

Chemical Burn among Diabetic Patient: A Case Report

Talal H. Almalki ^b, Ismail AlMogbil ^{a,*}, Raheef Alatassi ^b, Kamal Atif ^b, Abdullah alshahrani ^a

^a college of medicine, Qassim university, department of orthopedic surgery, Saudi Arabia

^bSecurity Forces Hospital, Department of Orthopedic Surgery, Riyadh, Saudi Arabia

*corresponding author: E-mail addresses: ialmogbil@hotmail.com , ismail.almogbil@ucm.edu.sa

Abstract: The Chemical burn is responsible for serious deep tissue damage to the lower limb due to loss of sensation in diabetic patient. Our patient presented to our specialized clinic with grade 2 superficial burn -last for prolonged periods- of her foot after standing barefoot on sodium hypochlorite (Clorox bleach) used for bathroom cleansing. Treatment and prevention of this burn were discussed.

Keywords: Diabetes Mellitus, foot burn, diabetic neuropathy, chemical burn.

1. INTRODUCTION

Diabetes mellitus has specific complications such as peripheral neuropathy, microvascular disease and increase wound complications including delayed healing and infection. These features make diabetic patients at increased risk for substantial morbidity and requiring further care [1]. Furthermore, Cowie et al [2] mention in his study in 2009 that about 170 million individuals around the world are having diabetes.

More than 50 % of all diabetic patients will develop a peripheral neuropathy which will result in peripheral and autonomic nerve dysfunction and distal symmetrical sensorimotor polyneuropathy is the most common type. [3] In addition, these neurological complications are not specific to any type of diabetes and may occur equally in both types. Unfortunately, the diabetic neuropathy is considered the most common reason for non-traumatic amputations and around 15 % chance that patients with diabetic neuropathy will undergo one or more amputations in their lifetime. [4-6]

As a result, burn in diabetic patients especially with who suffer from diabetic neuropathy is showing worse outcomes compared to non-diabetic patients. Moreover, Kimbell et al [3] report on his study that burns in lower extremities in a diabetic patient will increase the hospital admissions, length of stay and poorer clinical outcome.

Herein we present a rare case of a diabetic patient with peripheral neuropathy that suffered a grade 2 chemical burn in both feet and failed treatment with multiple dressing for one year. The patient underwent a special treatment which will be discussed later in the case. The current case report was written according to the recently published SCARE criteria. [7]

Presentation of Case:

A 38-year-old female patient, unemployed, known to have type I diabetes mellitus for 20 years ago. She is on multiple oral and subcutaneous anti glyceic agents, with uncontrolled diabetes and her HA1C is 12%. Presented to our clinic with a history of bilateral toes wound that had started 2 years prior to presentation. She described that wounds caused because of contact with sodium hypochlorite (Clorox bleach) to her bare feet while cleaning the floor. She tried regular dressing by Povidone for more than a year, without any improvement.

Upon examination, there are multiple superficial diabetic ulcers at the tip of toes bilaterally. No gangrene, no signs of infection or cellulitis were noticed. It was painless with no tenderness, and not probed to the bone. The neurovascular examination was performed showing neuropathy and vascular insufficiency. Macroscopically, ulcers are granulating 100%, no slough, and no epithelialization, as shown in Fig. 1.



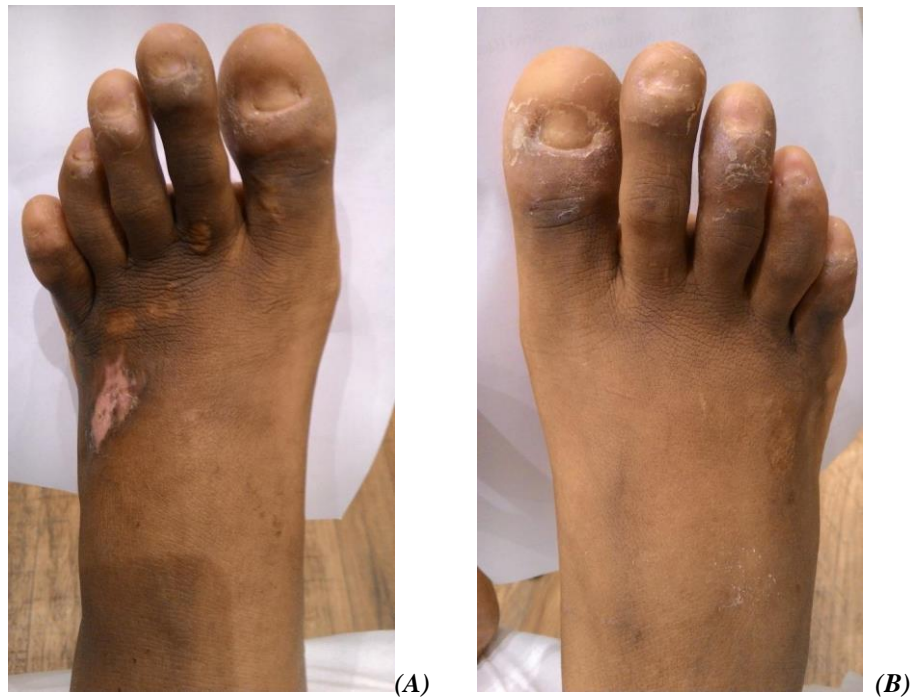
The decision was made to perform a special way of dressing. Firstly, we did a gentle debridement of the non-viable tissues and curettage to refresh the wound's bed, cleansed by NS 0.9%. The special dressing consisted of application of Inadine patch "non-adherent dressing" with nu-gel (sodium alginate hydrogel) and moist exposed burn ointment (Mebo cream), then covered by gauze and conforming bandage every other day. Around three weeks later, the patient ulcers completely healed and without the need of any further intervention.

2. DISCUSSION

Peripheral neuropathy is one of the most common complications among patients with diabetes mellitus, with 60–70% of all diabetics developing peripheral neuropathy [8]. Impaired sensation as a result of peripheral neuropathy may lead to prolonged exposure to injurious stimuli and result in more severe friction or burn injury. peripheral neuropathy is known to be predisposing factors for burn injuries, because of the decrease in protective sensation and tissue vascularity [9]. Chemical burn considered one of the commonest and dangerous types of burning, due to its corrosive effect on the contact surface. The severity of complications varies according to the chemical type, affected body part, age and exposure duration, which include sepsis from infection, hypotension due to arterial damage, blood clots due to prolonged hospitalization, limited ROM and depression. Management of burn-in diabetic patient is more difficult than in non-diabetic patients, referred to its direct and indirect effect on the neurovascular system. Burns in diabetic patients even when they are minor may lead to ulceration of the wound, serious infection and even amputation of the limb. In addition to its corrosive effect of the chemical substance, the diabetic patient has an impaired immune function, impaired sensation, and vascular supply, therefore they have an increased risk of injury, prolonged management course and more susceptibility to facing complications mentioned above. Therefore, early presentation to a specialized clinic and controlling glucose level in the blood and patient education are very important on the management without facing further complications.

Our patient is a clear example of a failure of the conservative management. As she tried multiple ways of management outside our center in the form of regular dressing by povidone and others but failed. There were several reasons explaining the failure of such treatment including inappropriate and noncompliance of the desired debridement and lacking the proper education of the patient.

Conservative treatment of our patient was successful because the chemical burn just affected the superficial part of the skin, with the absence of infection, making the healing process easier. Our plan started with a gentle debridement of the non-viable tissues and curettage to refresh the wound's bed, cleansed by NS 0.9%, and applied Inadine patch "non adherent dressing" with nu-gel (sodium alginate hydrogel) and Moist Exposed Burn Ointment (Mebo cream), then covered by gauze and conforming bandage every other day. The same management plan was continued for three weeks only, the patient was advised for regular follow-up and dressing, educated to inspect her feet for any changes daily as change of color, swelling or wounds; especially the bony prominences and interdigital web spaces and to report promptly, and to keep feet dry and clean all the time, especially interdigital area, apply lotion to feet twice per day, trimming of nails should not be done by herself; trim them straight across; then smoothed with a nail file and to avoid cutting into the corners of toes, avoid going barefoot; even indoors, avoid using sandals or those that place extra pressure against the foot, keep wound dressing dry and clean all the time. By this way, the patient recovered completely with complete healing of ulcers within the expected time, as shown in Fig. 2.



3. CONCLUSION

In a diabetic patient with peripheral neuropathy who develop ulcer the management will take long recovery time, with chemical burn being the cause the recovery time will be prolonged as a result of deep tissue injuries that do not appear clinically.

To treat and prevent burn injuries in diabetic patients, patient education and compliance are needed. They should avoid walking barefoot and early referral to a specialized center to minimize complications.

Figure legends

FIG.1: showing a superficial burn resulting in an ulcer in the right foot (a) and in the left foot (b) at the first visit.

FIG.2: showing complete healing of the ulcers in the left foot (a) and the right foot (b) during the seventh visit.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

We have reported a single case and ethical approval is not necessary for reporting single case without showing any characteristic of the patient identity.

Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors have no conflicts of interest to declare.

REFERENCES

- [1] Nerone VS, Springer KD, Atway SA. Diabetic foot burns: a case series. *The Journal of Foot and Ankle Surgery*. 2014 Jul 1;53(4):453-5.
- [2] Cowie, C. C., Rust, K. F., Ford, E. S., Eberhardt, M. S., Byrd-Holt, D. D., Li, C., ... & Geiss, L. S. (2009). Full accounting of diabetes and pre-diabetes in the US population in 1988–1994 and 2005–2006. *Diabetes care*, 32(2), 287-294.

- [3] Kimball, Z., Patil, S., Mansour, H., Marano, M. A., Petrone, S. J., & Chamberlain, R. S. (2013). Clinical outcomes of isolated lower extremity or foot burns in diabetic versus non-diabetic patients: a 10-year retrospective analysis. *Burns*, 39(2), 279-284.
- [4] Ryan, C. M., Schoenfeld, D. A., Thorpe, W. P., Sheridan, R. L., Cassem, E. H., & Tompkins, R. G. (1998). Objective estimates of the probability of death from burn injuries. *New England Journal of Medicine*, 338(6), 362-366.
- [5] Feldman, E. L. (2003). Oxidative stress and diabetic neuropathy: a new understanding of an old problem. *The Journal of clinical investigation*, 111(4), 431-433.
- [6] Vinik, A. I., Maser, R. E., Mitchell, B. D., & Freeman, R. (2003). Diabetic autonomic neuropathy. *Diabetes care*, 26(5), 1553-1579.
- [7] Agha RA, Fowler AJ, Saetta A, Barai I, Rajmohan S, Orgill DP, for the SCARE Group. The SCARE Statement: Consensus-based surgical case report guidelines. *Int J Surg* 34:180-186, 2016.
- [8] Diabetes statistics. American Diabetes Association. [http:// www.diabetes.org/diabetes-basics/diabetes-statistics/](http://www.diabetes.org/diabetes-basics/diabetes-statistics/); 2011 [accessed 02.07.11].
- [9] Shalom A, Friedman T, Wong L. Burns and diabetes. *Ann Burns Fire Disasters*. 2005;18(1):31-3.