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Case Report

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Diabetic foot ulcer with osteomyelitis in a young type 1 diabetic: a case report

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ABSTRACT

Diabetic foot ulcer (DFU) infection and osteomyelitis increase the risk of lower limb amputation. The prevalence of osteomyelitis (OM) varies between 20 and 68%. Resection of infected and necrotic bone is advocated as treatment for patients with osteomyelitis. This case report aims to highlight a DFU in a young adult with type 1 diabetes. We present a case of a 30-year-old Kuwaiti male who presented with progressive pain from a right foot DFU at the level of the 5th metatarsophalangeal joint (MTPJ) base, associated with fever and loss of appetite for two weeks. MRI revealed osteomyelitis involving the proximal phalanx of the 5th digit and the distal shaft and head of the 5th metatarsal. The patient underwent successful debridement and resection of the 5th MTPJ. Post-operatively, he was managed with advanced dressing and negative pressure wound therapy (NPWT), which was discontinued after two sessions due to surrounding skin maceration. Topical hemoglobin spray was then used. The wound almost completely healed within approximately 10 weeks.

Keywords: Diabetic foot ulcer, DFU, Type 1 diabetes, Osteomyelitis, Diabetic foot ulcer in young adult, Diabetic foot wounds

INTRODUCTION

Diabetic foot ulcers (DFUs) are among the most debilitating and costly complications of diabetes mellitus, affecting up to 25% of patients during their lifetime and accounting for the majority of non-traumatic lower extremity amputations worldwide.[1] These ulcers frequently progress to deep infections, including osteomyelitis (OM), which occurs in up to 68% of infected DFUs and significantly increases the risk of limb loss.[2] The development of OM often marks a critical threshold in DFU progression, where delayed or inadequate intervention may lead to irreversible tissue destruction and major amputation.[3] Several risk factors contribute to the chronicity and poor prognosis of DFUs, including peripheral neuropathy, peripheral arterial disease, and-critically-poor glycemic control.[4] Hyperglycemia disrupts wound healing through multiple mechanisms, including impaired leukocyte function, diminished angiogenesis, and altered tissue remodeling.[5] As such, glycemic optimization remains a cornerstone of effective DFU management.

While the clinical burden of diabetic DFUs and OM is well documented in older adults with type 2 diabetes mellitus (T2DM), significantly less attention has been paid to these complications in younger patients with type 1 diabetes mellitus (T1DM)-a demographic that remains underrepresented in both research and clinical guidelines.[6] Despite their younger age, patients with longstanding T1DM and suboptimal glycemic control are at risk of severe, limb-threatening infections requiring

aggressive multidisciplinary care. This case report aims to address this gap by presenting the successful limb salvage of a 30-year-old male with poorly controlled T1DM and MRI-confirmed osteomyelitis, managed with staged surgery, intensive glycemic control, and advanced wound therapies.

CASE REPORT

A 30-year-old Kuwaiti male with type 1 diabetes mellitus since age five and poor glycemic control (HbA1c~9) presented with a two-year history of a non-healing right foot ulcer that worsened over the prior two weeks. Symptoms included pain, erythema, and intermittent fever. His past medical history included bilateral diabetic retinopathy, ischemic maculopathy (right ocular surgery), ectopic kidney, and GERD (on treatment). He was a heavy smoker (20 cigarettes/day).

On examination, the patient was hemodynamically stable and fully conscious. Local examination revealed a Wagner stage 3 DFU on the plantar aspect of the 5th MTPJ (Metatarsophalangeal joint), measuring 2×2 cm containing slough tissue in its base. The ulcer was surrounded with erythema which was extending to the mid foot (Figure 1a).

Peripheral neuropathy assessment using the 10-gm monofilament test confirmed sensory loss. It is imperative to establish the vascular status of the lower limb when presented with a new or non-healing diabetic foot ulcer. In this case Vascular assessment showed normal ABPI (0.9) and strong foot pulses. X-ray suggested early osteomyelitis (Figure 1b). Systemic review was unremarkable. Family history revealed recently father and uncle diagnosed with type 2 DM. The patient was admitted and started on broad spectrum antibiotics.

Blood work showed WBC 14,000, Hb 9.8 g/dl, CRP 66 mg/l, RBS 24 mmol/l, creatinine 130 µmol/l, and INR 1.9. An impression of severe diabetic foot infection with stage 3 Wagner DFU was made and the patient was prepared for urgent incision, drainage and debridement (I&D). Intraoperative findings included necrotic tissue at the level of the 5th MTPJ and pus tracts. (inferio-medially and superio-laterally (Figure 2). A bone chip from the 5th MTPJ was sent for culture. Good bleeding was noticed during the whole procedure. Post-op the MRI was performed to understand the extent of osteomyelitis. Findings were evident of osteomyelitis in the 5th proximal phalanx and corresponding metatarsal distal shaft and head with no evidence of residual soft tissue collection or abscess.

Subsequently culture grew *Streptococcus agalactiae*, sensitive to penicillin to which the antibiotics were adjusted accordingly after consulting infectious disease specialist. The situation was discussed with the patient and his family regarding possibility of 2nd stage surgical intervention.

Figure 1: (a) initial presentation of diabetic foot ulcer with surrounding induration. (b) Initial X-ray on presentation with periosteum elevation of 5th MTPJ, (c) Post op-X-ray with resection of 5TH MTPJ.

The patient underwent 2nd stage of surgical intervention with resection of 5th MTPJ (metatarsophalangeal joint) (Figure 1c). Intraoperatively, there was ischemic fat layer at planter aspect (Figure 3 lower), with a tract extending to mid-planter aspect (Figure 3 upper), otherwise no Residual discharge was noticed. Debridement of the unhealthy tissue was carried out followed by thorough

cleansing. The resected bone was sent for culture and sensitivity, which finally showed no growth. The patient was managed with antibacterial dressing for next few days followed by NPWT (negative pressure wound therapy).

Post-op, NPWT was applied but later withheld due to skin maceration. Dressing with a gelling fiber dressing containing silver (Exufiber AG) and topical hemoglobin spray (Granulox) was used, improving wound oxygenation and granulation. The active substance hemoglobin supplies the base of the wound externally with oxygen stimulates the granulation. On further follow-up to the clinic, a marked improvement was evident (Figure 4b), the wound was superficial and new epithelialization tissue was visible around the wound margins. The patient continued to attend the clinic on a twice-weekly basis, for a further six weeks, to ensure optimum wound healing provision and continuity of care with respect to choice of dressings. The ulcer went on to heal almost completely within a period of 10 weeks approximately.

Figure 2: The initial intra-op findings post I & D with diffuse unhealthy tissue with tracts: inferio-medially and superio-laterally(arrows).

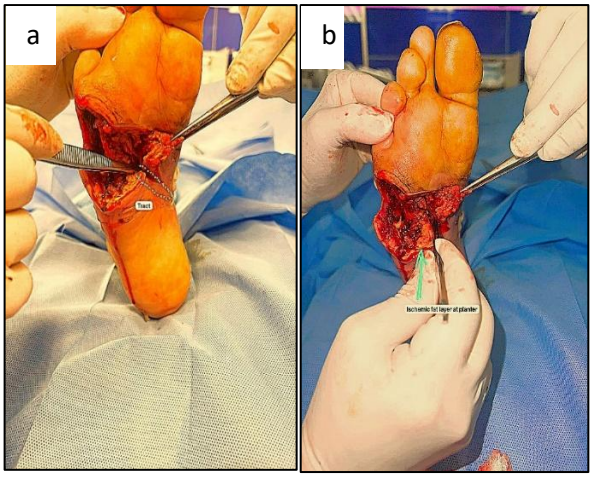

Figure 3 (a) Tract extending to mid-planter aspect obliquely (mark with dots) and (b) Ischemic fat layer (with arrow).

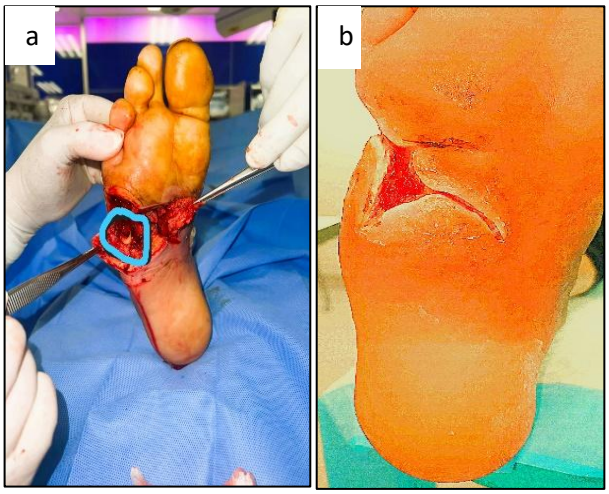

Figure 4: (a) Resected MTPJ with exposed remnant of 5th Metatarsal bone (with circle). (b) Partially healed wound which goes on complete healing within almost 10 weeks.

Figure 5: Completely healed wound.

DISCUSSION

While DFUs are most commonly studied in older adults with T2DM, this case reinforces that severe DFU complications, including OM, can also occur in younger adults with T1DM a demographic largely underrepresented in the DFU literature.[10] The presence of OM, confirmed by MRI, marked a critical inflection point in this patient's clinical trajectory. Without timely intervention, osteomyelitis in the context of DFUs has been shown to dramatically increase the risk of major amputation and poor healing outcomes.[11]

Multiple clinical risk factors likely contributed to ulcer progression in this case, including poorly controlled glycaemia, sensory neuropathy, and limited perfusion-features consistent with DFU pathophysiology in older cohorts.[12] Hyperglycemia, in particular, impairs neutrophil migration, sustains chronic inflammation, and disrupts wound matrix remodeling, all of which can impede healing and foster infection.[13] The decision to pursue early surgical debridement was supported by evidence showing that delayed intervention in OM can result in irreversible tissue loss and poorer surgical outcomes.[14]

Limb salvage was further supported by aggressive glycemic optimization, broad-spectrum antibiotics, and advanced wound therapies including negative pressure wound therapy (NPWT), which has been shown in randomized trials to accelerate healing and improve wound closure rates in diabetic foot ulcers.[15] Importantly, this case was managed within a structured multidisciplinary team (MDT) framework involving endocrinology, vascular surgery, infectious disease, and wound care nursing. MDT care has been repeatedly shown to improve DFU outcomes, reduce amputation rates, and facilitate earlier intervention.[16]

This case highlights a key lesson: younger age and T1DM status do not preclude the development of severe DFU complications. Instead, they highlight the need for earlier risk stratification and equally rigorous management protocols in younger patients. To our knowledge, this is one of the few published reports demonstrating successful limb salvage in a young adult with T1DM and MRI-confirmed OM, emphasizing that aggressive multidisciplinary care can reverse an otherwise limb-threatening trajectory.

CONCLUSION

Diabetic foot ulcers proper clinical examination with specific clinical guidelines and cost-effective therapies need to be developed urgently to halt this catastrophic pandemic. The case study highlights the importance of foot care, relevance of early detection of diabetes and subsequent monitoring of diabetic complications and timely proper care is necessary through this one can avoid amputation in young individuals having type 1 DM. Clinical suspicion is very important when commencing a medical investigation for osteomyelitis.

A thorough assessment of the foot or lower extremity should be performed, including examination of the ulcer, presence of peripheral neuropathy (present in 88% of DFUs), peripheral vascular disease (present in 45–65% of DFUs), and the extent of any underlying infection. Infected DFUs usually have purulent secretions or at least two signs of inflammation, yet diabetic foot-associated osteomyelitis can occur without any local signs of infection. Systemic symptoms are rare due to the presence of diabetic immunopathy, which impairs the patient's response to inflammation and infection.

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