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Use of Diperoxocholric Acid in Infected Diabetic Foot Ulcers Leading to Osteomyelitis: Case Reports

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Abstract:
This article describes three patients who had an episode of infected diabetic foot ulcer with osteomyelitis, and subsequently treated with a Diperoxochloric acid topical solution. Diperoxochloric acid is a new chemical entity approved in the treatment of diabetic foot ulcer. It has properties to heal the wound and kill the microbes in wound, which is the need of hour. As most of the products that are available in market have either antimicrobial activity or wound growth factors, which have no action on microbes makes Diperoxochloric acid mechanism unique. All three ulcers showed positive wound contraction and reduction in size throughout the follow-up period ranging from 3 to 10 weeks. All the three patients showed positive signs of wound healing. One of the patients in whom amputation of great toe was advised also healed completely without any need of amputation.
Keywords: Diabetic foot ulcer, Diperoxochloric acid

Introduction

Diabetes mellitus is a major healthcare concern, as evidenced by its high prevalence rate in the general population (8.3%). [1] Out of 62 million diabetics in India, 25% develop DFUs of which 50% become infected requiring hospitalization while 20% need amputation. DFUs contributes to approximately 80% of all non-traumatic amputations in India, annually. Patients with a history of DFU have 40% higher 10-year death rate, than those without[2]. Many non-traumatic lower-limb amputations and other costly medical treatment for chronic wounds were attributed to the incidence of diabetic foot ulcers. When ulcers get infected, cellulitis and osteomyelitis could develop very quickly. It is of paramount importance that any apparent local wound infection be treated.[3] With the advent of novel wound dressings, combating local wound infection may be more efficient than before.

Diperoxochloric acid is a topical solution having dual antibacterial and fibroblast proliferating action. Here we report three cases of infected diabetic foot ulcer with osteomyelitis that were treated with Diperoxochloric acid solution.

Case Report 1

A 66 years old female presented with non-healing ulcer over great toe of the left foot Figure 1(a). Patient had a history of ulcer for past three months. Patient was known case of hypothyroidism, Type 2 diabetes mellitus, secondary hypertension, morbid obesity with bilateral foot charcot's disease. She was under treatment at a corporate hospital and was advised for great toe amputation due to osteomyelitis which was diagnosed clinically.

On examination dorsalis pedis pulse was present. A foul-smelling discharge and mass protruding from base of ulcer was found. The wound swab was collected and sent for culture. The culture was tested positive for Pseudomonas aeruginosa.

Surgical wound debridement was performed followed by mechanical scrapping of phalanx. Patient was initiated with systemic antibiotics and wound approximation was done using sutures. Diperoxochloric acid solution once every day having antibacterial and fibroblast proliferating action was used as dressing and was made sure that the offloading was done completely. Wound healed completely with scar formation within 35 days and the need of amputation abolished Figure 1(b).

Figure 1(a): Non- healing ulcer (day 0)

Figure 1(b): Complete wound healing (day 35)

Case Report 2

70 years old male presented with severe pain and swelling over heal of right leg for past 2 months Figure 2(a). As the intensity of the pain was severe, it was managed with non-steroidal anti-inflammatory drugs, systemic antibiotics and other supporting medications. There was no ulcer on examination. Patient had a history of diabetes, hypertension and hyperlipidaemia from past twenty years and all the parameters were under control. Patient has iron deficiency

anemia with haemoglobin levels of 8 g/dl for which IV iron administration was carried out.

On investigation x-ray revealed that patient had developed osteomyelitis of one of bone of heal. Peripheral pulses showed biphasic pattern on doppler. Incision and drainage was done to relive pain and during the procedure large pus filled cavity was found. Initially the wound had developed excessive slough and the wound debridement was performed using papain and urea ointment for first five days post incision and drainage. Post procedure joint was immobilised and offloading shoes were provided.

Later to improve granulation tissue, reduce infection and shrink the wound site, for the purpose to prepare wound bed Diperoxochloric acid was used as daily dressing for 2 weeks.

Within 15 days of application of Diperoxochloric acid solution, wound showed positive signs of healing with appearance of red granulation tissue and it was decided to pack the wound with dermal substitute so that wound can get approximated without need of grafting. The entire treatment lasted for 2 months and wound healed without need of any skin grafting Figure 2(b).

Figure 2 (a): Osteomyletic foot (day 0)

Figure 2 (b): Healed foot (day 60)

Case Report 3

48-year-old tribal women, presented with large ulcer measuring 5x8 cm due to diabetic foot infection for 2 months Figure 3(a). Patient has history of infected diabetic foot ulcer with amputated fourth toe 3 years back. She is a known diabetic for 4 years, non-hypertensive, with elevated triglyceride levels. She was a tobacco chewer 15 years and had quit few months ago.

On examination of wound, foul smelling discharge with oedematous tissue and maceration was seen. Diagnosis of osteomyelitis was confirmed with X-ray. Peripheral pulses were biphasic in pattern. Surgical debridement was performed. Post-operative wound site filled with Slough and necrotic tissue at base of fourth toe with regular mechanical debridement and wound, dressing with Diperoxochloric acid daily surrounding tissue oedema subsided and healthy granulation tissue started appearing by fourteen days Figure 3(b). During the treatment period, the blood sugars were kept under tight control and anticoagulants and other supportive medications were prescribed. Vacuum assisted wound closure was planned to further shrink the size of ulcer and make it graft ready. Post skin grafting wound healed well. After healing she was provided with customised offloading shoes. Entire treatment lasted for 45 days and patients' fear of amputation of other toes was avoided Figure 3(c).

Figure 3 (a): Diabetic foot ulcer

Figure 3 (b): Post-operative wound site

Figure 3 (c): Skin grafted foot

Conclusion

These case reports had conclusive evidence to show that diperoxochloric acid was effective in treating infected diabetic foot ulcers with osteomyelitis. Skin surrounding the wound did not show any signs of trauma such as maceration or skin breakdown. Moreover, dressing change was carried out with ease. One of the patients in whom amputation of toe was advised healed completely. The three cases were followed up for six month and none of them came back with the recurrence of ulcer. All the patients were provided with appropriate offloading shoes during and after treatment. With this, we conclude that having dual mode of action that makes it suitable for management of infected diabetic foot ulcers. Together with the use of appropriate systemic antibiotics, dermal fillers and skin grafts Diperoxochloric acid provided infected ulcers to have a positive wound environment for contraction and healing to occur.

To prove the role of Diperoxochloric acid in extended indication of osteomyelitis as a complication of DFU would require larger clinical trial in future

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