A wound-healing rate in diabetic foot ulcers in response to treatment with maltodextrin/ascorbic acid wound dressing in outpatient diabetic foot unit Caja de Seguro Social Ciudad de Panama. A case series report.
The aim of this study was to describe and demonstrate the effectiveness of a diabetic foot limb preservation treatment protocol utilizing sharp debridement, maltodextrin/ascorbic acid dressing, gauze, and limb offloading.

- Diabetes affects 194 million individuals worldwide
- Foot ulceration is one of the most common complications associated with diabetes.
  - 15% of diabetic patients experience a foot ulcer
  - 7 to 20% of these patients require eventual amputation
- Treatment of diabetic foot wounds is costly due to prolonged care $4,595 to $28,000 per diabetic foot ulcer.
  - Costs increase to $40,000 if amputation is required
  - Estimated total cost in Panama: $288.92 Million
- A protocol is needed to reduce treatment time and burden on healthcare systems, especially in developing countries

Dressing in powder and gel formulation

- Initial studies by Silvetti demonstrated efficacy for treating traumatic wounds, decubitus ulcers, venous leg ulcers, diabetic ulcers, and 2nd degree burns
  - Reported cessation of pain, control of infection and purulence, granulation tissue formation and re-epithelialization of wound bed
  - Additional experiments indicated Maltodextrin has inherent antimicrobial properties
- Others report successful treatment of recalcitrant wounds including: peristomal ulcers, diabetic, surgical, and traumatic wounds, and venous ulcers.
- Dressing is inexpensive making it an ideal treatment option in developing countries with limited resources. However, research is limited to case studies and small clinical studies.

Methods

- Prospective observational case series approved by the Ethics Committee of Panama’s Ministry of Health
- Included all patients with Wagner Stage 3 and 4 diabetic foot ulcers between January 2014 – March 2015
  - 25 patient records included (26 wounds)
- Treatment Protocol
  - Sharp debridement as indicated and wound cleaned with saline
  - Maltodextrin/ascorbic acid dressing applied to the wound bed
  - Powder for moist/wet, gel for dry wounds
  - Cotton gauze used as secondary and appropriate offloading applied
  - Patients and care givers trained to change dressings daily
- Wounds were photographed and analyzed with digital planimetry at all follow-up visits.
- Healing trajectories and Modified Kaplan-Meier Survival Curves used to quantify granulation tissue formation and healing of the wound.
Representative Cases

Post transmetatarsal amputation.
Week 0: Initial area: 30.94 cm², Granulation tissue: 72%.
Week 11: Area 4.52 cm² (85% closed), Granulation tissue: 100%.
Week 16: Healed

Surgical Relief of Abscess.
Week 0: Initial Area: 6.93 cm², Granulation tissue: 100%
Week 3: Area 3.68 cm² (47% closed), Granulation tissue: 100%.
Week 7: Healed

Right Dorsum Wound with PVD.
Week 0: Initial Area: 32.45 cm², Granulation tissue: 58.1%
Week 7: Area 4.52 cm² (85% closed), Granulation tissue: 100%.
Week 14: Healed

Complete Granulation of Wounds Observed in Study

• Complete granulation of all wounds was observed
  - 100% Median: 57 days; Range: 0 – 193 days
  - 80% Granulation Median: 19 Days; Range: 0 - 118
• Non-healing wounds were delayed in granulation tissue formation
  - Healed Median: 55.5 days; Range: 0 – 147 days
  - Not Healed Median: 93 days; Range: 43 – 193 days
  - Log Rank Test demonstrates trend towards significance (p=0.094)

Treatment Protocol Promotes Wound Healing

• All wounds experienced at least 70% wound closure
  - 70% Healing Median: 56 days; Range: 14 – 144 days
  - 100% Healing Median: 103 days; Range: 48 – 193 days
  - Non-healing wounds (n=5) resolved through grafting after 100% granulation and 70% healing
• Wound healing trajectories predict 6-7% weekly healing rates
A wound treatment protocol utilizing debridement, maltodextrin / ascorbic acid dressing, gauze, and offloading led to rapid wound healing of stage II, III, and IV diabetic foot ulcers.

- 21 of 26 wounds healed
- 5 unhealed wounds achieved 70% size reduction and 100% granulation before resolution with grafting

Rapid formation of granulation tissue and re-epithelialization of the wound bed in treated wounds demonstrates protocol creates ideal conditions for wound healing.

- Multidex demonstrated to establish a moist wound environment conducive to wound healing
- Sharp debridement removed slough and necrotic tissue
- Offloading prevented re-injury of the wound bed during healing

Protocol demonstrates the ability to salvage limbs following diabetic ulceration.

- Successfully healed 10 post transmetatarsal amputation wounds (case 1)
- Potential to save $20 million in Panama alone by preventing full limb amputation

conclusions

- Rapid wound healing was seen for stage II – IV diabetic foot wounds utilizing described treatment protocol.
- The maltodextrin/ascorbic acid dressing established an ideal moist environment ideal for wound healing.
- The protocol is cost effective for developing countries with socialized healthcare systems as the maltodextrin/ascorbic acid is inexpensive.

References

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* Multidex® (DeRoyal Industries, Powell TN)

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