New Strategies in Complex Wound Management for Plastic Surgery Providers

43rd Annual ISPAN Convention
Orlando, Florida
October 8, 2017
David E. Halpern, MD FACS

- University of Pennsylvania (BA)
- New York University (MD)
- Maimonides Medical Center (GS)
- Children’s Hospital of Los Angeles
- University of Southern California (PS)
- Columbia-Presbyterian Med Ctr (HS)
Disclosures

• Married
• 3 children
• 2 dogs
• Cars, planes and motorcycles
• girlfriends (?volunteers)
Wound Healing Phases

- Injury
- Inflammation
- Collagen Deposition
- Collagen Remodeling
Complex Wound
Why am I smiling?
Other part of ? wound
11 hrs later...
Integra used as biologic substrate
Skin graft over integra
5 months later
Wounds: Form and Function

- Location (face)
- Joints (contracture)
- Pain (new consideration?)
- Residual deformity
- Multistage planning
Who is seeing wounds/ulcers?

- Attending Plastic surgeon? Lol
- Resident/Fellows? Clueless!! (duh Silvadene)
- PA/ARNP
- Ostomy/wound nurse in hospital
- Wound clinics
- Visiting nurse
What’s Your Strategy: Basics

- DEBRIDEMENT!!!!!!!
- Nutrition
- Moist wound environment
- Offloading/Protection
- Medical management comorbidities
Crush degloving injury: ATV
Initially repaired by ortho but...
Post debridement: Ahhh
Complex Strategy

• Stem Cells
• Growth factors
• Xenografts
• Dressings
• Biofilm management
Stem Cells

- NO FDA approved stem cell therapy (yet)
- Likely will be adipose origin
- Nucell(spine mostly): stem cell like activity
- Lots of marketing without the SCIENCE
- Clinical trials/case studies: fat grafts
Growth Factors

• Only one product proven (Regranex)
• Expensive
• Unstable without specific construct
• More likely a concentration/temporal deal
• No $$ to certify any new ones
Grafts (Xeno, Allo, Homo)

- Over 200 approved products for soft tissue
- High cost vs low cost category
- Porcine, Cow, Sheep, Codfish?
- Amniotic (frozen, dried, fresh)
- Umbilical cord (Avive, Epicord, etc.)
- What else can we come up with?
Xenograft: Complex strategy

- Biologic dressing
- Less pain (wound covered)
- Less colonization
- No Immobilization needed
- Improved contour and cosmesis
Powder plus xenograft
Several applications every 2 wks
Granulates up to skin edge
Bridge to skin graft
Powder

- Micronized product
- Acell and Epifix
- Increased surface area
- Rapid absorption
- Increased granulation
Recurrent skin cancer
Complex Defect
Powder to base
Xenograft over defect (bolster)
Final result (4 weeks)
VICTORY?
Transplant patients (PPP)
Xenograft with proper orientation
Pyoderma gangrenosum

- Autoimmune process
- PAINFUL
- Colonized
- Varying degrees of necrosis
- Controversial treatment strategy
Lower extremity most common
Inflammation (steroids!! + xenograft)
Healed??
Xenografts great biologic dressing

- Degloving injury
- Partial thickness burn
- Road rash
- Epidermylysis bullosum
Partial burn
Large or small surface area
Debridement/xenograft
All areas covered/less pain
2 week result: fully healed
No Pain and Cosmesis Superior
Dressings

• Purpose
• Moist
• Dakins? Betadine? (toxic, biofilm?)
• Collagenase
• Silver?
• DACC
Cutimed Sorbact

Dialkyl carbamoyl chloride (DACC)

- Most pathogens are hydrophobic and naturally aggregate together in an aqueous environment
- DACC has the ability to attract, bind and inactivate pathogens
- Once sequestered, the pathogens are permanently bound to DACC and become inert
- The pathogens are then removed from the wound with each dressing change
Cutimed Sorbact – Mech of Action

Electron Microscope Image - Pathogen Attraction
Effect of DACC Dressing on the Growth Properties and Proliferation Rate of Cultured Fibroblasts

- What does this mean to IHT?
  - Cutimed Sorbact is more than just antimicrobial
  - Cutimed Sorbact may encourage native fibroblast growth and proliferation in a wound
  - Wounds treated with Cutimed Sorbact heal faster

- RESULTS: The presence of Cutimed Sorbact increased the proliferation rate of cultured fibroblasts by 50%, and increased the rate of healing by more than 100% after 72 hours
Dakins solution

• Does not penetrate Biofilm
• Not effective at safe levels on Bioburden
• Damages the cellular components needed in wound healing
Hypochlorous acid (PhaseOne): A fast-acting anti-microbial agent, part of our immune systems’ response to infection

- PhaseOne is a stabilized topical hypochlorous acid (HOCl) solution, an oxidant found in the white blood cells (neutrophils) of a humans’ natural defense system
- PhaseOne is pure HOCl containing no sodium hypochlorite or bleach as a preservative
- PhaseOne decreases bacterial bioburden without impairing the wound’s ability to heal
- PhaseOne penetrates and disrupts biofilm
Biofilms

- Biofilms have increased resistance to detergents and antibiotics, as the dense extracellular matrix and the outer layer of cells protect the interior of the community.
- In some cases antibiotic resistance can be increased a thousand-fold.
- Biofilms account for more than 65% of the 1.7 million annual U. S. hospital associated infections (HAIs), contributing to 99,000 deaths each year.
- Any group of microorganisms that form an impervious shield to protect themselves from antiseptics and antibiotics.
Study

Antimicrobial Activity Comparison of Pure Hypochlorous Acid

• Total of 19 commercial wound cleansers evaluated including:
  • PhaseOne (pure hypochlorous acid)
  • Chlorhexidine Gluconate
  • Povidone-iodine
• Non-toxic concentrations of cleansers were tested against methicillin resistant S.aureus
  • Hypochlorous acid / Sodium hypochlorite mixture (bleach)
Reduction in Pathogen

- Enterobacter aerogenes
- Klebsiella pneumoniae
- Proteus mirabilis
- Serratia marcescens
- Staphylococcus
- VRE
- Enterobacter aerogenes
- Klebsiella pneumoniae
- Proteus mirabilis
- Serratia marcescens
- Staphylococcus
- H. influenzae
- Acinetobacter
- Pseudomonas aeruginosa
- Staphylococcus aureus
- Bacteroides fragilis
- Clostridium perfringens
Negative Pressure Wound Therapy from 1996 to now...

- Suction is applied above the wound, with higher pressures and associated pain
- Foam results in a high bacterial load and promotes tissue ingrowth
- Complex, time-consuming and painful dressing changes
- Foam is placed in the wound to serve as a conduit for wound drainage removal
Negative Pressure Wound Therapy: 1996 til now (Foam)

*High bacterial load in negative pressure wound therapy (NPWT) foams used in the treatment of chronic wounds*


PURPOSE: to investigate the bacterial load and microbiology of NPWT foam removed from chronic wounds

CONCLUSION: bacterial load remains high in NPWT foam despite routine changing
New Wound Care System

**Step 1.** PhaseOne (HOCL) is applied to penetrate and disrupt biofilm*

**Step 2.** The Wound is dressed with antimicrobial Cutimed Sorbact

**Step 3.** Negative pressure is applied at the wound bed, with lower pressures and less pain
Sorbact and HOCL Dramatically Enhances Speed of Wound Healing

• Cutimed Sorbact helps reduce tissue maceration
• NeutroPhase (HOCl) in combination with Cutimed Sorbact and negative pressure wound therapy dramatically enhances the speed of wound healing
• These case studies show NeutroPhase (HOCl) in combination with Cutimed Sorbact has the potential to be a very effective wound care product

• What does this mean to IHT?
  • NeutroPhase (HOCl) and Cutimed Sorbact dramatically enhance the speed of wound healing
  • NeutroPhase (HOCl) safely disrupts biofilm in the wound and is an effective topical antimicrobial which improves wound healing
Surgical Site Infections

- Surgical site infection a common post-operative complication
  - Up to 300,000 cases per year in the U.S.
  - Each episode associated with 7-11 additional post-operative days
  - 31% of all healthcare associated infections among hospitalized patients
Randomized Controlled Trial Evaluating DACC Impregnated Dressings for the Prevention of SSI in Adult Women Undergoing C-Section

• Methods: 543 women undergoing C-sections evaluated
  • Sorbact® dressings compared to standard surgical dressings (Tegaderm® + pad)

• Results: Significant reduction in SSI in the Sorbact® group
  • 1.8% vs 5.2%
  • P value: 0.04
New Negative Pressure System

• New system uses HOCL and DACC dressing
Conclusion: Complex Wounds

- Open Minds prevail
- No one patient or wound is the same
- The “Art” of the Practice of Plastic Surgery
- Science and Progress continue
- Be a patient advocate
- Educate your colleagues