



Introduction

Over 29 million people in the United States have diabetes mellitus, and 12 million have peripheral arterial disease (PAD), with 20-30% having both.¹ PAD can reduce wound healing rate up to 30%. ¹ Chronic wounds often struggle to heal due to vascular insufficiency, with 50-60% caused by venous insufficiency, 15-20% by arterial insufficiency, and 5% by diabetes related.² Also, chronic wounds have difficulty healing because they fail to progress beyond the inflammatory stage of the healing process.³ Despite various chronic wound treatment options, most are ineffective and expensive.

A new omega-based combination collagen matrix therapy has been created to tackle the challenges of healing chronic wounds. It is rich in omega-3 fatty acids, collagen peptides, nutrients, and vitamins, and enhances all phases of wound healing—from inflammation to the proliferative phase.⁴ Omega-3 fatty acids, along with collagen peptides and vitamins, play a crucial role in wound healing by promoting immune cell activation, reducing inflammation, accelerating reepithelialization, and providing antimicrobial, antioxidant benefits while supporting new collagen formation.⁵

Method

68-year-old African American male with a history of type 1 After 9 months of using advanced wound therapies with

diabetes, diabetic neuropathy, PAD, deep vein thrombosis, hypertension, hyperlipidemia, and a 4.5 pack-year smoking history presented with chronic gangrene of the left hallux. There were no clinical signs of infection, however, had significant pain to the left lower extremity. His imaging study, x-ray was unremarkable with no osseous involvements. The baseline arterial doppler with left great toe pressure of 30mmHg and toe brachial index (TBI) of 0.2. This later decreased to toe pressure of 25 mmHg and TBI of 0.15 before any surgical interventions. After receiving numerous vascular surgical interventions and consultation, he was optimized to undergo a left hallux amputation. Post-operatively, he developed few complications including a hematoma and surgical site dehiscence, which later developed into a non-healing wound. He was then referred to wound care clinic for further management. minimal progress, combination collagen matrix therapy was initiated. He received weekly wound evaluations, mechanical wound debridement, and combination collagen therapy. He underwent total of 14 applications of the combination collagen therapy. He was offloaded while wearing a diabetic pressure relief shoe and a controlled ankle motion boot throughout the entire treatment.

Case Report: Healing Made Simple Using Newly Developed Collagen Matrix Hojin Lee, DPM¹; Alton Johnson DPM, FACPM, FASPS, FFPM, RCPS, CWSP² ¹Division of Metabolism, Endocrinology, and Diabetes (MEND), Ann Arbor, MI ²Division of Orthopedic Surgery, Ann Arbor, MI



Figure 1. Before Left Hallux Amputation



Figure 4. 7 months Post Amputation



Figure 7. 12 months Post Amputation; After 10th Applications



Results



Figure 2. 3 weeks Post Amputation



Figure 5. 9 months Post Amputation; Start of Combination Collagen Therapy



Figure 8. 13 months Post Amputation; After 12th

Table 1. Summary of Combination Collagen Therapy Treatments



Figure 3. 2 months Post Amputation

Figure 6. 10 months Post Amputation; After 5th **Applications**

Figure 9. 14 months Post Amputation; After 14th Applications

Wound Measurements (Wound surface area)	Percentage of Wound Reduction
2.5 x 3.8 x 0.4cm (9.5cm ²)	0%
1.5 x 1.5 x 0.3cm (2.25cm ²)	76.3%
0.2 x 0.2 x 0.1cm (0.04cm ²)	99.6%
Closed (0cm ²)	100%
Closed (0cm ²)	100%

Fourteen months after left hallux amputation, the Throughout the course of this patient's wound history,

surgical dehiscence site of the left foot was closed using fourteen total application (14 weeks use) of the novel combination collagen matrix therapy. At the start of the collagen therapy, the wound surface area was 9.5cm². After five applications, the wound surface area was 2.25cm² with percentage area of wound reduction at 76.3%. The wound surface area was 0.04cm² with percentage area of wound reduction at 99.6% after 10 applications. Bettle et al. reported that the total wound percentage average reduction over the first four weeks was 69% in multiple chronic wound types using this combination collagen therapy. Additionally, 77% of the patients had a median wound closure time of 6.9 weeks.⁴ Sheehan et al. reported that if the wound has not reduced greater than 50% after four weeks of treatment, there is less than 9% chance of healing over a 12-week period.⁴ Our case aligns with the findings of the article with an average reduction of 76.3% in total wound area after five weeks of collagen therapy and suggesting a strong potential for complete healing within a 12-week period. the wound remained free from infection. There was an event where he developed a bullae prior to his last two collagen therapy treatment. However, the wound closed and stabilized without complications. Utilizing the combination collagen therapy can aid in reducing the bacterial load and preventing acute infection. Gil et al. studied the antimicrobial effects of combination collagen therapy against methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa, finding that it inhibited MRSA proliferation.⁶

Overall, this case emphasizes the effectiveness and simplicity of treating a chronic, non-healing foot wound in a patient with diabetes mellitus and peripheral arterial disease, following multiple unsuccessful advanced therapies. It can be anticipated that this therapy will help reduce amputation and infection rates, while primarily helping patients achieve woundfree healing and enhance their quality of life.

- 1. Swain et al. J Wound Care. 2024
- 3. Seth et al. Surgical Technology International. 2022
- 4. Bettle et al. Advanced Therapy. 2024
- 5. Serini et al. Foods. 2021.
- 6. Gil et al. International Wound Journal. 2024.



Discussion

References

2. Marso et al. Journal of the American College of Cardiology. 2006