Use of 3M™ Tegaderm Matrix Dressing with PHI™ technology for management of complex chronic wounds

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Introduction:

Wound healing is a complex regenerative process to repair or replace injured tissue. The injury often involves some form of ischemia and when injured, the natural balance between cells in tissue is disrupted creating an altered wound environment.¹,²

Acute surgical wounds are allowed to heal by one of three methods, closed at the time of surgery, left open and allowed to heal by the formation of scar tissue in the defect, or left open and closed at a later time. Closed surgical wounds that dehisce secondary to an infection or a surgical wound left open to heal may stall or become chronic during the healing process. Several factors may contribute to this chronic state including but not limited to diabetes, infection, obesity, cardiovascular disease, and poor nutrition.³

Chronic wounds have been defined as those that fail to progress through a normal, orderly and timely sequence of repair.⁴ Non-healing wounds become out of balance stalling at some point along the healing cascade. They are characterized by delayed healing for weeks, months, or even years, and also by a resistance to treatment with conventional dressings and therapies.¹,²

Three patients with stalled surgical wounds are presented describing our clinical experience using 3M™ Tegaderm™ Matrix Dressing with PHI™ technology, a wound dressing composed of an acetate cellulose carrier impregnated with polyethylene gels, metal cations, and citric acid. This dressing is designed to help restore balance and jump-start healing in chronic wounds. Prior to initiation of Tegaderm™ Matrix dressing patient care involved daily cleansing and wet to dry dressing changes BID to QID with frequent visits for debridement. This outdated approach increased the risk for infection, prolonged healing, increased pain, and limited patients’ daily activities. We initiated a new treatment with the use of Tegaderm™ Matrix dressing to help jump-start these chronic, high risk wounds. Infection was avoided and all three patients reported visible wound improvements within the first 7 days confirmed by wound measurements at initial and follow-up visits.
**Patient History and History of Treatment**

A 40-year old female presented for surgical repair of a vesicovaginal fistula with complications noted three-weeks post-operatively resulting in wound dehiscence. She returned to surgery for resection of an enterocutaneous fistula and small bowel re-anastomosis. A post-operative abdominal wound was packed with moist gauze two times a day. Negative Pressure Wound Therapy (NPWT) was initiated on post-op day three with goal of wound closure. She was discharged home with home health care (HHC) services for wound care management. NPWT was discontinued after 15 days. At this time the wound healed as much as the NPWT would allow due to the location and shape of her midline incision, therefore total wound closure was not obtained. Care for the wound was transitioned to wet to dry gauze covered using ABD dressings secured with tape for 3 days prior to presenting to our clinic. In addition to the wound dressings an abdominal binder was worn.

Past medical history includes morbid obesity, smoking, and previous complications with wound healing

**New Wound Management**

This patient presented to our clinic three weeks post small bowel resection with a full-thickness midline lower abdominal wound. Wound measured 13 cm x 2.5 cm, with red granular tissue, moderate serous drainage, no odor. Surrounding skin noted to have some erythema secondary to tape irritation. *(Image 1)*

After cleansing the wound with normal saline, Tegaderm™ Matrix dressing was initiated. A 4” x 5” dressing was cut into two strips and placed over the wound bed, covered by an ABD dressing secured with tape and an abdominal binder. HHC services were discontinued. Dressings were changed daily at home by family members. Patient returned to the wound general surgery clinic for follow-up wound assessments every two weeks. Clinic visits decreased in frequency as the wound progressed towards closure.

**Case results**

Marked improvement in the wound was noted within the first two weeks of using Tegaderm™ Matrix dressing. Wound dimensions 7 cm x 1 cm within 17 days and 2.0 cm x 0.5 cm after nine weeks of treatment *(Image 2)*. Wound closure with 100% epithelialization to the wound bed achieved after 12 weeks of treatment *(Image 3)*.

This patient was able to achieve independence in her own dressing changes, discontinue pain medications and return to work sooner than anticipated.
Patient 2

Patient History
Patient is a 43-year old male presenting S/P small bowel resection with anastomosis and revision of gastrojejuno-ostomy with Roux-en-Y reconstruction. Past medical history includes: poor wound healing, severe upper body burns, numerous plastic surgeries, gastric bypass surgery (GBP), obstructive sleep apnea (OSA), hypertension, iron deficiency anemia, and protein calorie malnutrition.

Medication and nutritional supplementation includes: total parenteral nutrition (TPN), multivitamins (MVI), and calcium +D.

Initial Wound Description and History of Treatment:
Approximately three weeks post-operatively patient presented with retention sutures in place with four areas measuring 2 – 3 cm deep noted between retention sutures. An open and draining wound present at the proximal (Wound 1) and distal end of the incision line (Wound 2) were also noted. Red granulation tissue present in both wound openings. Drainage was moderate serosanguineous, no malodor. (Image 1)
Past treatment included gauze-dressing change twice daily to superior and inferior wound incision openings as well as draining areas located between retention sutures.

New Wound Management
Tegaderm™ Matrix dressing was cut into strips and placed in open sites between retention sutures and in the superior and inferior open wounds. Entire area was then covered with an ABD dressing secured with tape. HHC visited two times a week for wound assessment and management. Patient’s spouse changed the dressing daily in-between home health visits. This patient showered daily prior to dressing change. Return visits to wound clinic occurred every two weeks.

Case results
This patient was at high risk for delayed wound healing and complications due to past medical history. Within two weeks after initiation of new treatment plan, the midline incision was closed (Wound 1) and less than 1cm of Wound 2 remained open. With the use of Tegaderm™ Matrix dressing the wound demonstrated marked improvement after 21 days (Image 2) with total wound closure after 26 days. This patient experienced an incredible amount of postoperative pain so the rapid closure of the wound was paramount in his recovery.

Image 1
Wound 1: 1cm x 1cm x 3cm
Wound 2: 4cm x 2cm x 2cm

Image 2
21 days after initiation of Tegaderm™ Matrix dressing. Marked improvements in the wound noted. Complete wound closure noted at day 26.
Patient 3

Patient History
A 47-year old female presented with type 2 diabetes, hypertension, retro-peritoneal leiomyosarcoma and retroperitoneal mass. Surgical history includes: small bowel resection with anastomosis, several serosal repairs, appendectomy, repair of abdominal wall hernia and retroperitoneal tumor resection involving great vessels. Patient at higher risk for poor wound healing due to diabetes, cancer diagnosis, and radiation therapy.

Initial Wound Description and History:
This patient was initially seen at home by home health care for wound assessment and management consisting of wet to dry gauze dressing twice daily. In addition she was seen in a local wound clinic for follow-up and sharp debridement. The wound did not progress. Patient experienced pain and discomfort daily. Five weeks postoperatively she presented to our wound general surgery clinic for follow-up. A midline incision was present measuring approximately 12-14 cm long, edges approximated and healing. The proximal end of incision line (Wound 1) was open measuring 3 cm x 6 cm deep with serosanguineous drainage, and no odor. Approximately 3 weeks later, the distal end of the wound re-opened (Wound 2), measuring 2.5cm x 8cm deep, no communication with proximal wound noted (Image 1)

New Wound Management
Upon presentation to our clinic a new treatment regime was initiated. Tegaderm™ Matrix dressing was cut in half with a single strip inserted into wound cavity of the superior wound (Wound 1), covered by an ABD pad and secured with tape. Same procedure initiated 3 weeks later when Wound 2 appeared. The patient’s son and HHC provided daily dressing changes. This patient continued to be seen in our general surgery clinic every two to four weeks by the NP and MD.

Case results
This patient started radiation therapy two months after her initial surgery putting her at increased risk for impaired or slow wound healing. Despite this, she experienced marked improvement by week 8 (image 2) and progress towards wound closure. With daily use of Tegaderm™ Matrix dressing both wounds have gone on to complete closure.
Conclusion
These three patients highlight the utility of 3M™ Tegaderm™ Matrix Dressing with PHI™ technology to promote balance and jumpstart healing of complex chronic wounds. Prior failed attempts to heal these wounds included the use of NPWT, and wet to dry gauze. With the initiation of Tegaderm™ Matrix dressing all three patients reported visible improvements within the first seven days. This was confirmed by wound measurements at initial and follow-up visits. Tegaderm™ Matrix dressing was easily applied by the clinic staff and patient/caregiver. There were no reports of wound infections or adverse events with the use this dressing.

References

