

## Case Report

# Theruptor Novo, a novel wound dressing in the management of infected diabetic foot ulcer: two case reports

Subhash M. Kale\*

Department of Plastic Surgery, Kovai Medical Center and Hospitals, Coimbatore, Tamil Nadu, India

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**\*Correspondence:**

Dr. Subhash M. Kale,

E-mail: [kalesubhashm@gmail.com](mailto:kalesubhashm@gmail.com)

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### ABSTRACT

India is the world's center for diabetes, with an estimated 77 million adults over the age of 18 having type 2 diabetes and nearly 25 million are pre-diabetics. Approximately 15-20% of diabetic patients will suffer from diabetic foot ulcer at least once in their lifetime which can also lead to deformity and amputation if timely intervention is not done. The presence of at least two classic signs of inflammation or purulence is the basis of clinical diagnosis of diabetic foot infection and it usually presents with mono/polymicrobial etiology. The surgeon must know the course of the infection, principles of non-healing wound management, and biomechanics of the foot for an optimal outcome. We described 2 case reports who presented with non-healing infected wounds. Healing was achieved through multidisciplinary team approach, patient education about diabetes, off-loading regime and regular wound dressing using Theruptor Novo.

**Keywords:** Diabetes, Diabetic foot ulcer, Non-healing wound, Theruptor Novo

### INTRODUCTION

It is a well-established fact now, that the most serious complication in diabetic patients is diabetic foot infections (DFIs), which can lead to significant morbidity and mortality and has significant effect on patients' quality of life.<sup>1</sup> India is the world's center for diabetes, with an estimated 77 million adults over the age of 18 having type 2 diabetes and nearly 25 million are pre-diabetics (risk of developing diabetes in near future).<sup>2</sup> Approximately 15-20% of diabetic patients will suffer from diabetic foot ulcer (DFU) at least once in their lifetime which can also lead to deformity and amputation if timely intervention is not done.<sup>3,4</sup> Foot ulcers are the cause for 85% of lower limb amputations. Further the five-year mortality rates for lower limb amputations in diabetic foot patients being approximately 22%, 44%, and 77% at 30 days, 1 year and 5 years respectively and in fact, these numbers are higher than the five-year mortality rates of cancer such as prostate, breast, colon, and Hodgkin's disease.<sup>5,6</sup> However, the attention to the exotic diseases outweighs the slow death causers like mismanaged diabetic foot ulcers.

Fifty percent of all diabetes patient hospitalization are due to diabetic foot ulcer complications which accounts for 24% of the healthcare costs.<sup>7</sup> The stage for foot-related infection is set because of the following risk factors leading to skin breakdown and ulceration: peripheral neuropathy, peripheral vascular disease, history of amputation or deformity, and repetitive injury.<sup>8</sup> The presence of at least two classic signs of inflammation or purulence is the basis of clinical diagnosis of DFI and it usually presents with mono/polymicrobial etiology with high prevalence of *Pseudomonas*, *E. coli*, and *S. aureus* infections.<sup>8-11</sup> Early identification and implementation of proper treatment plan can prevent amputation and a combination of surgical interventions and antibiotic treatment using appropriate systemic and local management is crucial for deep foot infections.<sup>12</sup>

The surgeon must know the course of infection, principles of non-healing wound management, and biomechanics of the foot for an optimal outcome.<sup>8,12</sup> Multidisciplinary team management and patient awareness about the complications of diabetes can reduce the incidence of

diabetic foot complications and amputations.<sup>10,13</sup> The aim of the treatment is to maintain a healthy, functional limb.

Here, we describe case report of 2 patients who presented with non-healing infected foot wounds. Healing was achieved through multidisciplinary team approach, patient education about diabetes, off-loading regime and regular wound dressing using Theruptor Novo (Healthium Medtech, India) which is a non-adherent 3D hydrocellular dressing pad with antimicrobial action.

## CASE REPORT

### Case 1

A middle aged alcoholic male patient, known case of diabetes mellitus and on medication, presented with history of stone injury in the right foot, resulting in non-healing wounds over the great toe and the mid plantar area. Also complained of fever and infection of the wound. Physical examination revealed an infected wound of size 2 cm<sup>2</sup> over the plantar surface of the great toe and an infected wound of size 4.5×5 cm over the mid plantar area. Both the wounds were sloughy, with signs of infection, purulent discharge and were painful (Figure 1A). X-ray was normal and HbA1c was 10%. The wounds were diagnosed as diabetic foot ulcers and the treatment plan was to reduce bioburden of wounds along with antibiotic coverage, maintain wound moisture balance and wound debridement along with regular wound dressings (Theruptor Novo). Following the standard wound care protocol, wounds were cleansed with povidone-iodine solution and Theruptor Novo was used for dressing. Wound dressing was done daily for first 3 days and later it was done once in 3-4 days. By the end of 1 week, the mid plantar wound completely epithelised (Figure 1B) and the wound over the great toe reduced to 1 cm<sup>2</sup> with granulation tissue and without any signs of infection including pain (Figure 1C) by the end of 2 weeks. During the follow-up visits, the patient continued to get educated about diabetes and diabetic foot complications, monitoring blood sugar and HbA1c levels.

### Case 2

A 47 years' male, known case of hypertension for 5 years and diabetes since 9 years and on medication, came with the history of non-healing ulcer over the right tendo achillis which started as a small blister 1-month back. He had consulted another clinic and has come to our hospital for further management. He was on oral analgesic and antibiotic medications. On physical examination, patient had an infected wound over the right tendo achillis of size 4×4×1 cm with slough, thick purulent discharge, and signs of local infection and was painful (Figure 2A). X-ray was normal and HbA1c was 11.5%. The treatment plan was to debride the slough to reduce the infection risk under antibiotic coverage, maintain the moisture balance for better healing and regular wound dressing. Following the standard wound care protocol, the wound was cleansed with povidone-iodine solution and Theruptor Novo was

used for dressing. The wound dressing was done daily for first 5 days and later it was done once in 5 days. By the end of 1 week, there was no slough or signs of infection (Figure 2B). The wound started to granulate and epithelise. During the follow-up visits, wound dressing was continued using Theruptor Novo, analgesic and antibiotic was stopped and was educated throughout the wound management about the diabetes and diabetic foot complication, monitoring blood sugar and HbA1c levels. Wound healed completely by epithelisation by the end of 3<sup>rd</sup> week of treatment (Figure 2C) and patient was satisfied with treatment given.



**Figure 1 (A-C): Progression of wound on great toe and mid plantar area over day 0, 7 and 14.**



**Figure 2 (A-C): Progression of non-healing wound on Tendo achillis over day 0, 7 and 21.**

## DISCUSSION

The diabetic foot is a major cause of amputations and diabetic foot morbidity. It has been reported that 45-85% of lower limb amputations can be prevented with appropriate early assessment and aggressive treatment.<sup>14,15</sup> The main risk factors for non-healing wounds and foot amputation in diabetics are neuropathy (loss of protective sensation), previous foot ulcer, consequences of chronic ischemia (due to peripheral artery disease or other vascular disease), overpressure causing foot deformity, external injury, and infection.<sup>16</sup> Diabetics can be more susceptible to infections if the bioburden becomes overwhelming, immediate intervention is essential to prevent the wound from further complications. Thus, timely and appropriate treatment of suspected DFU helps to prevent progression and better outcomes.<sup>17</sup>

One can identify the likelihood of a diabetic foot infection when typical attributes such as erythema, warmth, tenderness, swelling, or the discharge of pus are observed at wound site. The microbiology of diabetic foot wounds varies with the severity of involvement and are more likely to be poly-microbial.<sup>18</sup> The utilization of topical antimicrobials is increasingly becoming a practice to offer additional treatment for the management of DFUs. High and sustained concentration of antimicrobial activity at the site of the infection can be obtained using topical agents but can increase the incidence of antibiotic resistance. Multidrug-resistant bacteria accounts for up to 57.14% of the strains obtained by wound cultures.<sup>17</sup>

Managing diabetic foot complications involves several strategies, with prevention being a key approach. This includes educating both patients and their families, creating a foot care pathway, conducting foot screenings, and adhering to risk factor guidelines.<sup>13</sup> Furthermore, it has been suggested that community awareness campaigns focusing on diabetes and its associated foot complications can encourage patients to seek medical attention from their primary physicians at an earlier stage. This early intervention would then facilitate timely referral to the appropriate specialty care.<sup>5</sup> The aim is to enhance quality of life for patients and lower their healthcare expenses.

Both the patients in our case reports, presented with diabetic foot ulcer and had signs of infection. Multidisciplinary team approach along with patient education and using Theruptor Novo dressing (to maintain the wound moisture & control the local infection), we were able to overcome the infection and improve the healing process. Theruptor Novo has unique antimicrobial action that is "physical kill mechanism" unlike the traditional kill mechanisms and provides protection against a broad spectrum of organisms. Since its antimicrobial action is just physical, there is least chance of antibiotic resistance, and its continuous action does not have half-life depleting effect unlike topical antibiotics or any other depleting drug-based dressings. In this case report of 2 patients, the treated DFUs exhibited encouraging signs of wound

healing with reduction in wound size and without any signs of infection.

## CONCLUSION

This case report of 2 patients found that, following standard wound care management along with Theruptor Novo dressing for local infection management, the clinical signs and symptoms of local wound infection were significantly improved. The unique antimicrobial action of Theruptor Novo dressing appears to have a positive effect on decreasing the bioburden of the wound and assist in wound healing process, which needs to be evaluated further.

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