

Use of an Ovine Collagen with an Intact Extracellular Matrix (CECM) and negative pressure wound therapy (NPWT) as part of the wound management plan following limb salvage surgical intervention in high risk diabetic foot ulcers.

• Adam Silverman, DPM
Silverman Podiatry P.A., Baltimore, MD

Objective:

Demonstrate use of an Ovine Collagen with an Intact Extracellular Matrix (CECM)* and negative pressure wound therapy (NPWT) as part of the wound management plan following limb salvage surgical intervention in high risk diabetic foot ulcers.

Background:

Diabetes is a disease which is becoming more and more prevalent in our society.¹ As a result, more patients are developing complex lower extremity deformities which could lead to ulcerations that often progress to infection. As medical professionals, it is important that we realize the limb threatening diabetic foot ulceration or infection as early as possible so that we can provide patients with the urgent and aggressive wound care necessary for limb salvage. Patients who suffer a limb loss are more likely to suffer contralateral limb loss or even loss of life within the next few years.^{2,3}

Case Descriptions:

These four cases involve high risk diabetic patients who were treated with surgical intervention. As a part of post-operative wound management, CECM and NPWT were utilized. CECM was applied to the wound bed, covered with a contact layer dressing,** and then a NPWT dressing was applied. Dressings were changed two to three times a week per instructions for use.

Conclusion:

In these cases, the use of CECM and NPWT as part of the wound management plan following limb salvage surgical intervention has assisted in the task of saving these limbs.

Case Study 1: Left Hallux Amputation

Patient: 65 year-old, Diabetes, neuropathy, smoker, chronic DFU on bilateral great toes with osteomyelitis

Past medical history:

- Bilateral amputation of Hallux, 1 week later the patient developed post-op infection on left foot and went back to OR for debridement and partial 1st metatarsal amputation



Initial wound
Wound management post-op: Triple antibiotic solution packing, IV antibiotics, hyperbaric oxygen therapy (HBOT) was administered while in the hospital for a total of 5 treatments
Wound management: Application of CECM, contact layer dressing, and NPWT. NPWT changed 3 times weekly but CECM only added weekly

Week 3
Wound description: Beefy red granulation tissue; epithelialization starting on perimeter of wound
Wound measurement: 2.1 cm x 7.5 cm x 0.1 cm



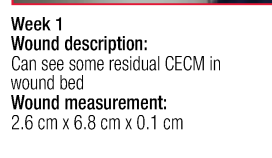
Week 6
Wound management: Discontinued NPWT. Continued using CECM and gentian violet and methylene blue (GVMB) polyurethane (PU) antibacterial foam***
Wound measurement: 0.7 cm x 5.0 cm x 0.1 cm



Week 16
Wound measurement: Wound closure



Week 1
Wound description: Can see some residual CECM in wound bed
Wound measurement: 3.0 cm x 7.0 cm x 0.2 cm



Week 0
Wound management: Start of CECM and NPWT (wound is 3 weeks old)
Wound measurement: 2.6 cm x 6.8 cm x 0.1 cm

Case Study 2: Diabetic Foot Ulcer- Wet Gangrene

Patient: 70 year-old female

Past medical history:

- Diabetes, peripheral neuropathy, peripheral arterial disease, hypertension, end-stage renal disease and on hemodialysis



Initial wound
Wound management: Patient presented to the clinic with wet gangrene on the right foot

Week 5
Wound description: CECM can be seen in wound bed
Wound measurement: 1.3 cm x 10.5 cm x 0.2 cm



Surgery: Incision and drainage, partial 1st and 2nd ray amputations
Wound management post-op: Triple antibiotic treatment, angioplasty 3rd post-op day, HBOT 5th day post-op, NPWT 12th day post-op, went to rehab 14th day post-op
Week 8
Wound management: NPWT discontinued, EDT, contact layer and compression wrap
Wound measurement: 1.1 cm x 10.3 cm x 0.2 cm



Week 16
Wound measurement: Proximal 0.5 cm x 2.2 cm x 0.1 cm
Distal 0.4 cm x 0.5 cm x 0.1 cm



Week 24
Wound measurement: Wound closure

Week 0
Wound management: Start of CECM and NPWT (wound is 3 weeks old)
Wound measurement: 3.7 cm x 15.9 cm x 1.8 cm

Case Study 3: Right Toe Gangrene and Abscess

Patient: 63 year-old female, admitted medical center with right 2nd toe gangrene and abscess

Past medical history:

- Diabetes, neuropathy, peripheral arterial disease, coronary artery disease, and underwent partial right 2nd ray amputation (below)



Initial wound
Wound management post-op: Antiseptic packing daily and oral antibiotics
Wound measurement: 2.0 cm x 1.0 cm x 3.0 cm

Week 4
Wound description: Increased granulation tissue, no tendon exposed, no pain or signs of infection, less drainage and no maceration
Wound measurement: 1.6 cm x 0.6 cm x 2.1 cm



5 days Post-op
Wound description: Granulating surgical wound with moderate drainage and macerated edges. Tendon exposed without exposed bone. The sutures are intact proximally and distally from amputation with no pain or signs of infection associated
Wound management: Continue to pack wound with antiseptic dressing, oral antibiotics and initiated HBOT
Wound measurement: 2.4 cm x 0.8 cm x 3.5 cm

Week 7
Wound description: NPWT Discontinued. CECM, contact layer dressing, and multi-layer compression wrap initiated
Wound measurement: 1.1 cm x 0.5 cm x 0.5 cm



Week 10
Wound description: NPWT Discontinued. CECM, contact layer dressing, and multi-layer compression wrap initiated
Wound measurement: 1.0 cm x 0.4 cm x 0.2 cm



Week 13
Wound measurement: 0.1 cm x 0.1 cm x 0.1 cm

Week 2-3
Wound description: NPWT-only initiated at week 2 - application of CECM, contact layer dressing, and NPWT initiated week 3. NPWT changed 2 times weekly but CECM only added weekly
Wound measurement: 1.6 cm x 0.6 cm x 2.6 cm

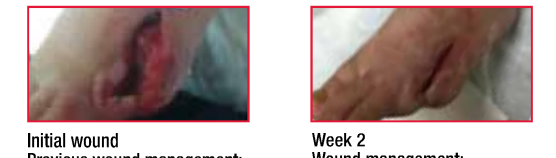


Week 18
5 weeks after wound closure

Case Study 4: Non-healing surgical wound after left partial 4th and 5th ray resection

Patient: 50 year-old female presented to wound care center after partial left 4th and 5th ray resections at another facility 3 weeks prior
Past medical history:

- Diabetes, neuropathy, peripheral arterial disease, heavy smoker

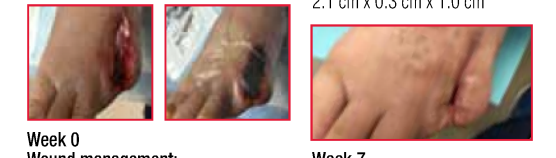


Initial wound
Previous wound management: Patient arrived to wound center with a NPWT device in place and on oral antibiotics. NPWT was continued and changed 3 times per week after wound debridement
Wound measurement: 4.5 cm x 2.2 cm x 3.6 cm

Week 2
Wound management: NPWT discontinued. CECM, contact layer dressing, and multi-layer compression wrap initiated
Wound measurement: 4.2 cm x 0.5 cm x 1.5 cm



Week 5
Wound measurement: 2.1 cm x 0.3 cm x 1.0 cm



Week 7
Wound measurement: 0.6 cm x 0.3 cm x 0.5 cm



Week 10
Wound management: Discontinued CECM. Continued contact layer with compression wrap
Wound measurement: 0.3 cm x 0.2 cm x 0.3 cm



Week 11
Wound measurement: Wound closure

REFERENCES
1. United States, Department of Health and Human Services, Center for Disease Control and Prevention. (2011). National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in United States, 2011.
2. Reiber, G. E., Boyko, E. J., & Smith, D. G. (1995). Lower extremity foot ulcers and amputations in diabetes. Diabetes in America, 2, 409-427.
3. Larson, J., Agerholm, C., Apelqvist, J., & Stenstrom, A. (1998). Long term prognosis after healed amputation in patients with Diabetes [Abstract]. Clinical Orthopaedics and Related Research, 350, 149-58.
* Endoform dermal template. Distributed by Hollister Incorporated.
** Restore contact layer FLEX. Distributed by Hollister Incorporated.
*** Hydrofera Blue Ready foam. Distributed by Hollister Incorporated.
Financial Disclosure: The author received an honorarium from Hollister Incorporated.