

Focused on the  
Trajectory of Healing -  
MIRRAGEN<sup>®</sup> Case Studies.



**ETS**

ENGINEERED TISSUE  
SOLUTIONS





## DIABETIC ULCERS

# Successful Progress Towards Wound Closure of a Hard-to-heal, One-year-old Diabetic Foot Ulcer Using MIRRAGEN® Advanced Wound Matrix

## CHALLENGE

A 64-year-old man presented to the wound care clinic with a one year-old diabetic foot ulcer. Patient had a history of diabetes and neuropathy, complicating wound healing. Prior treatments included three surgical closure attempts, two failed skin substitute products and one amnion graft.

## TREATMENT

At the initial encounter, the wound bed was debrided, removing all visible necrotic debris and slough. MIRRAGEN® Advanced Wound Matrix was applied weekly to the wound bed and affixed using a non-adherent silicone dressing, then wrapped with gauze. At weekly encounters, the patient returned for wound check and reapplication. The wound was not disturbed on subsequent visits and did not require any additional debridement. MIRRAGEN® was reapplied over the wound bed at each visit and secured in similar fashion.

## CONCLUSION

The wound progressed towards closure after only six applications of MIRRAGEN® within 42 days. This provider was extremely impressed with how effective MIRRAGEN® was at providing the right environment to support the body's ability to heal this wound, particularly after trying so many other treatments. The provider found dressing changes were much quicker and simpler compared to other skin substitutes and was impressed with how easy it was to apply MIRRAGEN® to the wound bed.



DAY 1 - 7 cm x 3 cm



DAY 42 - Closed

For information on MIRRAGEN® please visit our website at [ets123.com](https://ets123.com)

*Individual results may vary.*



# Two-year-old Diabetic Foot Ulcer Progressed Towards Closure After One Month's Use of MIRRAGEN® Advanced Wound Matrix

## CHALLENGE

A 64-year-old man presented to the wound care clinic with a two-year-old right diabetic foot ulcer that had failed to heal with multiple treatments, including serial debridement, advanced wound dressings and several different skin substitutes. The patient was a type II diabetic with neuropathy who had a BKA of his left limb due to complications from diabetes. The patient also suffered from hypertension and chronic renal failure on dialysis.

## TREATMENT

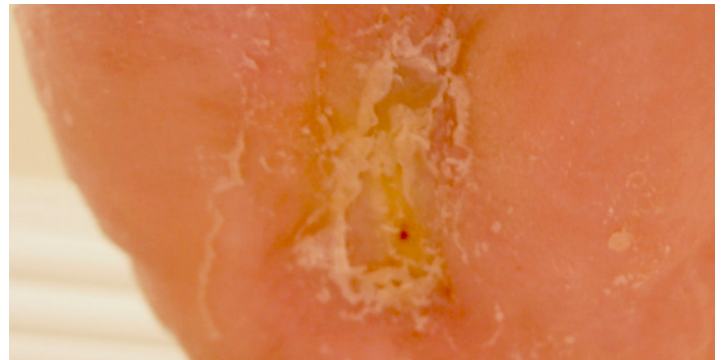
At initial presentation, the wound measured 2 cm x 0.75 cm x 1.2 cm. MIRRAGEN® Advanced Wound Matrix was applied to the wound bed at weekly intervals. With each follow-up, the wound was debrided and MIRRAGEN® was applied, secured with a non-adherent silicone dressing and covered with gauze wrap.

## CONCLUSION

The wound progressed towards closure with just three applications of MIRRAGEN® within 33 days, surprising both the provider and the patient with the ability of MIRRAGEN® to support the body's natural healing process. After a significant investment on expensive skin substitutes, the wound care center was very pleased with both the cost and efficiency of MIRRAGEN®.



DAY 1 - 2 cm x 0.75 cm x 1.2 cm



DAY 33 - Closed

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*Individual results may vary.*



# Successful Progression Towards Wound Closure of a Diabetic Foot Ulcer After Multiple Failed Attempts with Other Skin Substitutes

## CHALLENGE

A 63-year-old woman presented to the wound care clinic with a diabetic foot ulcer. The patient has history of diabetes and morbid obesity. Prior treatments included multiple skin substitutes with the ulcer persisting for six months.

## TREATMENT

At initial presentation, the wound measured 2 cm x 1.3 cm. During the first encounter, the wound was debrided and MIRRAGEN® Advanced Wound Matrix was applied to the wound bed and covered with a foam dressing and gauze wrap. At the second encounter, the wound was checked and MIRRAGEN® was reapplied to the wound bed with minimal disturbances.

## CONCLUSION

After only two applications over 14 days, the wound progressed towards closure. The patient found this treatment to be very comfortable and painless. The provider noted MIRRAGEN® was very easy to pull apart and apply to the wound bed. The wound care center was thrilled with convenience factor of MIRRAGEN® as it can be stored on the shelf at room temperature, eliminating the complications of cold shipping and storage — a win for all.



DAY 1 - 2 cm x 1.3 cm

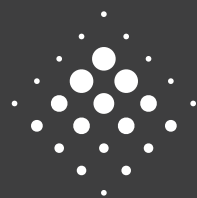


DAY 14 - Closed

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REFRACTORY WOUNDS



# Effective Wound Management of Traumatic Tibial Wound with MIRRAGEN® Advanced Wound Matrix

Martin L. Johnson, MD, Pomona, CA

## CHALLENGE

A 79-year-old man presented to the wound care clinic with a traumatic wound on the anterior right tibia. At initial presentation the wound measured 6.48 sq. cm. Patient has a history of type II diabetes, end stage renal disease, hypertension, obesity and venous insufficiency.

## TREATMENT

After assessing the wound bed, it was debrided to remove any necrotic debris and slough, and MIRRAGEN® Advanced Wound Matrix was applied in the wound bed. Since MIRRAGEN® is able to be pulled apart, it allowed a great deal of flexibility when being placed in the cavity of this challenging wound. Wound was then covered with an adhesive dressing and a gauze wrap. At weekly intervals, the patient returned for wound check and reapplication. The wound was minimally disturbed on subsequent visits, and required only light debridement. MIRRAGEN® was reapplied over the wound bed each time and secured in similar fashion. By week five, this hard-to-heal wound was on the path to healing.

## CONCLUSION

This challenging wound progressed towards closure in under six weeks. Low scar contraction was noted, and with the use of MIRRAGEN®, minimal dressing changes were required over the weeks of treatment, increasing the comfort level for the patient, as well as encouraging compliance with follow-up visits.



WEEK 1 - 6.48 sq. cm



WEEK 2 - 3.38 sq. cm



WEEK 3 - 2.07 sq. cm



WEEK 4 - 0.70 sq. cm



WEEK 5 - 0.01 sq. cm



WEEK 6 - CLOSED

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*Individual results may vary.*





# Successful Trajectory Towards Wound Closure in Patient with Pre-tibial Wound of Uncertain Etiology.

## CHALLENGE

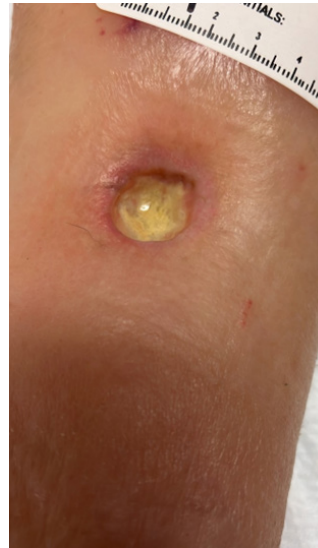
The patient is a 76-year-old woman who presented to the wound care clinic with two-year history of open left pre-tibial wound, of uncertain etiology. The patient had been treating with folk medicine remedy. At the persistence of family members, she presented to the clinic with a painful ulcer. Negative X ray to R/O osteomyelitis. Only medical background was hypertension. On presentation, the wound was 1.6 cm x 1.3 cm x 1.8 cm.

## TREATMENT

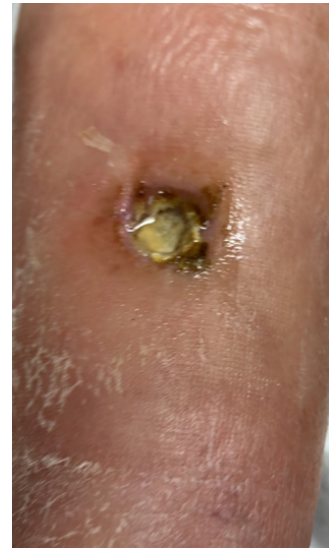
At the initial visit, the patient would not allow for any compression or debridement. The decision was to apply MIRRAGEN® Advanced Wound Matrix based on providers experience with bone coverage and anti-inflammatory reaction. MIRRAGEN® was packed into the wound and secured with a gauze bolster dressing. The patient returned to the office infrequently. MIRRAGEN® was applied to the wound only twice.

## CONCLUSION

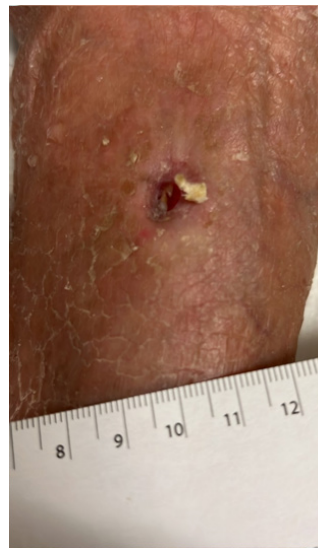
The wound progressed towards closure at three months after only two applications of MIRRAGEN®. MIRRAGEN® was selected for this patient because of its effectiveness in supporting the body's natural healing process and ease of use in managing deep wounds and exposed structures. He observed the decrease in edema despite no use of compression dressing from visit 1 to visit 2. At the second visit, the patient once again refused debridement. The question was raised at this visit to discontinue reapplication because of the wound appearance but they decided to reapply MIRRAGEN®. Patient agreed to return in a week, but did not return for two months. Upon her return the wound progressed towards closure. Patient expressed no pain.



10/27



11/29



1/19



2/2

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# Successful Progress Towards Wound Closure in Patient with Lymphedema-Related Lower Leg Ulcer

Martin L. Johnson, MD, Pomona, CA

## CHALLENGE

The patient is a 79-year-old man who presented to the wound care clinic with an acute right lower leg ulcer secondary to lymphedema. He also has a history of hypertension, gout, and a C5 incomplete spinal cord injury. The wound was initially 1.17 sq. cm.

## TREATMENT

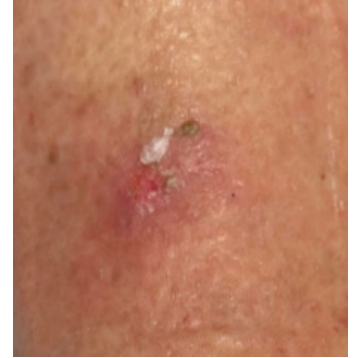
At first presentation, the wound bed was debrided of necrotic tissue and slough, and MIRRAGEN® Advanced Wound Matrix was applied to the wound bed, fixated using a self-adhesive wound dressing and covered with a gauze wrap. At weekly intervals, the patient returned for wound check and reapplication. The wound was not disturbed on subsequent visits, and did not require any additional debridement. MIRRAGEN® was reapplied over the wound bed at each visit and secured in similar fashion. By Week 4, this complex wound progressed towards closure.

## CONCLUSION

This challenging wound in the setting of underlying lymphedema progressed towards closure in 4 weeks, after just 3 applications of MIRRAGEN®. The scar closed with no evidence of scar contracture. MIRRAGEN® was selected by the provider for this patient because of its effectiveness at managing the wound environment, while supporting the body's natural healing process and minimizing the need for multiple weekly dressing changes. With MIRRAGEN® the patient experienced a flexible and comfortable treatment without pain.



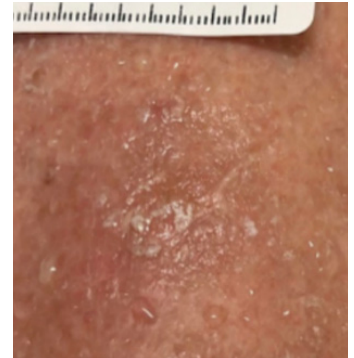
WEEK 1



WEEK 2



WEEK 3



WEEK 4



WEEK 5

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*Individual results may vary.*



# A Complex, Lower Leg Wound Improves Dramatically after Failed Attempts with NPWT

## CHALLENGE

A 62-year-old man presented to the wound care clinic after a lengthy hospital stay due to sepsis. During his hospital stay, he had an abscess on his lower right leg, which was incised and drained. The wound was treated for four months with NPWT. Having recovered fully from sepsis, the patient was discharged to the wound center for care because the wound persisted. The patient also had the following comorbidities, which contributed to delayed healing: diabetes, renal failure on dialysis, stroke, and peripheral vascular disease resulting in amputation.

## TREATMENT

At initial presentation, the wound measured 29 cm x 4 cm, was complex with exposed, dead and desiccated necrotic tendon and fascia. The wound was debrided, and necrotic tissue and tendon were removed. MIRRAGEN® Advanced Wound Matrix was applied to the wound bed, covered with an absorptive dressing and wrapped in gauze. The patient returned for wound check and reapplication and did not require any additional debridement. MIRRAGEN® was applied once per week for over 18 weeks.

## CONCLUSION

After 18 weeks of MIRRAGEN®, this complex and hard-to-heal wound is well on its way to completely closing. Measuring 3 cm x 0.5 cm, the wound was noticeably clean and improving at week 18. MIRRAGEN® was discontinued and conservative treatment was administered until the wound closed. The provider found MIRRAGEN® to be very efficient at supporting the body's natural healing process and was easy to place in the wound bed. MIRRAGEN®'s synthetic bioactive porous glass fibers, causes wicking of body fluids, which aids in the placement of the product, and once in the wound bed, mimics a fibrin clot, a well-documented healing process, allowing the body's natural healing process to proceed.



WEEK 1



WEEK 18

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# Progression Towards Wound Closure in an Infected Elbow with Osteomyelitis Where Other Treatments Fell Short

## CHALLENGE

A 69-year-old man presented to the wound care clinic with an infected elbow with osteomyelitis. The patient had suffered with an infected bursa and olecranon osteomyelitis for over a year. The patient had many complicating factors including history of diabetes, chronic renal failure, dialysis, malnutrition, and was wheelchair bound.

There had been several prior failed attempts at healing this wound including two rounds of surgical debridement, IV antibiotics, and a myriad of topical treatments. The patient's quality of life had diminished, and the provider had exhausted most options.

## TREATMENT

At the initial encounter, the wound bed was debrided, removing all visible necrotic debris and slough. MIRRAGEN® Advanced Wound Matrix was applied to the wound bed and affixed using a non-adherent silicone dressing, then wrapped with gauze. At weekly encounters, the patient returned for wound checks and reapplication. The wound was not disturbed on subsequent visits and did not require any additional debridement. MIRRAGEN® was reapplied over the wound bed, seven times over 56 days of treatment.

## CONCLUSION

This challenging wound, which had failed to heal for more than a year, progressed towards wound closure in 12 weeks with seven applications of MIRRAGEN®. Both patient and clinician were relieved with the comfort and efficiency of MIRRAGEN® treatment. The provider noted the patient's recovery was faster than other treatments with less complications and pain.



DAY 1 - 7 cm x 3 cm



DAY 56 - Closed

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*Individual results may vary.*





## VENOUS LEG ULCERS

# Progression Towards Wound Closure Success in Patient with Untreated Leg Ulcer

## CHALLENGE

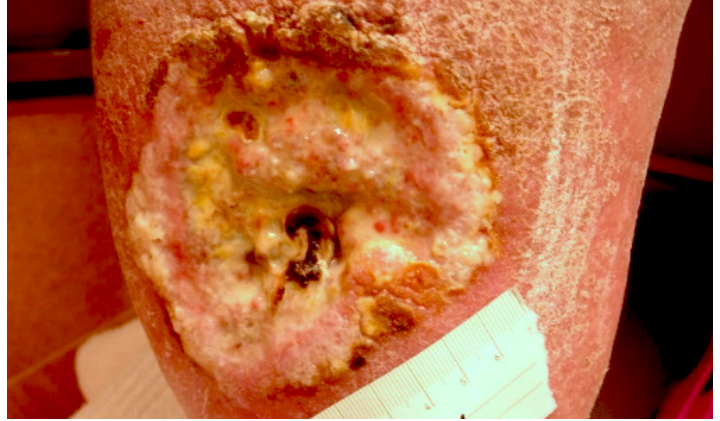
A 43-year-old woman presented to the wound care clinic with a severe lower leg ulcer that had no previous care due to patient neglect in seeking treatment. Patient has a history of morbid obesity, hypertension, lymphedema, venous insufficiency, extreme bioburden with mixed bacteria and fungus, producing a foul odor. The wound was unable to undergo debridement because of patient's intolerance of the pain.

## TREATMENT

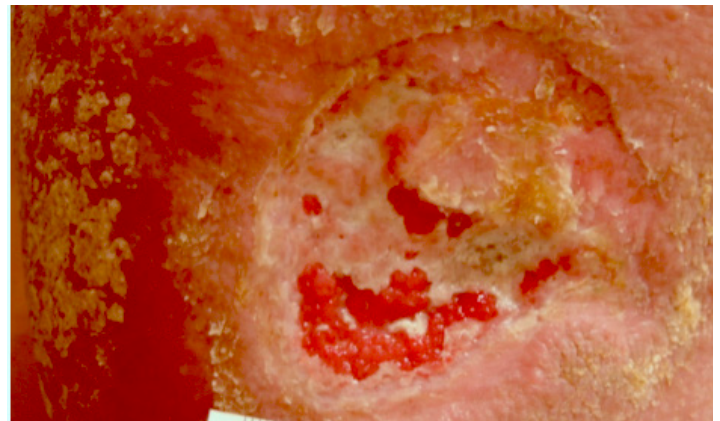
At initial presentation on week 1, the wound measured 8 cm x 8 cm x 2 cm. MIRRAGEN® Advanced Wound Matrix was applied to the wound bed at weekly intervals. At each visit, the wound was cleansed and necrotic tissue and slough removed from the wound bed. MIRRAGEN® was applied and covered with a non-adherent foam dressing and wrapped with gauze. MIRRAGEN® was applied to the wound seven times over 56 days.

## CONCLUSION

Wound progressed towards closure with seven applications of MIRRAGEN® over 56 days. The patient noticed early on that the smell from her wound had decreased significantly after just a couple of applications of MIRRAGEN® and dressing changes were painless and comfortable. This helped to ensure patient compliance with weekly visits to the clinic.



DAY 1 - 8 cm x 8 cm x 2 cm

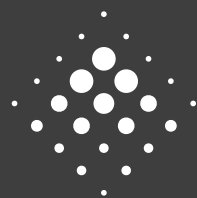


DAY 56 - Closed

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## SURGICAL WOUNDS



# Post-Surgical Incision Progression Towards Closure using MIRRAGEN® Advanced Wound Matrix

## CHALLENGE

The patient is a 45-year-old man. He was admitted following a C5-7 spinal cord contusion, from a offroad dirt bike accident where he spent over 30 hours before being found. He was unable to move the motorcycle from atop of him, causing compartment syndrome right leg. He underwent decompression surgery of his right leg. He was transferred intense physical rehab and continued wound care. The wound was initially 112sq cm.

## TREATMENT

NPWT 3 times per week tissue was granulating with exposed tendon. Use of MIRRAGEN® Advanced Wound Matrix for tendon coverage and wound bed preparation for surgery. STSG was performed 2/9/23. MIRRAGEN® was applied to the wound bed two times, fixated contact layer and covered with a NPWT. The NPWT was discontinued 2/13/23 that was 4 days post op, because the patient needed to return to physical therapy and the wound responded well that it was possible to move to standard dressing. By Week 3, this complex wound progressed towards closure.

## CONCLUSION

This was a challenging wound due to acute spinal cord injury and multiple trauma to right lower extremity. The patient required twice daily intensive physical therapy. The wound, both donor and skin graft sites, progressed towards closure in 3 weeks with 3 applications of MIRRAGEN®. The scar showed no evidence of contraction and decrease mesh pattern. MIRRAGEN® was selected by the provider for this patient because of its effectiveness at managing the wound environment, while supporting the body's natural healing process and minimizing the need for multiple weekly dressing changes. With MIRRAGEN® the patient was able to complete his intensive rehab without interruption for a prolonged surgical recovery.



APPLICATION 1



WEEK 1



WEEK 2



WEEK 3

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*Individual results may vary.*





## ATYPICAL WOUNDS

# Successful Progression Towards Wound Closure of a One-year-old Pilonidal Cyst Wound with One Application of MIRRAGEN® Advanced Wound Matrix

## CHALLENGE

A 20-year-old female presented with pilonidal cyst that had been present for over a year. Previous failed treatments included NPWT and surgical closure. The patient was also obese, which hindered wound healing.

## TREATMENT

At initial presentation, the wound was cleaned and MIRRAGEN® Advanced Wound Matrix was applied to the wound bed and covered with an adhesive foam dressing.

## CONCLUSION

After one application of MIRRAGEN® the wound progressed towards closure. MIRRAGEN® does not require any special storage temperature, so it was ready to use and easy to apply. Both patient and provider were very satisfied with the quickness and quality of the results.



BEFORE APPLICATION OF MIRRAGEN



AFTER ONE APPLICATION OF MIRRAGEN

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# Successful Progression Towards Wound Closure of a Pyoderma Gangrenosum (PG) Wound

## CHALLENGE

46-year-old patient with Pyoderma Gangrenosum (PG) to the right arm. Patient had a past medical history of a lower limb amputation due to PG. Patient developed this additional wound 6 years ago. Patient was treated by dermatology from 2016-2020. Dermatology team treatment included steroids, STSG (split thickness graft) and a skin substitute, without success. The wound continued to increase in size. In 2020, patient was referred to a wound center where she was treated for a year with additional attempts of skin substitutes and multiple collagen products. The patient was then referred to a plastic/hand surgeon. Options discussed included other graft or amputation. Two weeks before scheduling the split thickness graft, the provider-initiated treatment using MIRRAGEN® Advanced Wound Matrix.

## TREATMENT

On first application the wound was 8.2cm L x 5 cm W x 0.2 cm D, wound bed was red, non-granulating, and very painful to touch. Wound was cleansed with normal saline and gently patted with gauze. MIRRAGEN® was applied to the wound bed, covered with a non-adherent perforated dressing, fixated with steri strips. A super absorbent dressing with borders was applied. Before MIRRAGEN® application, dressing frequency was 4 times a week, due to exudate amounts causing pain and odor. After the first two weeks, of MIRRAGEN® the secondary dressing was decreased to one every 5 days, for exudate management. After 3 weeks of treatment, the frequency of dressing changes reduced further to once per week. The wound progressed to closure over 18 weeks.

## CONCLUSION

Wound progressed to closure at 18 weeks with applications of MIRRAGEN®. During treatment patient verbalized a remarkable decrease in pain. The provider noted that he was able to clean the wound without pain and dressing changes were significantly faster. In addition, the provider noted a significant decrease in product use because patient went from having her dressing change 4 times a week to once a week. On the last visit, the provider mentioned that the use of MIRRAGEN® prevented an amputation on this patient.



Before MIRRAGEN®



Week 1



Week 16



Week 18

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*Individual results may vary.*



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