

Late Presentation of Diabetic Foot Ulcer in a Type 1 Diabetes Mellitus Patient

Aisha Yibaikwal Shehu¹, Shema Abdulrahman Abba², Musa Faruk³, Odinakachi Agwu-Umah Kalu⁴

¹Department of Medicine, Plateau State Specialist Hospital, Jos, Plateau State, Nigeria, ²Department of International Education, Shenyang Medical College, Liaoning Province, China, ³Department of Mathematics, Ibrahim Badamasi Babangida University, Niger State, ⁴Department of Medicine, Abia State University Teaching Hospital, Aba, Abia State, Nigeria

Abstract

Diabetic foot ulcers (DFUs) are one of the most serious complications of diabetes mellitus and the second most common cause of amputation in Nigeria. The aim of this case report is to present the consequences of late presentation of a DFU. A 47-year-old man who has been a type 1 diabetic for 19 years with a haemoglobin A1c level of 5.6% presented to our facility with a discharging left foot wound of two months' duration. Examination revealed a left foot that was edematous with areas of necrosis discharging pus from the dorsum of the foot. He had a below-knee amputation and received postamputation rehabilitation. DFUs require a multidisciplinary approach to their management. It is important that individuals with diabetes are educated about DFUs as part of a preventive measure in addition to diet, exercise, and medication.

Keywords: Amputation, case report, complication, diabetic foot ulcer, type 1 diabetes

INTRODUCTION

Diabetes foot ulcer is one of the chronic complications of diabetes mellitus (DM). Globally, there are over 400 million people living with diabetes, and this number is expected to increase beyond 600 million by the year 2045.^[1] Low and middle-income countries (LMIC) of the world bear the greatest burden of diabetes.^[2] Management of diabetic foot in LMIC is faced with a lot of difficulties, including fragmentation of care, inadequate allocation of resources, and unwavering attention to achieving glycemetic control.^[3,4] The diabetic foot comprises a variety of pathological conditions that affect the feet in diabetics. DM is the second most common indication for amputation after trauma in Nigeria.^[5] Amputation is the removal of the nonviable portion of the limb. Foot ulcers are lesions involving a break in the skin that leads to loss of the epithelium. The break in the skin can sometimes extend into the dermis and deeper tissues, such as the bone and muscle. Diabetics have a 25% lifetime risk of developing foot ulcers.^[6] According to the International Working Group on Diabetic Foot, a wound is defined by the presence of purulent material or any two or more of the following: Foul smell, local warmth, peri-wound edema, peri-wound redness, pain or tenderness on palpation, and fever.^[7] About 25% of patients with diabetic

foot ulcers (DFUs) eventually require amputation.^[8] The consequences of lower limb amputation are reduced quality of life, aggravated social burden, and reduced life expectancy.^[9] This case study demonstrates the complication of diabetes on foot due to late presentation in seeking medical treatment and the use of nonappropriate methods in treating foot ulcers.

CASE REPORT

A 47-year-old male, a known type 1 diabetes patient, has been on subcutaneous insulin (Mixtard 30 IU AM and 15 IU PM) for 19 years. He was admitted on account of a left leg wound of two months' duration. He has no other comorbidities like hypertension, retrovirus disease, chronic kidney disease, or chronic liver disease. His body mass index is 22 kg/m² (weight: 55 kg, height: 160 cm). At his presentation to our facility, he had a random blood glucose of 8.7 mmol/L.

Address for correspondence: Dr. Aisha Yibaikwal Shehu,
Plateau State Specialist Hospital, Jos, Plateau, Nigeria.
E-mail: yibaikwalaisha@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Shehu AY, Abba SA, Faruk M, Kalu OA. Late presentation of diabetic foot ulcer in a type 1 diabetes mellitus patient. Niger J Med 2023;32:211-4.

Submitted: 06-Mar-2023

Revised: 05-Apr-2023

Accepted: 22-Apr-2023

Published: 14-Jul-2023

Access this article online

Quick Response Code:



Website:
<http://journals.lww.com/NJOM>

DOI:
10.4103/NJM.NJM_25_23

His temperature, pulse, and blood pressure were all within normal limits. On examination of the left lower limb, it was edematous, with an area of necrosis discharging pus from the dorsum of the foot. An assessment of DFU grade 4 was made [Figure 1]. Laboratory investigations done reported a raised neutrophil count. The fasting blood glucose was 3.8 mmol/L. The fasting lipid profile was within normal range, and the serum haemoglobin A1c (HbA1c) was 5.6%. The physical examination was unremarkable. He was kept on the same insulin regimen. Immediately on admission, he was commenced on broad-spectrum intravenous (IV) antibiotics (IV ceftriaxone, Sulbactam 1.5 g 12 hourly, and Metronidazole 500 mg 8 hourly). At the presentation, a wound swab was collected for microscopy, culture, and sensitivity. Three days later, heavy growth of *Proteus* spp. was cultured and was most sensitive to chloramphenicol, which warranted the addition of IV chloramphenicol 1 g six hourly for seven days to his antibiotic regimen. He received daily wound dressing in the surgical ward [Figure 2], and he had a surgical debridement with disarticulation of the 3rd and 4th toes two days after admission [Figure 3]. Before the debridement, he had a packed cell volume (PCV) of 35%; after the debridement, he was noticed to be pale, and the PCV test done was 19. He had a blood transfusion with three pints of blood. He was counselled on the need for a below-knee amputation due to the extensiveness of the lesion. He and family members initially rejected the idea; two weeks later, he agreed to have the procedure done. He had a below-knee amputation with an uneventful outcome [Figure 4]. He was discharged on the 26th postoperative day. He received postamputation rehabilitative therapy.

DISCUSSION

In our study, a review of our index patient showed that lack of knowledge about diabetic foot care and warning signs of diabetic foot despite adherence to medication is a major risk factor for amputation. DFU is one of the most severe consequences of diabetes, and it is associated with high

morbidity and mortality.^[10] According to the World Health Organisation, diabetic foot syndrome is an ulceration of the foot (distally from the ankle and including the ankle) associated with neuropathy and different stages of ischemia and infection.^[11] It is estimated that 5% of patients with a history of foot ulcers and diabetes have a 15% risk of developing such complications.^[12] About 60%–80% of foot ulcers will heal, 10%–15% of them will remain active, and 5%–25% will require limb amputation within a period of 6–18 months after initial evaluation.^[13] The common causes of DFUs are: peripheral neuropathy, foot deformity, high plantar pressure, trauma, and peripheral arterial disease.^[11] Peripheral neuropathy is the most important cause of foot ulcers in diabetic patients. It impairs nerve activity throughout the body as well as autonomic, sensory, and motor functions,^[11,14] with sensory neuropathy presenting the most frequent event in the pathogenetic axis that causes DFU.^[15]

According to the plane of amputation, DM-related lower limb amputations are classified as either major or minor. Major amputation involves amputations above the ankle, below the knee, and at the hip and is done when it is not possible to treat the severe disease condition with vascular remodeling, medication control, or minor amputation. On the other hand, a minor amputation includes digital amputation, metatarsal resection, and partial foot amputation; it involves partial vascular repair or limb correction, and infected and necrotic tissue is removed. A major amputation may be done following minor amputations in the following conditions: if the wound is not likely to heal, if gangrene or infection has spread to the mid-foot region.^[16] The Wagner grade for diabetic foot disease is the most popular scale for assessing diabetic feet and serves as a crucial foundation for deciding how to manage amputations caused by DM. The higher the Wagner grade of the ulcer at presentation, the higher the rate of amputation.^[17] This is in line with the study conducted in Edo State, Nigeria,^[18] which reported that the majority of patients with grade 4 and 5 DFU will require amputation.



Figure 1: At initial presentation



Figure 2: After daily dressing in the ward



Figure 3: Surgical debridement and disarticulation

In a meta-analysis conducted, it was reported that men are more likely to develop DFUs than females, and men are less likely to care for their feet than females and seek medical attention.^[9] The study further reported that the HbA1c level and type of diabetes did not influence amputation incidence.^[9] In another study conducted in northern Nigeria, it was reported that there were no associated risk factors with age, gender, diabetic foot care education, walking barefoot, neuropathy, hypertension, smoking, or osteomyelitis and the development of DM foot ulcers.^[19] This is similar to a study conducted by Pensey (2010)^[20] but contrary to what was reported by Carlson and Reed., which stated gender, foot infection, foot abscess, osteomyelitis, diabetic retinopathy, and diabetic nephropathy are risk factors for toe amputation.^[21]

In Nigeria, insufficient knowledge, skills, and education on the part of patients and physicians contribute to the increased prevalence and worse outcomes of DFUs. A lot of people do not have access to healthcare, and the majority of patients present late to healthcare facilities when all herbal and traditional medications fail to resolve their condition. Major contributors to the worse outcome of DFUs are financial constraints and poor glycemic control. In addition, inadequate facilities and experts such as podiatrists and orthotists are obstacles to prompt and appropriate treatment.^[22] The risk of amputation is much higher in patients who delay presenting to the hospital for expert management. Some of the factors responsible for late presentation to the hospital are: unawareness of the presence of the foot ulcer, underestimating the significance of the problem, and lack of access to appropriate healthcare providers. Other factors could be economical, such as poverty and the high cost of treatment, misinformation, and the patient's beliefs.^[23] The outcome of patients can be improved by educating individuals who have diabetes about good glycemic control and diabetic foot care, including the dos and don'ts such as avoiding tight-fitting shoes and early presentation to a hospital facility when they sustain a wound. Increase funding



Figure 4: Post amputation

and the allocation of resources for specialised foot clinics. In this case report, the patient developed a DFU despite having a HbA1c level within the normal range. The presence of gangrene increased the risk of amputation.^[9] Regardless, the role of glycemic control cannot be ignored in the prognosis of DFUs, and more research should be conducted on this topic. There are some limitations in our facility, such as a lack of specialists (podiatrist, endocrinologist, plastic surgeon), which may have contributed to a poor outcome.

CONCLUSION

In our case, the patient presented late and refused amputation due to ignorance on severity of condition and lack of knowledge on diabetic foot care. Insufficient knowledge, skills, and education on the part of patients and physicians contribute to the increase prevalence and worse outcome of DFU. Educational programs on diabetes should not be limited to diet emphasis should also be diabetic foot care and signs of diabetic neuropathy even before developing a leg ulcer for diabetics.

Patient perspective

The patient was satisfied with treatment received and has commenced the use of crutches. He is saving money to buy a prosthetic leg. He regrets presenting late to the hospital and wished he was educated about diabetic foot care earlier.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Morbach S, Furchert H, Gröblichhoff U, Hoffmeier H, Kersten K, Klauke GT, *et al.* Long-term prognosis of diabetic foot patients and their limbs: Amputation and death over the course of a decade. *Diabetes Care* 2012;35:2021-7.
- Peer N, Kengne AP, Motala AA, Mbanya JC. Diabetes in the Africa Region: An update. *Diabetes Res Clin Pract* 2014;103:197-205.
- Sarfo-Kantanka O, Sarfo FS, Kyei I, Agyemang C, Mbanya JC. Incidence and determinants of diabetes-related lower limb amputations in Ghana, 2010-2015- a retrospective cohort study. *BMC Endocr Disord* 2019;19:27.
- Guell C, Unwin N. Barriers to diabetic foot care in a developing country with a high incidence of diabetes related amputations: An exploratory qualitative interview study. *BMC Health Serv Res* 2015;15:377.
- Ekere AU, Yellowe BE, Dodiya-Manuel A. Pattern and management approach of diabetic foot disease in a developing country. *Niger J Med* 2005;14:272-5.
- Singh N, Armstrong DG, Lipsky BA. Preventing foot ulcers in patients with diabetes. *JAMA* 2005;293:217-28.
- Lipsky BA, Aragón-Sánchez J, Diggle M, Embil J, Kono S, Lavery L, *et al.* IWGDF guidance on the diagnosis and management of foot infections in persons with diabetes. *Diabetes Metab Res Rev* 2016;32 Suppl 1:45-74.
- Pendsey SP. Understanding diabetic foot. *Int J Diabetes Dev Ctries* 2010;30:75-9.
- Lin C, Liu J, Sun H. Risk factors for lower extremity amputation in patients with diabetic foot ulcers: A meta-analysis. *PLoS One* 2020;15:e0239236.
- Habibu RA, Uloko AE, Gezawa ID, Ramalan MA, Muhammad FY, Abubakar UI, *et al.* Health-related quality of life of persons with diabetic foot ulcers in a cosmopolitan city in northwestern Nigeria. *Ann Afr Med* 2022;21:250-4.
- Tuttolomondo A, Maida C, Pinto A. Diabetic foot syndrome: Immune-inflammatory features as possible cardiovascular markers in diabetes. *World J Orthop* 2015;6:62-76.
- Abbott CA, Carrington AL, Ashe H, Bath S, Every LC, Griffiths J, *et al.* The North-west diabetes foot care study: Incidence of, and risk factors for, new diabetic foot ulceration in a community-based patient cohort. *Diabet Med* 2002;19:377-84.
- Lauterbach S, Kostev K, Kohlmann T. Prevalence of diabetic foot syndrome and its risk factors in the UK. *J Wound Care* 2010;19:333-7.
- Ramsey SD, Newton K, Blough D, McCulloch DK, Sandhu N, Reiber GE, *et al.* Incidence, outcomes, and cost of foot ulcers in patients with diabetes. *Diabetes Care* 1999;22:382-7.
- LeQuesne P, Parkshouse N, Faris I. Neuropathy. In: Faris I, editor. *The management of the diabetic foot*. 2nd ed. Edinburgh: Churchill Livingstone;1991. p. 41.
- Liao X, Li SH, El Akkawi MM, Fu XB, Liu HW, Huang YS. Surgical amputation for patients with diabetic foot ulcers: A Chinese expert panel consensus treatment guide. *Front Surg* 2022;9:1003339. Available from: <https://pubmed.ncbi.nlm.nih.gov/36425891/>.
- Eggert JV, Worth ER, Van Gils CC. Cost and mortality data of a regional limb salvage and hyperbaric medicine program for Wagner Grade 3 or 4 diabetic foot ulcers. *Undersea Hyperb Med* 2016;43:1-8.
- Edo AE, Edo GO, Ezeani IU. Risk factors, ulcer grade and management outcome of diabetic foot ulcers in a Tropical Tertiary Care Hospital. *Niger Med J* 2013;54:59-63.
- Enamino M, Odoh G, Uwakwe JN, Puepet FH. Predictors of lower extremity amputation among patients with diabetic foot ulcer in a tertiary health facility in north central Nigeria. *Niger J Med* 2018;27:92-6.
- Shojaiefard A, Khorgami Z, Larijani B. Independent risk factors for amputation in diabetic foot. *Int J Diabetes Dev Ctries* 2008;28:32-7.
- Carlson T, Reed JF 3rd. A case-control study of the risk factors for toe amputation in a diabetic population. *Int J Low Extrem Wounds* 2003;2:19-21.
- Adeleye JO. Diabetic foot disease: The perspective of a Nigerian tertiary health care Centre. *Pract Diabetes Int* 2005;22:211-4.
- Ogunlana MO, Govender P, Oyewole OO, Odole AC, Falola JL, Adesina OF, *et al.* Qualitative exploration into reasons for delay in seeking medical help with diabetic foot problems. *Int J Qual Stud Health Well-being* 2021;16:1945206.