

Extensive, Amputation Threatening, Diabetic Foot Ulcer Closed Rapidly with Multifunctional Silver Polymeric Membrane dressings*



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OBJECTIVE

Treatment goal was to close 13.5 cm x 2.5 cm x 1 cm deep infected diabetic foot wound in 67 yr old female patient. The wound, continuing to enlarge for 16 weeks, was previously managed with saline rinses, surgical debridement and toe amputation. The wound was then managed with povidone-iodine ointment, packed with silver hydrofiber and covered with gauze without success. A new dressing and treatment regime was needed to eliminate wound slough, manage exudate, reduce oedema, kill microorganisms in contact with the dressing, speed up healing, and provide effective pain relief. The dressings also needed to be intact when removed from cavities and tunnels.

Multifunction silver containing polymeric tunnel rope, cavity filler and membrane dressings were selected because the unique features and components of the dressings claimed to serve the above functions, and were corroborated with published studies and posters.¹⁻¹¹

BACKGROUND

Madam Y's lateral left foot developed a small blister. She first attended the general outpatient clinic for wound care on 16 February. The blister developed into an opened wound and increased in size after two months' treatment with simple gauze dressing. On 16 April she was admitted to the Orthopaedic unit for in-patient management.

On admission, her general condition was stable, BP 136/63mmHg, P82/min, RR 18/min. ADL independent, walk with aids, BW 54.5kg. Left lateral foot presented with a 2 cm x 1 cm ulcer with bone exposed and discharge noted. Pain score: 5 (VAS scale 0-10) Left leg ABI: 0.33. TBI: 0.04

She had a history of Type II diabetes and was on regular insulin injection (Novo mix -30: 30 unit am, 14 unit pm). Even with her insulin injections her diabetes was not well controlled as indicated by HbA1c result of 8.1% (results above 7% for diabetics is an indication of increase risk of complications). She also had hypertension, heart disease and hyperthyroidism. Medications prescribed included aspirin, lisinopril (Zestril), carbimazole, clopidogrel (Plavix), diltiazem CR, warfarin, furosemide (Lasix) and isosorbide dinitrate (Isordil).

From 16 to 23 April, Madam Y's wound was debrided three times. The wound was managed with 0.9% NS irrigation, followed with the application of povidone-iodine ointment and silver hydrofiber placed in the wound which were then covered with gauze. This dressing regime continued till 3 June. Wound assessment performed weekly.

28 April, after 12 days of in-patient management, the necrotic covered wound had increased by 25%, to 2.5 cm x 2 cm x 1 cm with undermining. Patient was transferred to the vascular unit for treatment of peripheral vascular disease and wound management.

On 11 May percutaneous transluminal angioplasty of popliteal and femoral arteries, debridement and amputation of the left 5th toe were performed. The wound was packed with aqueous chlorhexidine gluconate (Hibitane) soaked gauze, covered with dry gauze and absorbent orthopaedic padding (Velband bandage) to secure the dressing. When this dressing was removed, the dressing regime initiated from 16 to 23 April was resumed.

On 3 June an abscess was found lying within the left 5th toe flexor tendon sheath extending up to calcaneal level. The abscess was drained, the wound was debrided and packed with aqueous chlorhexidine gluconate (Hibitane) soaked gauze, covered with dry gauze and absorbent orthopaedic padding (Velband bandage). This dressing was left in place until haemostasis was achieved, then the dressing regime initiated from 16 to 23 April was resumed.

Systemic antibiotic therapy was prescribed for the treatment of wound infection from 20 April to 28 June.

The patient's persistent wound pain score was 5 (0-10 scale) and 8 during dressing changes. The greatest disturbances she suffered as a result of the wound were the pain and her limitations of daily life activities including walking with unfitted shoe and assisted showering.

METHOD

On 4 June, the wound was irrigated with 0.9% normal saline and sharp debridement was performed. Silver containing polymeric rope, cavity filler and membrane dressings covering the wound were started. The ulcer was 75% covered with slough, measured 13.5 cm x 2.5 cm x 1.5 cm (depth) with sinus 2.5 cm in depth located at the heel and presented with copious purulent discharge.

12 June an abscess appeared deep underneath the heel which was incised and drained, then it was packed tightly for 2 days with povidone-iodine soaked gauze in order to control bleeding. Afterwards, the polymeric membrane dressing regime resumed.

Later, steri-strip was applied across the wound to prevent separation of the wound during daily walking. A hydrocolloid dressing was used underneath the steri-strip to prevent damage of fragile periwound skin caused by the traction of the steri-strip.

Initially the polymeric membrane dressings were changed once daily for 4 weeks and gradually on alternate days for another 2 weeks before the patient was discharged from hospital. Afterwards, the dressing was changed twice per week in outpatient clinic for 12 weeks and finally once per week until the wound closed.

Silver polymeric membrane dressings were used to closure to reduce risk of wound deterioration.



4 June: 75% covered with slough, wound is 13.5 cm (length) x 2.5 cm (width) x 1.5 cm (depth) with sinus 2.5 cm in depth. Silver polymeric membrane dressings begun.



12 June: incised, drained and packed with povidone-iodine gauze for 2 days.



15 June 15 cm x 4 cm x 1.5 cm wound. Silver polymeric membrane dressing regime resumed.

RESULT

There was significant improvement in the wound as soon as the silver polymeric membrane dressings were begun. Wound was quickly cleared of infection and slough accompanied by rapid growth of granulation tissue. The wound closed in 18 weeks with good linear union.

The patient's pain was well addressed through use of the dressing allowing her to resume limited daily walking activities, which were essential for her daily household work. Once polymeric dressings were initiated, her dressing changes pain score was reduced from 8 to 2. Persistent wound pain score was reduced from 5 to 1.

High absorption capacity of the dressing helped reduce the frequency of dressing change across the course of treatment from daily to twice per week and then weekly. The design of the polymeric rope was appreciated because the rope could be removed without concern of any residue being left inside the tunnel.



3 July: Wound is much cleaner forming healthy granulation tissue. Notice how healthy the rest of the foot looks.



16 October: Closed after only 18 weeks.



30 October: Patient happy she can wear sandals!

CONCLUSION

Silver polymeric membrane dressings are excellent dressings for closing diabetic foot ulcers when combined with adequate blood glucose control and patient compliance.

Dedication of the professional team, compliance of the patient, regular wound assessment, adequate blood glucose control and use of appropriate dressing products were all the essential components accounting for the successful outcome of this limb salvage case.

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REFERENCES

1. Aganhtangelou C. Deep ulcer on charcot foot closed after treatment with polymeric membrane silver cavity dressing. Poster. 3rd Congress of the Wound Union of Wound Healing Societies. June 2008. Toronto, Ontario, Canada.
2. Beitz AJ, Newman A, Kahn AR, Ruggles T, Eikmeier L. A Polymeric Membrane Dressing with Antinociceptive Properties: Analysis with a Rodent Model of Stab Wound Secondary Hyperalgesia. The Journal of Pain Feb 2004;5(1):38-47.
3. Benskin L. Diabetic foot salvaged, wounds closed in only two months using polymeric membrane cavity filler and polymeric membrane dressings. Poster. 12th Annual Wound Care Congress. September 2008. Orlando, Florida, USA.
4. Blackman JD, Senseng D, Quinn L, Mazzone T. Clinical Evaluation of a Semipermeable Polymeric Membrane Dressing for the Treatment of Chronic Diabetic Foot Ulcer. Diabetes Care April 1994; 17(4):322-5.
5. Burd A, Kwok CH, Hung SC, Chan HS, Gu H, Lam WK, Huang L. A Comparative Study of the Cytotoxicity of Silver-Based Dressings in Monolayer Cell, Tissue Explant, and Animal Models. Wound Repair and Regeneration 2007;15(1):94-104.
6. Gorchynsky AM. Cavity from removal of infected arteriovenous graft closed quickly, painlessly using new dressing. Poster. 8th Annual American Professional Wound Care Association. April 2009. Philadelphia, Pennsylvania, USA.
7. Hjalmarsson, M. Diabetic foot saved from amputation with polymeric membrane dressings. Poster. 19th Conference of the European Wound Management Association. May 2009. Helsinki, Finland.
8. Lee, BY, Berkowitz-Smith, P, Guerra, VJ, Madden, RE. Chapter 20. The Diabetic Foot: A Comprehensive Approach In The Wound Management Manual Editor: Lee BY. McGraw Hill. 2005 New York, New York, USA.
9. Sessions RC. Can a drug-free dressing decrease inflammation and wound pain? What does the evidence say? Poster. 41st Annual WOCN (Wound Ostomy Continence Nurses) Conference June 2009. St. Louis, Missouri, USA.
10. Tamir J. Extremely painful pilonidal cyst infection resolved quickly and easily using new reinforced rope dressing. Poster. 8th Annual American Professional Wound Care Association. April 2009. Philadelphia, Pennsylvania, USA.
11. Vanwalleghem G. Rapid closure of infected diabetic foot through the use of polymeric membrane cavity filler. Poster. 19th Conference of the European Wound Management Association. May 2009. Helsinki, Finland.

*PolyMem Silver, PolyMem WIC Silver, and PolyMem WIC Silver Rope wound dressings are made by Ferris Mfg. Corp., Burr Ridge, IL. 60527 USA