Optimal Management for Upper Extremity Wounds with a Multifunctional Polymeric Membrane Dressing*

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Clinical Problem

In our Hand Management Center (HMC), I identified that traditional wound dressings were not providing optimal management. Previously, traumatic wound cases were managed with various advanced wound care dressings that were changed daily to twice a day, and whirlpool treatments administered 2-3x a week.

Previous dressings tended to be:

- bulky, requiring removal to perform range of motion (ROM) exercises
- difficult to apply and time consuming
- adherent to healing tissue, causing pain with dressing changes and delaying closure

Four cases are presented: Patient 1: A 60 y.o. male with a work related crush injury to the left hand affecting 2nd,3rd, 4th and 5th digits; Patient 2: A 62 y.o. male with a left dorsal hand crush injury from a forklift; Patient 3: A 21 y.o. female with a tendon laceration and vascular injury on the right forearm from punching hand through glass and Patient 4: A 52 y.o. male with a laceration and soft tissue injury to the left index, middle and ring finger from a circular saw.

Rationale

Polymeric membrane dressing (PMDs), finger/toe configuration, was initially evaluated with patient 1 in the HMC and provided the rationale to continue using PMDs with our patients.

Before the application of PMDs

Patient 1 was seen 2-3x/week in the HMC for whirlpool/ wound management on all 4 affected digits. When the patient was not in the HMC, he and his wife performed daily dressing changes at home. Dressings included: amorphous hydrogel, collagenase, silicone absorbent foam and silicone wound contact layer. Adherence of the bandages to the wound caused pain, in spite of using "non-adherent" dressings. Dressings had to be soaked with normal saline before removal. It took up to 90 minutes to change dressings for all 4 digits. In 64 days the 4th and 5th digits reached wound closure. The wound care for the left middle index finger took 30-45 minutes and the 2nd digit was almost at closure. The patient had severe vascular compromise of the left middle finger, and was fearful of a complete amputation. The wound on the finger was slow healing with slough, despite additional surgical management and leech therapy. After a review of PMDs, PMD finger/toe dressing #3 was initiated on the middle finger, 64 days after the initial trauma. The patient was educated to leave this dressing in place and change the dressing depending on the amount of exudate that was visible through the dressing at the wound margins. Manual cleansing was not necessary during dressing changes because PMDs contain a non-toxic cleanser. The patient reported increased ease of dressing changes with no adherence to the wound bed, thereby eliminating the pain associated with wound care. With the decreased frequency of dressing changes, the patient had more time to work on his home exercise program (HEP), and his wife was able to resume her normal daily routine. The patient was spared from having to undergo any further surgeries, including amputation of his middle finger.

Clinical Treatment Approach

PMDs provided optimal management and eliminated the previously identified clinical problems with patient 1. As a result, 3 additional cases were managed with PMDs, replacing prior dressing approaches. Whirlpool treatment frequencies were maintained. The whirlpool's warm water was soothing to the patients and allowed for ROM exercises. Patients performed their own dressing changes when needed. PMDs manufacturer's Instructions For Use were followed.

Patient Outcomes

PMDs are slim and flexible, thereby allowing patients to perform their ROM exercises without PMD removal. They are easy to don and doff (vs individually wrapping each digit), which simplified dressing changes and decreased the amount of time required for wound care at home. PMDs, when applied to intact skin or open wounds, help to focus the inflammation response and reduce the swelling and pain usually associated with tissue injury. These properties helped facilitate increased ROM, and allowed patients to perform their HEP easily and independently. PMDs did not adhere to the wound tissue, dramatically reducing wound pain from dressing changes. PMDs helped encourage autolytic debridement and all wounds progressed rapidly from black to yellow to red tissue to closure. Frequency of dressing changes immediately went from daily (and in some cases, twice daily) to 3x per week, and then "as needed." Dressing changes took as little as 5 minutes.

Conclusions

PMDs alleviated the staff and patients' challenges associated with prior wound care approaches, which encouraged these deep, traumatic, and slow healing wounds to reach closure. PMDs are now the standard of care at the HMC.

	Patient 1: Work related crush injury to the left hand affecting 2nd, 3rd, 4th and 5th digits: Photo taken 22 days post injury by HMC with traditional wound care before PMDs. Pins stabilized the fractures and were left in for 50 days.		Patient 1: Photo taken 64 days post injury by HMC. Initial application of PMDs. Middle finger wound measurement: 1.1 cm x 1.3 cm -with 95% fibrin/slough Swelling and erythema to the digits. Dressings changed every 2 days.		Patient 1: Application of finger/toe PMD #3 dressing. Length was shortened to fit the length of the finger and the part of the dressing that was cut in a ring was applied on the 2nd digit on a very small superficial wound. The PMDs were wrapped with 1" self-adherent wrap.		Patient 1 Patient reached wound closure in 48 days after application of PMDs.

Age/Sex and Injury		Wound Management and Duration before Polymeric Membrane Dressings (PMDs)	Wound Management and Duration with Polymeric Membrane Dressings (PMDs) until wound closure	Wound Closure	
Patient 2: 62 y.o. male, left dorsal hand crush injury from a forklift: Photo taken post injury day 2 by HMC.		Patient seen in the emergency room and admitted into the hospital. Daily gauze dressings applied for 1 day. After 1 day, the patient was managed by the HMC. Tissue bruised and skin torn. Periwound swollen and bruised. Wound edges with epibole.	PMDs initiated on day 2 while in the hospital. In the hospital for 4 days. The patient was discharged and continued to be managed by the HMC. Finger/toe dressing applied and cut/layed flat to fit over affected area. Compression glove applied. Dressing changes were daily while in the hospital and every 2-3 days outpatient. Notable reduction in swelling and bruising with each application of PMDs until closure. Epibole resolved with PMDs without additional management of chemical cauterization.	Wound closure in 36 days after application of PMDs	
Patient 3: 21 y.o. female, tendon laceration and vascular injury on the right forearm from punching hand through glass: Photo taken 28 days post injury by HMC with initial visit.		Admitted into the hospital for 28 days. Daily wet to dry dressings with a stretch wrap. Patient discharged home with home health for 1 week. After 1 week, home health was discharged since the patient was able to care for wound herself and the patient was seen by the HMC. Bandages not always changed by patient at home because of fear, anxiety and pain. Pain a 10 (0-10 scale). Wound 90% granulated Wound edges with epibole.	PMD cavity filler and standard PMD applied with gauze and tubular elastic bandage for 20 days, then standard PMD, gauze and tubular elastic bandage for 8 days. Dressing changes every 2-3 days. Epibole resolved with PMDs without additional management of chemical cauterization. Patient compliant with wound management because pain decreased significantly with PMDs. Pain a 1 (0-10 pain scale).	Photo taken 20 days after initial application of PMDs. Note rapid granulation tissue formation. Wound closure in 28 days after application of PMDs	
Patient 4: 52 y.o. male, laceration and soft tissue injury to the left index, middle and ring finger from a circular saw: Photo taken 12 days post-injury by HMC with the initial visit.		Wounds were sutured in the emergency room. Dressings: Daily to twice a day with silicone absorbent foam, gauze and gauze wrap for 12 days, then referred to the HMC. Wounds with eschar. Periwound macerated and swollen.	PMD finger/toe dressing applied. PMDs wrapped with a self-adherent wrap. 14 days after initial application of PMDs periwound healthy and wounds 100% granulated. Dressing changes every 2 days.	Wound closure in 29 days after application of PMDs.	

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* PolyMem® wound dressings are made by Ferris Mfg. Corp., Fort Worth, TX 76106 USA, 800.POLYMEM (765.9636) • www.PolyMem.com
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