scar by producing ECM, MMPs & TIMPs

Mature scar

Inflammatory phase

Proliferation & repair phase

Remodelling phase

There are over 4,000 wound care products!

- How do we choose?
- Shotgun approach is not acceptable
- Begins with patient assessment
Patient Assessment

- Accept that no two patients or two wounds are going to be the same
- ROS
- Past Medical Hx/Treatment Hx
  - Diabetes, Hypertension, Respiratory Disorders, Connective Tissue Disorders
- Past Surgical Hx
- Social Hx
- Risk/Healing Obstacles
- Allergies
- Physical Exam, including full assessment of wound
Wound Assessment

- Partial thickness vs. full thickness (acute or chronic)
- Only pressure ulcers are staged
- Location
- Size
- Description of wound and periwound tissue (pay attention to scars, radiation damage, atrophy, pigment changes)
- Note bone, tendon, joint, hardware, foreign bodies etc
- Drainage/exudate
- Odor
Partial Thickness Wounds

- Shallow wound that extends through the epidermis and may partially extend to the dermis
- Painful
- Usually highly exudative
- Examples include Stage II PU, second degree burns, blisters, road rash
- Usually heal by epithelial proliferation and lateral migration
Full Thickness Wounds

- Deep wounds that extend through the epidermis and dermis and to or into the subcutaneous tissue or further
- Often complicated by necrotic tissue and/or infection
- Heal by primary, secondary or tertiary intention
- Includes surgical wounds, Stage III and IV PU, diabetic ulcers, full thickness burns
DIME or BED

DIME
- Debridement
- Infection Control
- Exudate Management
- Wound Edges

BED
- Bioburden
- Exudate Management
- Debridement
Exudate Management

- Exudate management means maintaining a moist wound environment while controlling excess wound drainage.
A Moist Wound Environment . . .

- Promotes granulation and collagen synthesis
- Prevents eschar development which slows healing
- Allows faster epithelization
Products to Promote a Moist Wound Environment:

- Transparent Film Dressing
- Hydrogel
- Hydrocolloid
- Continuously Moist Saline Gauze
Transparent Film Dressing - Provides Moist Environment

- Vapor permeable
- Impermeable to bacteria and contaminants
- Allows wound’s own drainage to keep the wound moist
- Examples - Op-Site, Tegaderm, Polyskin
Hydrogels-Promotes Moist Environment

- Available in gels, sheet dressing or impregnated gauzes
- Water or glycerine based
- Examples-Carrasyn Gel, Intrasite Gel, Dermagel, Elasto-Gel, Vigilon, SoloSite Gel
Chronic Venous Insufficiency
Note dryness and eschar development, began using hydrogel
Hydrocolloid-Promotes Moist Environment

- Composed of gelatin, pectin and carboxymethyl-cellulose
- Allows wound’s own drainage to keep the wound moist
- Occlusive
- Do not use with infected wounds
- Examples-DuoDerm, Restore, Tegasorb
Continuously Moist Saline Gauze - Promotes Moist Environment

- Gauze must remain moist between dressing changes. Do not confuse this with a wet to dry dressing which can mechanically debride both necrotic and healthy tissue.
Heavily Draining Wound

- Often seen with chronic, non-healing wounds.
- Often seen with edema, especially leg edema.
- Drainage often contains increased proteases which can harm the wound bed.
Wound Care Products to Absorb Excess Drainage

- Alginate
- Foam
- Composite Absorptives
- Sodium Chloride Dressing
- Wound Drainage Collector
- Negative Pressure Wound Therapy
Alginate-Absorbs Wound Drainage

- Can absorb up to 20-30 times its weight
- Derived from seaweed
- Available in rope or pad
- Examples-Carrasorb, Kaltostat, Maxorb
Foam Dressings

- Made of polyurethane foam
- Hydrophilic
- Less absorbent than alginate
- Examples-Lyofoam, Allevyn, Mepilex
Moderately Draining Wound

- Weeping skin tear from tape removal
- Applied foam with silicone backing
Moderately Draining Wound

- Blisters secondary to epidermal sloughing from tape removal
Application of Foam Dressing

- Will cover foam dressing with gauze and porous tape.
Impregnated Gauze

- Gauze impregnated with hypertonic sodium
- Example-mesalt
Debridement

- The removal of dead, devitalized, or necrotic tissue from the wound.
- Debridement is complete when 100% of the wound bed tissue is viable.
Identification of Necrotic Tissue

- May be brown, black, gray or yellow
- May be stringy, dry leathery or hard
- May be loosely or firmly attached
- May cover all or part of the wound
- Slough - soft & moist, loose, stringy or firmly adherent
- Eschar - thick & leathery
Skin Sparing Mastectomy

Mastectomy skin flap necrosis
The problem with necrotic tissue:

- Germs love to grow in necrotic tissue. Debriding the wound leads to reduction in the bioburden of the wound.
- It keeps wounds in the inflammatory phase and retards healing.
- It prevents new granulation tissue.
- Resistant biofilms more prone to develop in necrotic tissue.
Types of Debridement

- Autolytic
- Mechanical
- Enzymatic
- Sharp/Excisional
- Maggot Debridement Therapy/Larval Therapy/ Biodebridement
Autolytic Debridement

- The use of an occlusive dressing to allow endogenous enzymes in the wound drainage under the dressing to debride necrotic tissue
- Do not use with infected or ischemic wounds
- Transparent Film, Hydrocolloid, Hydrogel
Mechanical Debridement

- The use of an external force to remove the necrotic tissue
  - Wet to dry dressing
  - Wound scrubbing
  - Hydrotherapy, whirlpool or pulsatile
Enzymatic Debridement

- The topical application of proteolytic enzymes to breakdown the necrotic tissue.
  - Collagenase Santyl
Maggot Debridement Therapy
Larval Therapy Biodebridement

- Alternative to surgical debridement for patients who cannot undergo surgery
- Can be more accurate than sharp debridement
- Secrete proteolytic enzymes, then eat & digest necrotic tissue; stimulate healing and kill bacteria
Maggot Debridement Therapy

- Beware of YUK factor - educate staff, patient and family
- Place hydrocolloid dressing periwound, apply maggots, cover with nylon chiffon dressing, moist dressing, then dry dressing.
- Remove and change dressing every 48 hours.
Bacterial Balance

- All wounds are contaminated but certain organisms are especially virulent. They can multiply and invade the host, causing systemic infection.
Bacterial Burden

Contamination - Infection Continuum
Signs & Symptoms of Infected Wounds

- **Classic Signs**
  - Advancing erythema
  - Fever
  - Warmth
  - Edema/swelling
  - Pain
  - Purlence

- **Secondary Signs**
  - Delayed healing
  - Change in color of wound bed
  - Poor quality of granulation tissue
  - Increased odor
  - Increased serous drainage
  - Increased wound pain
Bacterial Balance-Categories of Wound Care Products/Treatments

- Topical Antibiotics
- Topical Anti-microbials
- Topical Antiseptics
- Antimicrobial Dressings
- Systemic Antibiotics
Antibiotics/Anti-bacterials

- Silver Sulfadiazine
- Nitrofurazone
- Neomycin
- Metronidazole
- Gentamicin
- Bacitracin
- Mupirocin

- There may be a risk of resistance with prolonged use of antibiotics.
Antiseptics

- Topical agents that inhibit the growth of microorganisms
- Examples include povidone iodine, Sodium Hypochlorite, Acetic Acid, Chlorhexidine, Hydrogenperoxide
Antimicrobials

- Silver
- Cadexomer Iodine
- Honey Products
- Methylene Blue
Silicone Dressings

- Non adherent dressings available in many forms
- Fenestrated sheets (washable and reusable)
- May modulate inflammation
- Comfortable removal (decrease pain)
Advanced Wound Care Products

- Growth Factors
- Negative Pressure Wound Therapy
- Mist Therapy
- Compression wrapping
- Human and Artificial Skin and Tissue Substitutes/Tissue Engineering
Putting It All Together

Wound Factors
- Bacterial Balance
- Exudate Management
- Wound Bed Prep/Debridement

Patient Factors
- COST
- Who is doing wound care
- How often can someone do wound care
- Compliance and Accountability
- Follow up
- H&P
A Few Tips

- Wounds are dynamic and the treatment should change as the wound heals or fails to heal.
- If your treatment hasn’t helped in 2-4 weeks, change the treatment.
- Clean, aseptic technique is usually adequate. Exceptions-fresh post-op wounds, immuno-compromised patients and deep cavity wounds.
- Remember to treat the whole patient, not just the hole in the patient.
References


Thank you

Go forth and facilitate wound healing.