

Use of ovine collagen extracellular matrix (CECM)* dressing and gentian violet and methylene blue (GV/MB) antibacterial foam** dressing in the management of diabetic foot ulcers

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INTRODUCTION:

Diabetic foot ulcers (DFU) are estimated to affect ~15% of all diabetic individuals during their lifetime.¹ The management and treatment of DFU's can be costly and complex. In 2008, the mean reimbursement for all Medicare related services for DFU's was \$35,100.² DFU's also have a negative effect in the quality of life on diabetic patients as a result of decreased mobility.³ Early intervention is important to prevent further complications and improve quality of life of patients with DFU's. Chronic wounds represent a failure in the normally ordered sequence of wound healing. Changes in local pH, temperature, and amounts of chemical reactants are all factors influencing wound healing. The three main components of local wound management include: debridement, infection/inflammation, and moisture balance. Bioburden, or critical bacterial colonization, leads to persistently high levels of matrix metalloproteinases (MMP) being released from inflammatory cells that digest the normal collagen scaffold in the base of a healing wound. Using advanced wound care products may assist to achieve wound healing in a timely manner.⁴

OBJECTIVE:

To describe the use of CECM, and in combination with gentian violet and methylene blue (GV/MB) antibacterial foam,** to manage MMPs and bioburden in DFU.

METHODS AND MATERIALS:

Patients were selected with wounds of diabetic origins. The CECM and GV/MB antibacterial dressings were changed according to product instructions for use. Assessments and measurements were performed by the clinician weekly.

CONCLUSION:

The use of the dressings in this case series were helpful in the management of these complex wounds. Both the CECM and GV/MB antibacterial foam dressings may have been instrumental in MMP and bioburden reduction with complete resolution of wounds without complication. Overall patient satisfaction and compliance were also observed by the clinician.

Case Study 1 - Diabetic Foot Ulcer - Right Plantar 5th metatarsal

Patient: 70 year-old male with one week old diabetic foot ulcer.

Past medical history:

- Diabetes with neuropathy, hypertension.

Previous treatment:

- None.

Wound treatment:

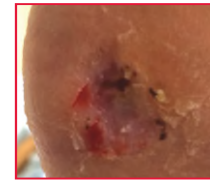
- Sharp debridement
- CECM, non-adherent contact layer, *** GV/MB antibacterial foam dressing secured with rolled gauze. Dressing changed weekly.
- Post-op shoe with accommodative padding



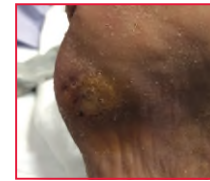
Initial wound measurement:
1.2 cm x 1.4 cm x 0.4 cm
Wound Description:
Post debridement, Bone palpable



Week 7 Wound measurement:
0.5 cm x 0.4 cm x 0.3 cm



Week 9 Wound measurement:
0.2 cm x 0.2 cm x 0.2 cm



Week 10
Wound healed

Case Study 2 - Diabetic Ulcer-Achilles

Patient: 70-year-old male with 8-month-old diabetic ulcer over Achilles

Past medical history:

- Uncontrolled diabetes, neuropathy, peripheral vascular disease, > 50 years of tobacco use.
- Revascularizations with stents to left leg and angiography x 2.

Previous treatment:

- Failed Cellular tissue based wound dressing for 21 days

Wound treatment:

- Application of hydrogel and CECM covered with non-adherent contact layer, silver foam, and secured with roll gauze. Dressings changed weekly.



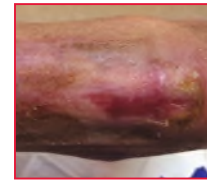
Initial wound measurement:
8.0 cm x 5.0 cm x 0.4 cm
Wound Description:
80% Granulation tissue, 20% fibrous tissue with moderate drainage



Week 9 Wound measurement:
7.0 cm x 1.5 cm x 0.4 cm
Wound Description:
90% granulation to 10% fibrous tissue



Week 14 Wound measurement:
5.0 cm x 1.5 cm x 0.3 cm



Week 20 Wound measurement:
1.5 cm x 0.5 cm x 0.3 cm



Week 24 Wound measurement:
1.0 cm x 1.2 cm x 0.3 cm



Week 31
Wound healed

Case Study 3 - Diabetic foot ulcer: Right Dorsal Foot

Patient: 59-year-old male presented to emergency room with acute necrotizing gangrene with abscess of right dorsal foot with osteomyelitis

Past medical history:

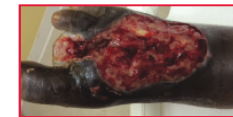
- Hypertension, uncontrolled diabetes

Previous treatment:

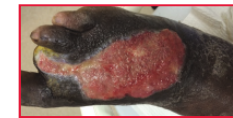
- 2nd and 3rd Ray resection with incision and drainage of abscess.
- Systemic antibiotic for 14 days.
- Post ray resection, began 1 week of Negative pressure wound therapy (NPWT) followed by an Amniotic stem cell graft for 2 weeks.
- At week 4, CECM was applied one time for 1 week and discontinued due to copious amount of drainage.

Wound treatment:

- At week 5, the use of GV/MB antibacterial polyvinyl alcohol (PVA) foam,**** 4x4 sterile gauze, secured in place with rolled gauze and elastic bandage. Dressings changed 3 times a week for one week. After one week, frequency was changed to daily due to copious amount of drainage.
- At week 20, drainage decreased. GV/MB antibacterial PVA foam was discontinued. Wound treatment changed to hydrogel, CECM, covered with non-adherent contact layer, 4x4 sterile gauze, secured with roll gauze and elastic bandage. Dressing changes were done once a week.



Initial wound measurement:
14.0 cm x 5.0 cm x 0.8 cm
Wound Description:
Clean red tissues with heavy serosanguinous drainage with tendon exposed



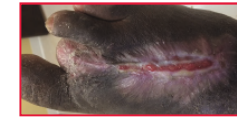
Week 5 Wound measurement:
13.0 cm x 7.5 cm x 0.8 cm
Wound Description:
Red granulating tissue with tendon visible



Week 9 Wound measurement:
8.5 cm x 2.0 cm x 0.3 cm
Wound Description:
Granulating tissues with epithelialization on wound edges



Week 17 Wound measurement:
6.3 cm x 0.8 cm x 0.3 cm



Week 19 Wound measurement:
6.0 cm x 0.5 cm x 0.3 cm



Week 21
Wound healed

Case Study 4 -Diabetic Foot Ulcer- Left Lateral Foot

Patient: 55-year-old female presented to emergency room with elevated white count, febrile with acute necrotizing gangrene to left lateral foot with osteomyelitis.

Past medical history:

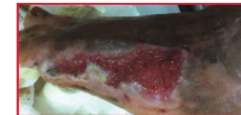
- Uncontrolled diabetes, neuropathy

Previous treatment:

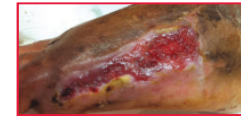
- 4th and 5th ray resection with incision and drainage of abscess.
- Systemic antibiotic for 14 days.
- Negative pressure wound therapy (NPWT) for one week post-surgery.
- Cellular tissue based wound dressing was applied for 21 days

Wound treatment:

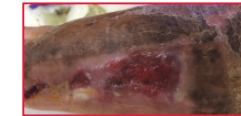
- Application of hydrogel and CECM, covered by a non-adherent contact layer and GV/MB antibacterial PVA foam, and secured with roll gauze. Based on clinical preference, dressing changed weekly.



Initial wound measurement:
9.0 cm x 3.5 cm x 0.3 cm



Week 2 Wound measurement:
8.0 cm x 3.0 cm x 0.3 cm



Week 5 Wound measurements:
1.0 cm x 0.5 cm x 0.2 cm
3.0 cm x 1.5 cm x 0.2 cm
Wound Description:
Wound separated into 2 wounds



Week 11 Wound measurement:
1.0 cm x 0.5 cm x 0.2 cm



Week 13
Wound healed

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3. Goodridge, D., Treisman, E., & Embil, J. (2005). Health-related quality of life in Diabetic patients with foot ulcers: Literature Review. *Journal of Wound, Ostomy, & Continence*, 32(6), 365-377.
4. Sibbald, R., Ovington, L., & Goodman, L. (2014). Wound bed preparation 2014 update: Management of critical colonization with a gentian violet and methylene blue absorbent antibacterial dressing and elevated levels of matrix metalloproteinases with an ovine collagen extracellular matrix dressing. *Advances in Skin and Wound Care: The International Journal of Prevention and Healing*, 27, 3 suppl 1, 1-6.

* Endoform dermal template. Distributed by Hollister Incorporated
** Hydrofera Blue Ready foam. Distributed by Hollister Incorporated
*** Restore Contact Layer FLEX. Hollister Incorporated
**** Hydrofera Blue classic foam. Distributed by Hollister Incorporated