



V.A.C.®
Therapy System

Case Studies



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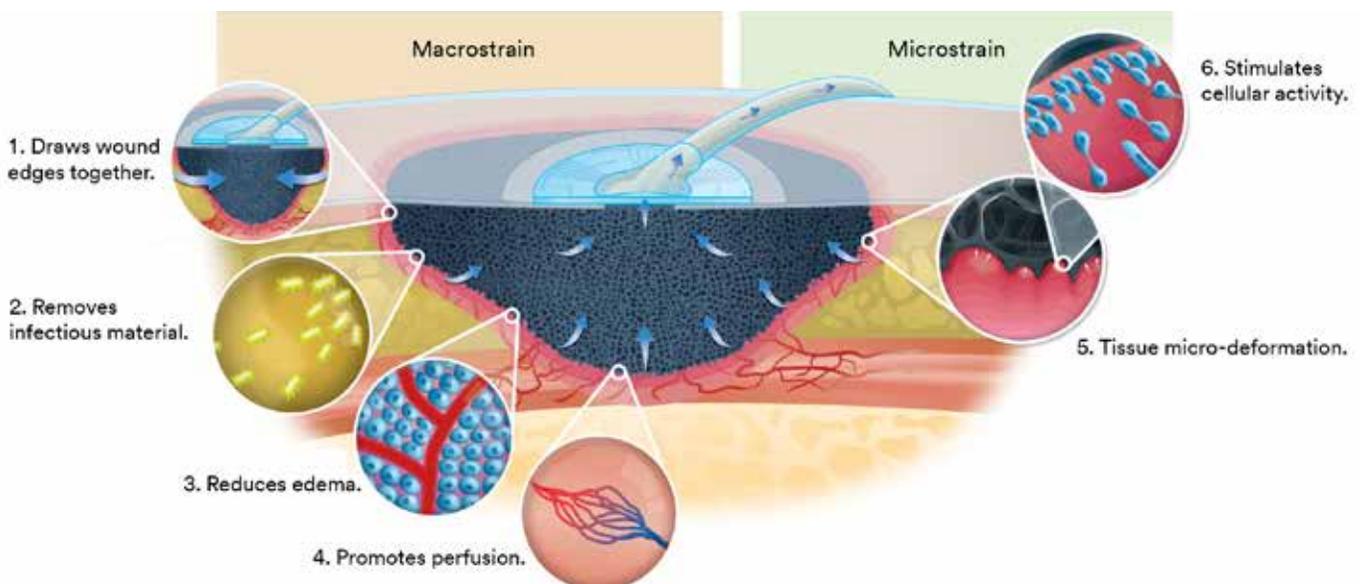
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Introduction

This booklet includes case studies across several wound types. As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's condition and circumstances.

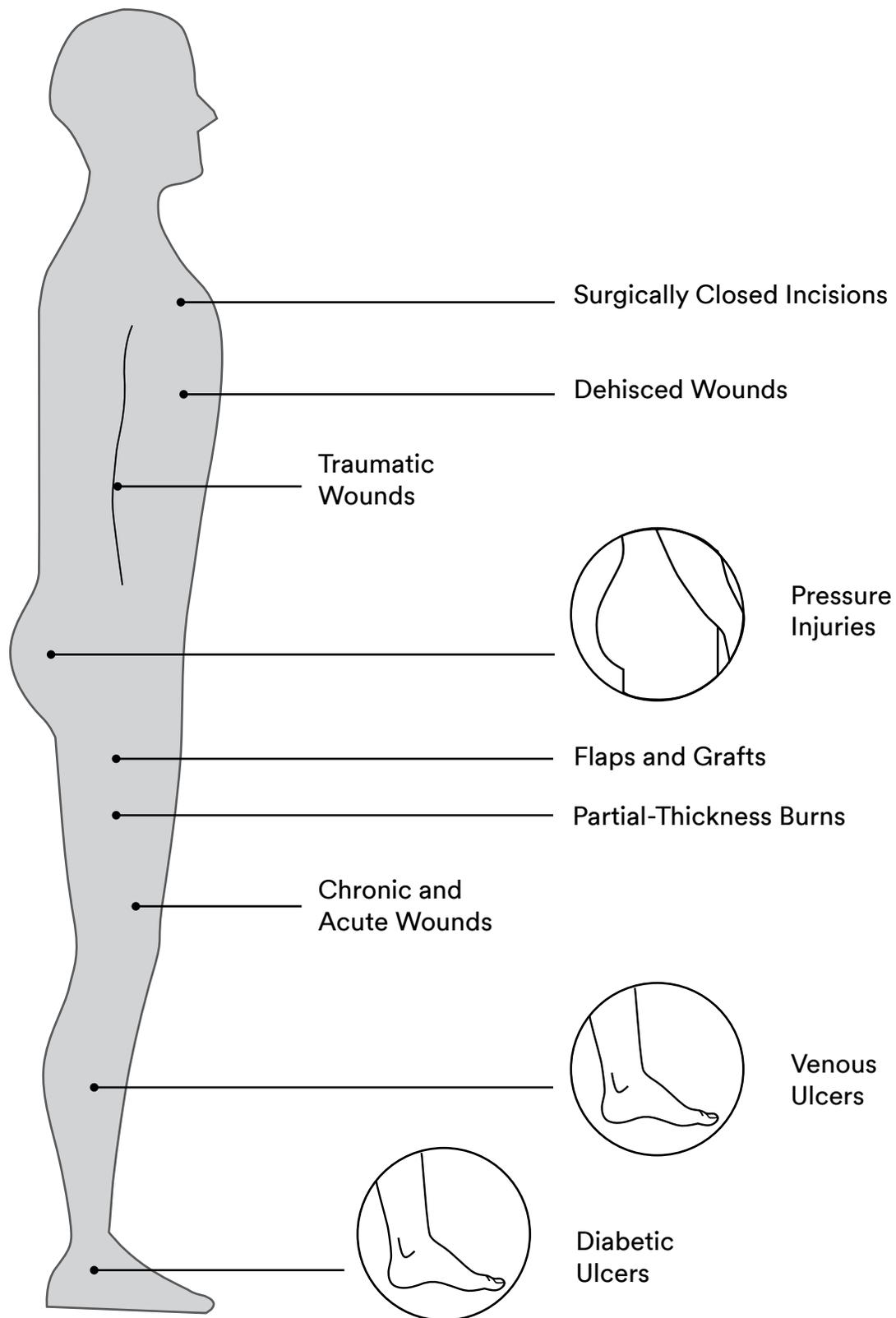
Mechanism of Action

The integrated V.A.C.® Therapy System has a unique mechanism of action whereby the delivery of negative pressure using the proprietary V.A.C.® Granufoam™ Dressing not only maintains a moist wound environment that promotes healing, but also stimulates physiologic responses important to wound healing. These responses are observed at the tissue and cellular levels. Macrostrain approximates the tissue edges, minimizing the tissue defect size.¹⁻³ Microstrain stimulates increased cellular proliferation, leading to angiogenesis and granulation tissue formation.⁴⁻⁶ These effects, as predicated by the adequate delivery of negative pressure to the wound site, are translated into clinical outcomes such as improved tissue perfusion⁷, reduced tissue edema⁸ and increased granulation tissue formation.⁹ The scientific foundation for V.A.C.® Therapy forms the basis for the improved patient outcomes observed in the published clinical literature and supports its use for temporizing wounds and protecting them from external contamination during long-term care.



3M™ V.A.C.® Therapy Indications

These 3M NPWT products are indicated for the following wound types:



Key Publications Demonstrating the Efficacy of 3M™ V.A.C.® Therapy NPWT

The body of literature provides evidence to 3M™ V.A.C.® Therapy's effectiveness in diabetic foot wounds, chronic wounds such as pressure ulcers and lower extremity ulcers, and a wide variety of acute wounds (Table 1 below).

Wound type	Key publications – Acute wounds
Surgical wounds	Zannis et al. 2009 (PCT) ¹⁰ Siegel et al. 2007 (CRS) ¹¹ Biter et al. 2014 (RCT) ¹² Zenke et al. 2014 (PCT) ¹³ Seidel et al. 2020 (RCT) ¹⁴
General trauma	Machen et al. 2007 (CSE) ¹⁵ Labler et al. 2007 (CST) ¹⁶ Raj et al. 2016 (PCT) ¹⁷ Maurya et al. 2017 (PC) ¹⁸ Burt et al. 2020 (CRS) ¹⁹
Grafts	Blume et al. 2010 (RS) ²⁰ Ho et al. 2013 (PCT) ²¹ Eisenhardt et al. 2011 (RCT) ²² Joo et al. 2020 (RCT) ²³ Vather et al. 2018 (RCT) ²⁴ Halama et al. 2019 (RCT) ²⁵
Diabetic foot amputations	Lavery et al. 2008 (RS) ²⁶ Armstrong et al. 2005 (RCT) ²⁷ Dalla Paola et al. 2010 (RCT) ²⁸ Eginton et al. 2003 (RCT) ²⁹ De Caridi et al. 2016 (PCT) ³⁰ Sukur et al. 2018 (CRS) ³¹

Wound type	Key publications – Chronic wounds
Pressure	Warner et al. 2003 (RCT) ³² Ford et al. 2002 (RCT) ³³ Joseph et al. 2000 (RCT) ³⁴ Wild et al. 2008 (RCT) ³⁵ Fulco et al. 2015 (RCT) ³⁶ Wagstaff et al. 2014 (RCT) ³⁷
Diabetic foot	Suissa et al. 2011 (Meta Analysis) ³⁸ Blume et al. 2008 (RCT) ³⁹ Cole et al. 2016 (PCT) ⁴⁰ Skrinjar et al. 2016 (RCT) ⁴¹ Maranna et al. 2021 (RCT) ⁴²
Venous stasis ulcer	Vuerstaek et al. 2006 (RCT) ⁴³ Dini et al. 2010 (RCT) ⁴⁴ Egemen et al. 2012 (PCT) ⁴⁵

Case Study 1: A case of metastatic melanoma of the right lower extremity.

Stanley P.L. Leong, MD, FACS, MS

Sutter Pacific Medical Foundation at California Pacific Medical Center, San Francisco, CA, USA

Patient:

A 68-year-old retired male police officer developed wound breakdown (due to infection) following a right radical ilioinguinal lymph node resection for melanoma. His previous medical history included hypertension, hypothyroidism, hypercalcemia, degenerative disc disease, prediabetes, basal cell carcinoma, and chronic pain.

Diagnosis:

Patient developed postoperative right groin wound infection. At presentation, the wound was 20 cm x 10 cm x 6 cm and copiously draining (Figure 1).

Course of Treatment:

Systemic antibiotics were administered, and the wound was surgically debrided followed by application of 3M™ V.A.C.® Therapy using a negative pressure of -125 mmHg in the clinic. (Figure 2). V.A.C.® Therapy was continued for five weeks with dressing changes occurring three times per week. Excellent granulation tissue formation was noted after one week with V.A.C.® Therapy (Figure 3). All treatments were delivered in the clinic setting without the need for any intra-operative procedures.

Discharge and Follow Up:

After five weeks, V.A.C.® Therapy was discontinued, and the wound was sutured (Figure 4). After suturing the wound, a local wound care clinic applied standard dressings, which were changed according to manufacturer's instructions until complete wound healing three months after discontinuing V.A.C.® Therapy (Figure 5).



Figure 1. Wound at presentation.



Figure 2. Initial application of 3M™ V.A.C.® Therapy after surgical debridement (Day 1).



Figure 3. Wound after 1 week of 3M™ V.A.C.® Therapy.



Figure 4. Primary wound closure after 5 weeks of 3M™ V.A.C.® Therapy.



Figure 5. Complete wound closure at long-term follow-up (3 months after discontinuing 3M™ V.A.C.® Therapy).

Case Study 2: Management of a chronic diabetic foot ulcer with 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing.

Brent Bernstein, DPM,
Diamond Podiatry; Bethlehem, PA, USA

Patient:

A 64-year-old female patient presented to the hospital with a stage 3 diabetic ulcer measuring 2.5 x 2.5 x 0.3 cm³ (Figure 1) that had been present in the right foot for 4 months. Her comorbidities included type 2 diabetes, morbid obesity, hypertension, Charcot neuroarthropathy of the left foot, bilateral peripheral neuropathy of the lower extremities, and a recent history of gallbladder tumor with chemotherapy and radiation less than a year prior.

Diagnosis:

The patient was examined and diagnosed with a medial ulceration of the right first metatarsophalangeal joint with osteomyelitis of the exposed head of the first metatarsal and base of the proximal phalanx. Previous treatment included daily application of gentian violet with a dry sterile dressing. No antibiotic therapy or bone biopsy had been performed. Bacterial cultures were taken, and the wound was positive for Beta Hemolytic Streptococcus Group G, Enterococcus species, and methicillin-resistant Staphylococcus aureus. Organism-specific antibiotics were administered intravenously. Two days after presenting to the hospital, the patient underwent surgical debridement via resection of the first metatarsal head and base of the proximal phalanx, with diastasis permitted with a mini-external fixator (Figure 2).

Course of Treatment:

Post-debridement wound measurements were 5.0 x 3.0 x 1.9 cm³. Twenty-four hours after surgery, V.A.C.® Therapy with V.A.C.® Granufoam Silver™ Dressing was applied at -125 mmHg (Figure 3). Dressings were changed every 3 days, at which point the wound was reassessed (Figure 4). The goal of therapy was wound bed preparation, granulation tissue formation, and removal of infectious materials. During therapy, the patient was required to be strictly non-weightbearing in a wheelchair.

Discharge and Follow up:

After 41 days, the goals of therapy were achieved, and the external fixator was removed (Figure 5). A split-thickness skin graft (STSG) was harvested from the ipsilateral calf. The STSG was applied following a 2:1 mesh ratio to the wound surface (Figure 6), then covered with a non-adherent dressing. V.A.C.® Therapy with V.A.C.® Granufoam Silver™ Dressing was resumed at -125 mmHg to bolster the STSG (Figure 7). After 5 days, 100% STSG take was evident, and V.A.C.® Therapy was discontinued. Upon follow-up 3.5 months after STSG, the wound remained healed (Figure 8).



Figure 1. Diabetic ulcer at presentation.



Figure 2. Wound appearance after debridement and external fixation.



Figure 3. Application of 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing.



Figure 4. Wound appearance after 19 days of 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing.



Figure 5. Wound appearance after 41 days of 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing.



Figure 6. Application of meshed STSG.



Figure 7. Application of 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing to bolster the STSG.



Figure 8. Wound closed at 3.5-month follow-up visit.

Case Study 3: 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam™ Dressing in management of wound created by abscess of the right groin.

Michael Robinowitz, MD,
Piedmont Atlanta Hospital, Atlanta, GA, USA

Patient:

A 43-year-old male presented to the hospital with pain, erythema, and swelling in his right groin that had persisted for 1 week. Initial care included antibiotics, aseptic skin cleanser, warm compresses, and incision and drainage of the abscess. Seven days later, the patient presented to the emergency room with a fever and increased right groin erythema, edema, and tenderness. The patient was admitted with a soft tissue infection, abscess, and sepsis. Upon examination, the patient was found to have a small punctate opening in the right lateral suprapubic area, with marked erythema down to the inguinal ligaments. Necrotic skin and marked fluctuance were present. A computed tomography (CT) scan of the pelvis indicated an elongated skin defect or wound in the upper anterior right thigh with extensive subcutaneous inflammatory changes, with nonoculated fluid densities, edema, and extensive gas bubbles extending from 20 cm below the hip joint to the right inguinal region and the base of the scrotum. Necrotizing fasciitis could not be ruled out.

Diagnosis:

The patient was taken to the operating room for exploration and surgical debridement of necrotic skin, subcutaneous tissue, and muscle tissue in the right thigh (Figure 1). The postoperative diagnosis suspected necrotizing fasciitis of the right thigh up to, but not involving, the scrotum. The wound was irrigated via pulsed lavage and packed with oxychlorosene-soaked gauze. Hyperbaric oxygen (HBO) therapy was started. Additional surgical debridement and irrigation with pulsed lavage were performed due to the progression of necrotizing infection into the posterior and distal thigh (Figure 2). Clindamycin was added to the intravenous antibiotics. HBO treatments were continued, and the infectious disease service was consulted. Systemic antibiotics were continued, and a peripherally inserted central catheter (PICC) line was ordered. Dressings were changed daily with wet-to-moist gauze soaked with oxychlorosene solution. The PICC line was placed, and antibiotics were continued.

Course of Treatment:

V.A.C.® Therapy at -125 mmHg was initiated 7 days following presentation to the emergency room. At the time of application, the wound measured 29 x 24 x 2 cm³ with a 2.5 cm tract and 4.2 cm undermining. The wound contained <10% yellow slough in the wound bed. Both V.A.C.® Granufoam™ and 3M™ V.A.C.® Whitefoam™ Dressings were used. The patient noted only procedural pain during dressing changes. Wound care staff changed the dressings 3 times a week. Nine days after presentation, the patient was discharged with a PICC line, intravenous antibiotic therapy, and V.A.C.® Therapy with home healthcare for dressing changes 3 times a week. After 21 days, the wound measurements were 25.5 x 20 x 0.3 cm³, and bright red granulation tissue covered 100% of the wound bed (Figure 3). Moderate serosanguineous drainage was also observed. V.A.C.® Therapy was discontinued, and the plan of care was changed to a silver alginate dressing with a gauze dressing bolster and self-adhesive wrap to be changed 3 times per week. At each follow-up visit, the wound size decreased, and there were no further signs of infection (Figure 4).

Discharge and Follow up:

The patient regained full range of motion, mobility, and gait without skilled therapy intervention. At the last clinic visit, the wound measured 11.7 x 1.4 x 0.1 cm³ (Figure 5). The patient was discharged 3 months following the last clinic visit (Figure 6).



Figure 1. Right thigh wound following surgical debridement and wet-to-moist oxychlorosene-soaked gauze (postoperative Day 1).



Figure 2. Right thigh wound following 2 hyperbaric oxygen treatments and minimal sharp debridement of loose nonviable tissue during wet-to-moist oxychlorosene gauze dressing change (postoperative Day 2).



Figure 3. Right thigh wound following 21 days of 3M™ V.A.C.® Therapy (postoperative Day 26).



Figure 4. Right thigh following use of silver alginate dressing (postoperative Day 42).



Figure 5. Wound healing by contraction with 100% granulation tissue (postoperative Day 105).



Figure 6. Right thigh wound completely healed 8 months following presentation to the emergency room.

Case Study 4: Management of a lower extremity trauma wound using 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam™ Dressing.

D. Heath Stacey, MD,
Northwest Arkansas Center for Plastic Surgery; Fayetteville, AR, USA

Patient:

A 46-year-old male with no significant past medical history presented to the hospital with a significant multi-level lower extremity trauma injury. After receiving care under an orthopedic surgeon, he was referred to a plastic surgeon for soft tissue closure. The patient's external fixator had been removed, and an intramedullary rod had been placed in his tibia.

Diagnosis:

The wound bed exhibited granulation tissue and eschar overlying the tibia on the middle third of the leg (Figure 1). After debridement, the bone was exposed (Figure 2).

Course of Treatment:

V.A.C.® Therapy was applied at -125 mmHg using V.A.C.® Granufoam™ Dressing. After 1 week, the wound showed signs of healing (Figure 3), but exposed fragments of tibia remained distally. A debridement was performed and V.A.C.® Therapy with V.A.C.® Granufoam™ Dressing was resumed. After the second week, the wound was ready for closure. Split thickness skin grafting was used to cover the granulation tissue over muscles, and a hemi-soleus muscle flap was used to cover the tibia (Figure 4).

Discharge and Follow up:

Upon follow-up, the wound was closed (Figure 5) and the patient was ambulatory.



Figure 1. Left leg upon presentation.



Figure 2. Wound after initial debridement.



Figure 3. Wound after 1 week of 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam™ Dressing.



Figure 4. Intraoperative photo of wound closure with split thickness skin graft and a hemi-soleus muscle flap.



Figure 5. Wound remained closed upon follow-up.

Patient data and photos courtesy of D. Heath Stacey, MD; Northwest Arkansas Center for Plastic Surgery; Fayetteville, AR.

Case Study 5: Management of a lower extremity Diabetic Foot Ulcer (DFU) with cellulitis with infected submetatarsal 5 ulceration.

Brent Bernstein, DPM,
Diamond Podiatry; Bethlehem, PA, USA

Patient:

A 64-year-old Hispanic male with a history of poorly controlled type II diabetes, hypertension, peripheral vascular disease, peripheral neuropathy, was admitted for right lower extremity cellulitis with infected submetatarsal 5 ulceration and with suspected osteomyelitis. The ulcer had developed 4 weeks prior and it had worsened over time. He then sought treatment in Puerto Rico and was instructed on local wound care and a prescription for amoxicillin clavulanate. Despite this, he developed a fever, chills, pain, swelling, and loss of right leg function 3 days prior to returning to the United States for more definitive treatment.

Diagnosis:

Examination revealed right submetatarsal 5 ulceration, probing to the 5th metatarsal head plantarly. The ulceration measured 4.0 x 4.0 cm² with a necrotic wound bed and foul odour. Dishwater pus was draining from the wound. There was erythema around the ulcer, extending proximally to the right knee with significant swelling. There was undermining and tunneling from the ulcer to the dorsal foot with blistering of the dorsal foot. A palpable dorsalis pedis and posterior pulse was present. Cutaneous sensation was absent.

Course of Treatment:

An immediate bedside incision and drainage was performed to decompress the lesion on the first day of admission with planned radical operative debridement for the following day. A diagnosis of necrotizing fasciitis and contiguous focus osteomyelitis was made.

Hospital Course:

Initially, vancomycin and cefepime were administered and switched to penicillin on the 5th day upon culture result. Bedside incision and drainage was performed on the first day of hospitalization and he was taken to the operative theatre the following day for partial 5th ray resection and radical wound debridement. Intra-operative findings were consistent with strep infection including liquefaction of the subcutaneous tissue and thrombosis of vessels. The dorsal ankle and foot were degloved of infected tissue followed by pulsed lavage irrigation. 3M™ V.A.C.® Granufoam™ Dressing was applied to the surgical wound. A 2nd debridement and irrigation was performed on the 3rd day with continued 3M™ V.A.C.® Therapy. A 3rd wound debridement and a split thickness skin graft was performed 4 days later with continuous V.A.C.® Therapy at -75 mmHg used to bolster the skin graft. V.A.C.® Therapy was discontinued on the 10th day of hospitalization and local skin graft care was initiated. The patient was discharged to home on the 12th day and antibiotic therapy with penicillin was continued for 5 days.

Osteomyelitis was diagnosed from X-ray findings and confirmed with intra-operative bone biopsy.

Discharge and Follow up:

All outpatient care was supervised by the initial surgeon. Approximately 35% loss of the initial split thickness skin graft was noted at the first outpatient follow-up 3 days after discharge from the hospital. Residual wounds measured 13.5 x 10.0 x 0.5 cm³. Exposed bone over the cuboid as well as exposed peroneus brevis tendon were noted. Local wound care was performed with excision debridement and collagenase dressings weekly.

V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing was initiated 1 month after discharge from the hospital, with wound measurement of 12.5 x 8.0 x 0.5 cm³. A biopsy of exposed bone removed with rongeur debridement prior to initial V.A.C.® Granufoam Silver™ Dressing was positive for osteomyelitis. The patient received oral cephalexin and V.A.C.® Therapy with V.A.C.® Granufoam Silver™ Dressing was continued. A bone debridement and biopsy revealed pseudomonas aeriginosa, and antibiotics were changed to oral ciprofloxacin.

Case Study 5 (cont):

After 3 weeks of 3M™ V.A.C.® Therapy with 3M™ V.A.C.® Granufoam Silver™ Dressing, the size of the wound decreased to 8.0 x 7.5 x 0.2 cm³. Wound tissue cultures revealed pseudomonas aeruginosa, enterococcus, and enterobacter cloacae. Weekly soft tissue wound debridements were continued with interval V.A.C.® Granufoam Silver™ Dressing changes occurring with home care nursing, with a temporary hold on V.A.C.® Therapy in the 5th week due to lower leg pain and a venous duplex revealing a ruptured Baker's cyst. Oral cephalexin was started. A wound tissue culture showed pseudomonas aeruginosa and enterobacter cloacae and the prescription was changed to ciprofloxin. V.A.C.® Therapy with V.A.C.® Granufoam Silver™ Dressing was resumed after 1 week, being changed 3 times per week. A 3rd bone debridement occurred 2 weeks later.

After a total of 8 weeks of V.A.C.® Therapy with V.A.C.® Granufoam Silver™ Dressing, the wound was noted to have adequate granulation coverage of the bone and peroneal tendon. A cultured skin graft and a meshed bi-layered cultured graft was placed on the residual wound and V.A.C.® Therapy was discontinued. A meshed silicone dressing was placed over the graft and left in place. One week later, the graft was evaluated and noted to be incorporating well with active contracture of the wound. At last follow-up 2 weeks post graft application, continued contracture was noted with a loose fragment of bone noted and resected from the wound.



Figure 1. Initial Presentation Post Debridement.



Figure 2. Initial Split Thickness Skin Graft.



Figure 3. Patient 3 Partial SPTSG failure prior to 3M™ V.A.C.® Granufoam Silver™ Dressing.



Figure 4. Post- 3M™ V.A.C.® Granufoam Silver™ Dressing.



Figure 5. Cultured allograft application.



Figure 6. Wound closure.

3M™ V.A.C.® Therapy Ordering Information

3M™ V.A.C.® Therapy System Dressings	Dimensions	Part Number/ Dressings Per Case	
3M™ V.A.C.® Simplace™ EX Dressing Kit* - Small	(7.7 × 11.2 × 1.75 cm)	M8275046/5	
3M™ V.A.C.® Simplace™ EX Dressing Kit* - Medium	(14.7 × 17.4 × 1.75 cm)	M8275045/5	
3M™ V.A.C.® Granufoam™ Bridge Dressing Kit*	(6 × 17 × 1.9 cm)	M8275042/10 M8275042/5	
3M™ V.A.C.® Granufoam™ Bridge XG Dressing Kit*	(6 × 17 × 1.9 cm)	M8275044/5	
3M™ V.A.C.® Granufoam™ Dressing Kit* - Small	(10 × 7.5 × 3.2 cm)	M8275051/10 M8275051/5	
3M™ V.A.C.® Granufoam™ Dressing Kit* - Medium	(18 × 12.5 × 3.2 cm)	M8275052/10 M8275052/5	
3M™ V.A.C.® Granufoam™ Dressing Kit* - Large	(26 × 15 × 3.2 cm)	M8275053/10 M8275053/5	
3M™ V.A.C.® Granufoam™ Dressing Kit* - X-Large	(60 × 30 × 1.5 cm)	M8275065/5	3M™ V.A.C.® Granufoam™ Dressing System
3M™ V.A.C.® Granufoam Silver™ Dressing Kit* - Small	(10 × 7.5 × 3.2 cm)	M8275098/10	
3M™ V.A.C.® Granufoam Silver™ Dressing Kit* - Medium	(18 × 12.5 × 3.2 cm)	M8275096/10	
3M™ V.A.C.® Granufoam Silver™ Dressing Kit* - Large	(26 × 15 × 3.2 cm)	M8275099/10	
3M™ V.A.C.® Granufoam Silver™ Dressing System			3M™ V.A.C.® Granufoam Silver™ Dressing System
3M™ V.A.C. Whitefoam™ Dressing Kit* - Small	(10 × 7.5 × 1 cm)	M8275068/10	
3M™ V.A.C. Whitefoam™ Dressing Kit* - Large	(10 × 15 × 1 cm)	M8275067/10	
3M™ V.A.C. Whitefoam™ Dressing System			3M™ V.A.C. Whitefoam™ Dressing System
3M™ V.A.C. Whitefoam™ Dressing - Small (foam only)	(10 × 7.5 × 1 cm)	M6275033/10	
3M™ V.A.C. Whitefoam™ Dressing - Large (foam only)	(10 × 15 × 1 cm)	M6275034/10	
3M™ V.A.C. Whitefoam™ Dressing			3M™ V.A.C. Whitefoam™ Dressing

*Kit includes foam dressing, drape(s), 1 disposable ruler, 1 3M™ SensaT.R.A.C.™ Pad with connector. Specifications subject to change at any time without notice.

3M™ V.A.C.® Therapy Ordering Information

V.A.C.® Therapy System Accessories	Part Number/Dressings Per Case	
3M™ SensaT.R.A.C.™ Pad Only	M8275057/10	
3M™ V.A.C.® Drape	M6275009/10	
3M™ V.A.C.® Y-Connector	M6275066/10	
3M™ V.A.C.® Tubing Cap	M6275069/10	

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Note: As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition.

Note: Specific Indications, contraindications, warnings, precautions and safety information exist for these products and therapies. Please consult a physician and product instructions for use prior to application. This material is intended for healthcare professionals.

Note: Disposable components of the 3M™ V.A.C.® Therapy System, including the foam dressing (i.e., 3M™ V.A.C.® Granufoam™, 3M™ V.A.C.® Granufoam Silver™, or 3M™ V.A.C. Whitefoam™ Dressing), tubing and drape are packaged sterile and are manufactured without natural rubber latex. V.A.C.® Therapy Unit canisters are packaged fluid path sterile and are manufactured without natural rubber latex. All disposable components of the V.A.C.® Therapy System are for single use only. To help ensure safe and effective use, the V.A.C.® Granufoam®, V.A.C.® Granufoam™ and V.A.C. Whitefoam™ Dressings are to be used only with V.A.C.® Therapy Units.



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