Bridging the Gap Between Compression and Exudate Management in Lower Extremity Wounds

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BACKGROUND

Compression is the gold standard for management of edema associated with venous leg ulcers (VLU). Unfortunately, during seven day compression cycles, chronic wound exudate oftentimes leads to maceration of the periwound, degradation of healthy skin, patient discomfort and ultimately prolonged healing times. Combining a new compression technology, Fuzzy Wale Compression (FWC), with a unique exudate management technology, Active Fluid Management (AFM), has shown improved healing times in previously recalcitrant wounds. Results from “in-vitro” pressure mapping reveal a unique compression profile while five case studies resulted in a healthy periwound skin and short time for wound closure.

MATERIALS AND METHODS

In-vitro Laboratory Testing: Pressure profiles for the FWC technology applied to a Simulated Leg Model (SLM) were evaluated. In experiment #1, a pressure sensor as placed between the FWC stockinet and SLM to capture the unique pressure profile. In experiment #2, thermal imaging was used to assess the pressure profile impact of different dressing formats between the FWC and a healthy leg.

Clinical Evaluation: Five patients, ages 58-85, presented to an outpatient lymphedema clinic for management of lower extremity swelling and chronic non-healing wounds. Intervention included a combination of AFM, FWC and additional compression therapy where appropriate. Wound characteristics and measurements were documented.

TECHNOLOGY

AFM technology is a bi-component textile engineered to move exudate through the Protection Layer to the Transfer Layer, where it is transferred into an absorbent reservoir. The Micro-Knit Process creates a capillary action which pulls the exudate up and away from the wound bed providing an optimal environment for wound healing.

The FWC technology is composed of fuzzy longitudinal wales that are connected by Lycrea spandex elastic yarns. Fuzzy wales create a unique compression stockinet that compresses just 20% of the skin surface. The non-compressible subcutaneous tissue between the wales has open veins and lymphatics that promote return of edema fluid into the vascular space.

RESULTS

The use of a thin wound contact layer has minimal impact on the temperature differential between fuzzy longitudinal wales vs a 4mm foam dressing.

DISCUSSION

Successful wound healing involves adequate circulation and the management of the wound environment and wound exudate. The combination of AFM and FWC addresses each of these.

Chronic wound fluid contains high levels of proteases, pro-inflammatory cytokines and elevated levels of MMPs. Prolonged exposure to chronic wound fluid is thought to degrade the extracellular matrix, prolong the inflammatory phase, and degrade peri-wound tissue with deleterious effects. AFM is designed to manage the wound exudate by pulling it through the protection layer and distributing it across the transfer layer to be absorbed into a secondary dressing. Easy of use is a positive secondary benefit, facilitating wound care when a skilled healthcare provider is not available.

Maximizing venous and lymphatic return without compromising arterial inflow is the goal of compression. The effects of compression discussed in the literature focuses on the positive effects of compression on the macro-circulation of the limb via its direct impact on the venous system. The observed linear epithelization mirrors the compression-induced low pressure produced by the FWC, as well as the reduced epible*improved edge effect seen with the addition of the FWC to the wound care regime. One possible explanation is that the FWC lowers the tissue pressure in areas of the wound bed and along the margins allowing for an enhanced microcirculation in those channels of lower pressure. This micro-circulation provides a favorable environment for epithelial advancement. Taking epithelial advancement as a sign of wound healing, it suggest that this unique type of compression benefits wound healing.

CONCLUSION

The combination of AFM and FWC demonstrate the ability to effectively manage wound moisture and impact the overall microcirculatory environment of the wound bed itself. Further scientific investigation regarding the exact mechanism of action is warranted.

References