

# Wound Edge Epiboly Responds to Elastic Compression Therapy

MARTIN J WINKLER MD FACS | CHI Health Advanced Wound Care Center, Omaha Nebraska

## PROBLEM

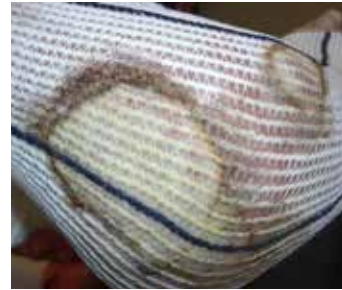
- 60 yo female vasculopath
- 3 Painful full thickness R foot ischemic ulcers with epiboly
- R foot equinus due to distal paraplegia
- Profound R leg ischemia, ABI 0.0 non-reconstructible due paraplegia
- L BKA



09/21/2009 Rx Day #14. After 7 days of NPWT skin on R foot is macerated, wounds are exquisitely painful and appear to be enlarging.

## TREATMENT

- Bilayer human cultured epithelial cells
- Longitudinal Fuzzy Wale elastic compression stocking in direct contact with healing surface\*
- Hydroxy ethyl methyl methacrylate HEMA Nano powder\*\*
- 22.3 KHz ultrasound debridement



09/28/2009 Rx Day #21: Fuzzy wale elastic compression textile\* rests directly on the wound surface. Hydroxy ethyl methyl methacrylate, HEMA nanoparticle powder\*\* was applied to wound surface following 22.5 KHz ultrasound powered wound debridement with hypochlorous acid solution irrigation.



Rx Day #42 Observe: Epiboly gone, wound edges now flat, peri wound edema has decreased. Granulation tissue robust with cornrow furrows. Iowa Medicaid authorized use of bilayer human bioengineered skin cells at this point in healing.



Rx Day #199: One of 3 wounds remain. Observe (1) islands of translucent epithelial cells that appear to "float" on mature granulation tissue between cornrow furrows, and (2) a halo of translucent thin new epithelium without liver spots covering the peri wound skin, this healthy "pink zone" of epithelial daughter cells has covered a profoundly ischemic, ABI 0.0, wound. We believe that fuzzy wale elastic compression appears to be salutary to heal profound refractory ischemic wounds, one probable mechanism may be elastic compression controls skin edema which is salutary for daughter cell division of bone marrow derived circulating epithelial cells.



Rx Day #271: Complete healing without scar, patient reports "... a miracle", see crucifix. Healing without a scar is a clinical sign of regenerative healing, meaning that bone marrow epithelial precursor cells are recruited to wound surface where daughter cells divide to cover the wound with epithelium. Our work in Omaha suggests a powerful hypothesis based on regenerative healing, controlling wound edema with elastic compression improves healing by enhancing survival of circulating epithelial precursor (CEP) daughter cells.

## OUTCOME

- Complete healing without scarring - 271 days

**PROBLEMS** Initial appearance of the wound edge betrays the multiple comorbid physiologic problems at work in a chronic wound and, importantly, guides our initial care of the wound. One example, early debridement of hyperkeratotic wound shoulders to create a flat wound couture is widely accepted. The role of edema control to treat epiboly is not widely understood.<sup>1</sup> Sibbald et al. established the importance of wound edge therapy as an integral part of wound bed preparation in an evidence level 5 review article in 2000.<sup>2</sup> Recently Snyder and Fife include wound edge effects in the DIME paradigm (Devitalized Tissue, Inflammation, Moisture Balance and Edge Preparation), which is a Centers for Medicare and Medicaid (CMS) Physician Quality Reporting System (PQRS) measure.<sup>3</sup> This case series asks, does elastic compression therapy decrease wound epiboly?<sup>3</sup>

**METHODS** Photos document presentation, treatment and outcomes of ten lower extremity wounds of mixed etiology that had dramatic wound edge response to elastic textile compression.\*

**RESULTS** This non-controlled case series demonstrates that elastic textile compression therapy controls two **DIME** PQRS measures, wound Moisture control and wound Edge preparation.

**CONCLUSIONS** Elastic textile compression therapy appears to improve wound Edge epiboly and improve wound healing.

## REFERENCES

1. Winkler, M., Science Poster, Symposium Advanced Wound Care, 2014, Longitudinal Wale Elastic Compression Textile Controls Comorbid Wound Edema to Improve Wound Healing: online at: <http://compressiondynamics.com/wp-content/uploads/2016/01/PosterLongitudinal-Wale-Elastic-Compression-Textile-Controls-Comorbid-Wound-Edema-to-Improve-Wound-Healing.pdf>
2. RG Sibbald, D Williamson, HL Orsted... - Ostomy/Wound Management ... , 2000. Preparing the wound bed--debridement, bacterial balance, and moisture balance.
3. RJ Snyder, C Fife, Z Moore, Advances in Skin & Wound Care, 2016 - ncbi.nlm.nih.gov. Components and Quality Measures of DIME (Devitalized Tissue, Infection/Inflammation, Moisture Balance, and Edge Preparation) in Wound Care.

\* EdemaWear® fuzzy wale elastic compression textile, Compression Dynamics LLC, Omaha, Nebraska 68102  
\*\* Altrazeal, Hydroxy ethyl methyl methacrylate (HEMA nanoparticle powder), Uluru Inc., Addison, TX 75001

## PROBLEM

- Nonagenarian L calf & heel ulcer, "TED hose were implicated, thus TED sore"
- Peripheral vascular occlusive disease, ABI ~ 0.25
- MI with low cardiac output, coma, prolonged ICU stay
- MI with low cardiac output, and coma



Rx day #0: Necrotic L heel present 6 weeks, painful cool dusky skin, CHF with 6 mm pitting edema, ankle brachial index (ABI) of 0.25.



Rx day #0. Necrotic L calf skin with ominous halo of erythema present 6 weeks following MI with coma and prolonged ICU stay. Painful cool dusky skin. CHF with 6 mm pitting pretibial edema, ABI of 0.25.



## TREATMENT

- Wound center debridement
- Control of edema with fuzzy wale elastic compression\*
- L femoral Atheroectomy



Rx Day #6: Sharp debridement and honey dressings clean up necrotic eschar. Observe cornrow furrows in peri wound skin, Fuzzy Wale elastic compression therapy controls extensive edema due to post MI congestive heart failure.



Rx Day #96: Observe skin edge epiboly with a trench around edematous wound edge. Extensive post MI edema has slowed healing and increased wound exudate.



A decision was made to use fuzzy wale elastic compression directly on the wound granulation tissue, in a short time wound bed was ready for split thickness skin graft.



## OUTCOME

- Complete healing ~170 days
- Fuzzy wale elastic compression therapy controlled edema in profoundly ischemic limb.



Rx Day #159: Split thickness skin graft over calcaneus remains friable, fuzzy wale elastic compression therapy was started one the skin grafts.



Rx Day #164: Patient discharged. Photos shows results of seven days of fuzzy wale elastic compression, observe decreased peri graft edema and redness, dry skin scales evidence that the skin is maturing more normally cuboidal cells at basement membrane mature to keratin scales falling off at surface.

## PROBLEM

- Non healing shin laceration

Rx Day #0: Non-healing R shin laceration via sheet metal, while riding lawn mower, present ~ 10 days. Observe widespread wound edge erythema, edema with weeping lymphorrhea, skin hemorrhage and patchy skin edge necrosis. No antibiotics were prescribed.



## TREATMENT

- Fuzzy wale elastic compression therapy to control peri wound edema, weeping lymph, and wound edge epiboly
- Soft debridement weekly



Rx day #17. Observe (1) Fuzzy wale elastic textile forms cornrow furrows in skin as edema fluid effluent exits the subcutaneous fat, (2) decreased peri wound erythema, and (3) decreased inflammation of wound edges. White powder is a sacrificial porcine collagen matrix to mollify host matrix degrading enzymes.



Rx Day #17: Because of wound edge problems (DIME) Fuzzy Wale compression therapy is indicated in this patient, see Rx Day #0 photo, observe all four components and of DIME, Devitalized Tissue, Infection/Inflammation, Moisture Balance, and Edge Problems) are present.<sup>1</sup>



Rx Day #29: Observe dramatic effect of fuzzy wale elastic compression on wound and peri wound skin. The four Components of DIME, Devitalized Tissue, Infection/Inflammation, Moisture Balance, and Edge Preparation) all show dramatic improvement.<sup>2</sup>

## OUTCOME

- Heals in 43 days



Rx Day #43: Patient discharged.