The Use of a Novel Hyaluronic Acid Based Device in the Management of Difficult Chronic Wounds

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INTRODUCTION

Hyaluronic acid is a glycosaminoglycan that contributes significantly to cell proliferation and migration. Glycosaminoglycans are highly polar and attract water, so they are particularly useful to the body as a lubricant. One of the principal extracellular matrix (ECM) components, hyaluronic acid is an essential “building block” of the ECM, and it plays an integral role in ECM dynamic recellularization and cell surface receptor communications. Hyaluronic acid has also been studied extensively in all phases of wound healing. During the inflammatory phase, hyaluronic acid increases pro-inflammatory cytokines TGF-α, IL-4, and IL-8 via a CD 44-mediated mechanism, but it also helps moderate the inflammatory response, which may contribute to the stabilization of the granulation tissue matrix. As wound healing progresses into the granulation stage, hyaluronic acid synthesis facilitates cell detachment and mitosis, and a hyaluronic acid rich extracellular matrix provides an open, hydrated matrix that facilitates CD44 and RHAMM mediated cell migration. In the proliferation and remodeling phases, the hyaluronic rich extracellular matrix facilitates keratinocyte migration via a CD 44 mediated mechanism.

During the biodegradation process, the matrix has mitigated these issues so the 3-D scaffold can remain in place for two to three weeks, at which time the hyaluronic acid matrix will have incorporated into the wound bed and the silicone top layer can be removed with ease. Weekly evaluations of wound bed were conducted until the silicone top layer could be removed. The wound surface area measurements and any adverse events were recorded.

METHODS

A hyaluronic acid wound device was evaluated in a three difficult patients with multiple co-morbidities. The wound beds were properly cleansed at each dressing change. In the early weeks prior to the application of the hyaluronic acid wound device, cases 1 and 2 received weekly serial debridement, but case 3 refused debridement. The hyaluronic acid wound device was applied per manufacturer’s recommendations in this post-marketing product evaluation in a variety of wound types the patients did not receive a serial debridement except for the removal of peripheral hyperkeratotic tissue in order to prevent debridement from being a confounding factor. The hyaluronic acid wound device was secured with a fenestrated silicon contact layer and covered with an appropriate cover dressing to manage exudate. Wounds which were selected typically had minimal (less than 40% wound surface area in 4 weeks) response to modern wound care dressings and good wound care practices (successful completion of wound bed preparation and treatment of underlying disease processes). The hyaluronic acid wound device can remain in place for two to three weeks, at which point the hyaluronic acid matrix will have incorporated into the wound bed and the silicone top layer can be removed with ease. Weekly evaluations of wound bed were conducted until the silicone top layer could be removed. The wound surface area measurements and any adverse events were recorded.

CASE PRESENTATIONS

Case 1

A 68-year-old male with alcohol induced peripheral neuropathy and bilateral Charcot foot deformity developed a left plantar foot wound. Due to the lack of diabetes, his insurance company denied total contact casting and cell-based therapy products. Eventually, he paid for custom molded shoes out of pocket, and the wound surface area initially decreased by 12%. However, the 14-month-old wound, 4 months with poor microvascular flow with an ABI of 0.6. Previous treatment included the use of multiple topical dressings and antimicrobials and serial debridement, but there was no noticeable improvement of pale wound bed. The18-month-old wound had a baseline size of 2.3 cm x 2.0 cm x 0.3 cm. After two weeks and three applications of the hyaluronic acid wound device, the patient’s wound bed appearance improved to a size of 2.0 cm x 1.7 cm x 0.1 cm. The patient was lost to follow up.

Case 2

A 68-year-old male with alcohol induced peripheral neuropathy and bilateral Charcot foot deformity developed a left plantar foot wound. Due to the lack of diabetes, his insurance company denied total contact casting and cell-based therapy products. Eventually, he paid for custom molded shoes out of pocket, and the wound surface area initially decreased by 12%. However, the 14-month-old wound, 4 months with poor microvascular flow with an ABI of 0.6. Previous treatment included the use of multiple topical dressings and antimicrobials and serial debridement, but there was no noticeable improvement of pale wound bed. The18-month-old wound had a baseline size of 2.3 cm x 2.0 cm x 0.3 cm. After two weeks and three applications of the hyaluronic acid wound device, the patient’s wound bed appearance improved to a size of 2.0 cm x 1.7 cm x 0.1 cm. The patient was lost to follow up.

Case 3

A 57-year-old female with systemic lupus with CREST syndrome presented with recurrent leg wounds. She was receiving various long-term systemic therapies for her underlying medical condition, but her health had been slowly declining. She refused stem cell transplantation. Her lower leg ulcer developed heterotopic bone (ossification) in the wound bed, but she refused local debridement. The patient consented to the use of hyaluronic acid wound device. The 4-month-old wound had a baseline size of 1.2 cm x 0.5 cm x 0.7 cm. Within three weeks, the heterotopic bone was covered with granulation tissue, and the wound was completely closed within six weeks with three applications.

CONCLUSION

The hyaluronic acid wound device successfully managed difficult to treat wounds of an avascular, non-healing chronic wound size of four to 18 months. The wounds of cases 2 and 3 closed after three to four applications, respectively, in cases of 6-15 weeks and have remained closed. For case 1, the health of the wound bed markedly improved after application of the hyaluronic acid wound device. The wound also decreased in volume by 22% and by 33% in area. The hyaluronic acid matrix was found to be a particularly viable option for patients who do not qualify for traditional wound care products due to insurance or product approval restrictions. Patients reported improved satisfaction with the use of hyaluronic acid based matrix. The formulation of this hyaluronic acid hyaluronic acid wound device effectively managed and two cases promoted closure of difficult chronic wounds, making it a practical option for use in the recalcitrant wound. This evaluation was consistent with the findings of a published systematic review and meta-analysis of HA derivatives.9 Critical effectiveness studies are warranted.

REFERENCES

6. Motofusa N, Vignati F, Brambilla R, Conati M, Passi A. Interaction between a regenerative matrix and wound bed microvasculature. The wound space at baseline measured 1.1 cm x 1.5 cm x 0.1 cm. After four applications of the hyaluronic acid wound device, the wound achieved closure in 4.3 weeks.