Managing Difficult Wounds Secondary to Charcot Deformity with a Novel Total Contact Cast System.

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Introduction:
Charcot foot deformity is a serious and a possible lower-extremity limb threatening complication of diabetes. During this uncontrolled inflammatory cycle, the Charcot foot is characterized by varying degrees of bone and joint disorganization secondary to underlying neuropathy, trauma, and disruption of bone metabolism. The Charcot foot in diabetes poses many challenges in its diagnosis and management. The classic rocker-bottom foot deformity is a late stage of the deformity and can be avoided by early recognition and management. Off-loading is the most important initial treatment recommendation. Surgery can be helpful in the early stages involving acute fractures of the foot or ankle or in later stages when off-loading is ineffective.1

Objective:
The objective of this case series is to evaluate the use of a comprehensive system that addresses both the off-loading needs and wound management needs of the charcot foot patient. The system used in this case series was a total contact cast (TCC) comprised of a clamshell cast with off-loading footplate, along with an ovine collagen with intact extracellular matrix (CECM)** to manage MMPIs and a gentian violet/methylene blue (GV/MB)** antibacterial foam which was designed to manage bioburden.2

Method:
Patients were selected with wounds secondary to diabetic Charcot deformity. The CECM dressings and GV/MB antibacterial foams were changed according to instructions for use. Assessments and measurements of wounds were performed by the clinician weekly.

Conclusion:
The use of a TCC system comprised of a clamshell cast with off-loading footplate along with the advanced wound dressings in this case series were effective in the management of these complex Charcot wounds. The CECM dressing provided an intact, native extracellular matrix which promotes tissue granulation* and epithelialization for final wound closure.3 The GV/MB antibacterial foam dressings helped to facilitate bioburden reduction. This comprehensive off-loading and wound management system resulted in resolution of wounds without complication. Overall patient satisfaction and compliance were also observed.

Case Study 1
Patient: 53 year-old
Post medical history:
- Left foot diabetic foot ulcer of 3 years
- Hypertension, non-insulin dependent diabetes mellitus, and Hepatitis C
- Mid-foot collapse from Charcot deformity
- Chronic osteomyelitis calvarium bone

- Clear cast
- Internal & external fixation
- Ulcer debridement with demin gruel & negative pressure wound therapy (NPWT)

Week 0: CECM dressing applied to wound and covered with GV/MB antibacterial foam
- TCC system comprised of a clamshell cast with off-loading footplate
- Off-loading footplate cutout 1 cm larger than wound with such application

Week 5: Wound closure
- Transitioned to custom diabetic shoes

Week 1 (Figure 4):
- Heat ulcer measurement: 8.5 cm x 5 cm x 0.1 cm
- 18% decrease in heel wound size
- Significant improvement in 3 plantar ulcers

Week 2:
- Heat ulcer measurement: 3.5 cm x 3.5 cm x 0.1 cm
- 11% decrease in heel wound size

Week 3:
- Heat ulcer measurement: 3.5 cm x 3.5 cm x 0.1 cm
- 3 plantar ulcerations have resolved

Week 4:
- Heat ulcer measurement: 4.0 cm x 3.3 cm x 0.2 cm
- Bacterial is healing

Week 5:
- Heat ulcer measurement: 3.3 cm x 2 cm x 0.2 cm
- Bacterial is healing

* Partially supported by the University of Pennsylvania Department of Orthopedic Surgery.
** Provided courtesy of Integra Lifesciences.
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Week 1:
- Frame removed at 1 week
- Patient compliance became an issue
- Raised NPWT while healing
- Raised 2 competitive TCCs while laying flat
- Wound worsened

Week 2:
- Solar pressure ulcer to the left foot
- Off-loading footplate cutout 1 cm larger than wound with such application

Week 4:
- Wound improving
- Patient was more complacent with this TCC system comprised of a clamshell cast with off-loading footplate

Week 5:
- Frame replaced at 1 week
- Patient compliance became an issue
- Raised NPWT while healing
- Raised 2 competitive TCCs while laying flat
- Wound worsened

Week 6:
- Solar pressure ulcer to the left foot
- Off-loading footplate cutout 1 cm larger than wound with such application

References: