CASE SERIES

The New Diabetic Foot Ulcer Standard of Care: Instant Total Contact Cast PLUS Polymeric Membrane Dressings*

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Introduction

In our practice setting, diabetic foot ulcers (DFUs) were not closing to our satisfaction. It was apparent that improved off-loading could improve outcomes. A thorough literature review was performed. Literature showed the Total Contact Cast (TCC) as the "gold standard of care," but it had many contraindications and was not practical in most settings. Articles also reported that a TCC modification, called the instant Total Contact Cast (iTCC), which could be used in most settings, eliminated the TCC contraindications, but still had limitations. A key limitation identified in the literature was periwound maceration. The goal was to maximize DFU healing through the development of a practical off-loading approach that eliminated all contraindications and problems.

Methods

Phase 1: We implemented the iTCC approach as reported in clinical literature. The iTCC was found to provide improved results, but our experience confirmed the maceration problems as reported in the literature.

Phase 2: We evaluated alternative dressings including collagens, hydrofibers, and polymeric membrane dressings (PMD) for the purpose of reducing periwound maceration without increasing dressing change frequencies. Maceration occurred with all dressings except PMDs.

Phase 3: We developed a best practice protocol for the team to test using the iTCC with PMD.

Phase 4: We validated the approach in complex DFU patients. Home health nurses applied the iTCC with PMD 2-3 times a week, depending on exudate amounts, until closure. Digital photographs were taken and analyzed using digital planimetry software to ensure measurement accuracy.

Costs

The total cost of the iTCC/PMD dressing will depend on the size of the wound, how often the dressing is changed, the type of PMD used, and the off-loading device used. The off-loading device is classified as durable medical equipment and is typically charged to the patients' insurance provider and/or patient. There is a significant difference in cost when comparing the TCC to the iTCC/PMD. The cost of one application of TCC materials alone can range from $50-$117, while the iTCC/PMD is considerably less. Including the off-loading device, case #1 had a total healing cost of $61.88. This is less than the cost of one application of the TCC. The total cost to close the wound for case study #2 was only $153.88. Case study #3 had an atypically large DFU and the total cost to closure was still very low at $208.12, which is potentially less than the cost of 2 TCC applications.

The iTCC is easy to apply and application can be done in less than 10 minutes. It does not require the use of expensive tools, such as a cast removal saw, that the TCC requires. Using PMD also contributes to the cost efficiency of this protocol. PMDs contain unique components that work together to fill, absorb, cleanse, and maintain optimal moisture levels, while helping to reduce swelling and wound pain. Silver PMDs provide additional antimicrobial benefits of small particle silver to help protect the wounds from microbial contamination. The dressings contain absorbing materials that draw and lock the exudate into the dressing. This prevents pooling and leaking out of the dressing, which minimizes maceration and periwound skin breakdown. The components in PMDs draw the natural healing substance in the body to the wound bed to promote healing while facilitating autolytic debridement. PMDs contain a nontoxic, nonirritating cleanser, so the use of additional cleansers/saline is unnecessary. The combined actions of these components, along with other design features in the dressing, usually ensure the dressing will not stick to the wound. Combining PMD and the iTCC reduces costs and improves healing outcomes.

Conclusion

The outcomes of this case study validated our approach and supported our practice. The iTCC/PMD can be applied on most any patient and does not have the contraindications of the TCC. None of the patients in this study experienced maceration, subsequent ulcerations, or any complications from the application of the iTCC/PMD. This approach can be applied in most settings and all three of our cases were applied in the comfort of the patients' own home. Prior to this approach, the 3 case study wounds were treated with different combined methods including dry dressings, wet-to-dry dressings, ORC collagen, hydrofiber, platelet derived growth factors, cadexomer iodine gel, hydrogel, negative pressure wound therapy, and bi-layered skin substitutes, all without success. While the sample size is small, the wounds presented here closed 43% faster than would have been expected if the TCC was utilized. All three wounds were 100% closed in an average of 6.8 weeks. With the TCC, literature reports only 73-100% of wounds closed within 12 weeks. This approach to DFU healing significantly reduces costs, while improving healing outcomes. The iTCC/PMD is the new diabetic foot ulcer gold standard of care for our agency.

Case	Age of wound	Previous cost to manage	Time to heal with iTCC/PMD	Cost of iTCC/PMD to healing
1	330 days	More than $2,200	12 days	$61.88
2	180 days	More than $1,800	83 days	$153.88
3	396 days	More than $4,500	48 days	$208.12

iTCC and Polymeric Membrane Dressing Protocol: How to Apply iTCC/PMD

Three home health nurses were taught the use of the iTCC and PMD. This is the protocol that is utilized in this facility and for this case study series (step 1-5). The dressing should be changed twice weekly or 3 times a week for moderate to heavy draining wounds. For heavy drainage, or when there are signs and symptoms of infection, you may use silver PMD.

Step 1: Apply the appropriate PMD and secure with surgical tape.

Step 2: Wrap the lower extremity with an absorbent padding from the base of the toes to 1 inch below the knee using a spiral wrap technique.

Step 3: Apply a cotton tubular bandage over the absorbent padding with an extra 2-3 inches at the base of the toes. Fold the excess back over the toes toward the forefoot (without pulling tight) and secure with tape, as shown.

Step 4: Make sure the inside padding of the removable cast walker (RCW) is clean and dry. If so, apply the RCW or offloading device and secure as indicated.

Step 5: Apply a cohesive wrap over the removable cast walker or off-loading device with a spiral technique to render the device non-removable.

Case 1: 37-year-old male with IDDM, hyperlipidemia, peripheral neuropathy, and a DFU present for 11 months to the right lateral foot with tendon exposure. The iTCC/PMD was applied. After only 4 days, the wound bed was 100% granulation tissue and had decreased in area by 83.1%. The wound was fully healed after only 12 days of using the iTCC/PMD protocol.

Case 2: 56-year-old male with IDDM, PVD, peripheral neuropathy, hypertension, hyperlipidemia, obesity, atrial fibrillation, and a right plantar DFU present for 6 months prior to the iTCC/PMD application. Wound was fully healed in 83 days. This includes a 7-day hospital stay, for reasons unrelated to this DFU, where the hospital did not remove the iTCC during the 7-day stay.

Case 3: 49-year-old male with IDDM, HTN, hyperlipidemia, charcot arthropathy, morbid obesity, peripheral neuropathy, prior left toe amputation amd a right plantar DFU present for 13 months. iTCC/PMD applied. Wound size was 6.4x4.0x0.2cm with an area of concern at 9 o'clock of 100% slough. In 35 days, the size decreased to 4.8x2.8x0.2cm but the 9 o'clock area revealed a tunnel with osteomyelitis. Patient was admitted to a facility with alternate wound orders for 10.6 weeks. On readmission to home health, the wound measured 3.0x1.0x0.2cm and the iTCC/PMD was reapplied. Wound fully healed in just 13 days. Patient wore the iTCC for a total of only 48 days.

*PolyMem® wound dressings, PolyMem® Wic cavity filler, PolyMem Wic Silver® cavity filler and PolyMem Wic Silver Rope® cavity fillers are made by Ferris Mfg. Corp., 5133 Northeast Parkway, Fort Worth, TX 76106 USA, 1-800.POLYMEM (765.9636) • www.polymem.com

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