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CASE PRESENTATION

Clinical case of diabetic foot infected by Escherichia coli in Meggitt-Wagner stages III–IV

Segundo Moisés San Lucas-Coque[1], John Henry Sánchez-Lascano[1], Dayana Salomé Gallegos-Mera[3]

[1]Universidad Regional Autónoma de Los Andes. Ambato, Ecuador.

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ABSTRACT

Introduction: diabetic foot is one of the most severe chronic complications of diabetes mellitus, associated with infections, vascular impairment, and a high risk of amputation when timely and comprehensive management is not implemented.
Objective: to describe the clinical course and therapeutic approach of a patient with advanced diabetic foot complicated by opportunistic bacterial infection.
Case presentation: a 62-year-old male patient with a history of type 2 diabetes mellitus and arterial hypertension presented with a progressive ulceration on the right foot of twelve days' duration. Clinical examination revealed an extensive lesion measuring between five and ten centimeters, with deep tissue involvement, presence of larvae, and signs of severe infection, consistent with stages III–IV of the Meggitt-Wagner classification. Laboratory studies showed marked hyperglycemia, leukocytosis with neutrophilia, and progressive anemia. Culture of the secretion identified Escherichia coli as the causative agent, with a favorable antimicrobial sensitivity pattern. Doppler ultrasound ruled out thrombosis but revealed venous insufficiency and arteriosclerosis. Treatment was initiated with daily wound care, metabolic control, targeted antibiotic therapy, and comprehensive management of the patient's general and emotional condition, resulting in favorable clinical evolution.
Conclusions: comprehensive management of advanced diabetic foot, based on timely microbiological diagnosis and targeted antibiotic therapy, can prevent amputations even in severe stages. This case highlights the importance of multidisciplinary care and metabolic and emotional control in patients with chronic diseases.

Keywords: Wound Infection; Escherichia Coli Infections; Diabetic Foot; Foot Ulcer.

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INTRODUCTION

Diabetic foot is a chronic complication associated with diabetes mellitus—a lifelong condition characterized by elevated blood glucose levels. This pathology affects the feet of individuals with diabetes, and its progression causes damage to nerves and blood vessels, primarily due to sustained hyperglycemia. As the disease advances, consequences include peripheral neuropathy, loss of sensation, reduced blood circulation, and structural changes in bones and joints. These factors predispose patients to foot ulcers—open wounds that, if inadequately treated, can become infected and lead to severe complications.(1)

Loss of foot sensation renders patients unaware of injuries or irritations, increasing the risk of unnoticed trauma. Additionally, poor circulation impairs the body's ability to heal wounds effectively. In advanced cases, ulcers may extend into deeper tissues, leading to gangrenous stages.(2)

The Meggitt-Wagner scale—also known as the Wagner classification—is a clinical tool used to assess the severity of foot ulcers in diabetic patients. Developed by D.G. Armstrong and L.A. Lavery, this system helps healthcare professionals determine the extent of foot lesions and guide appropriate treatment.(3)

Opportunistic bacterial infections can develop due to a combination of diabetes-related factors, including neuropathy, impaired blood flow, and increased susceptibility to infection. Bacteria from the skin or environment can enter open ulcers. The combination of heat, moisture, and necrotic tissue in the diabetic foot creates an ideal environment for bacterial growth, as the skin barrier is compromised. Unlike a well-vascularized limb, the diabetic extremity fails to mount an adequate inflammatory response—resulting in insufficient local perfusion and leukocyte accumulation. Moreover, altered tissue perfusion prevents antibiotics from reaching effective histological concentrations.(4) Given these considerations, the present study was conducted with the objective of describing the clinical evolution and therapeutic management of a patient with advanced diabetic foot complicated by opportunistic bacterial infection.

CLINICAL CASE REPORT

We present a 62-year-old male from Sucumbíos Province with a medical history of type 2 diabetes mellitus (treated with metformin 500 mg) and arterial hypertension (treated with enalapril 25 mg). He presented with a 12-day progressive ulceration on the right lower extremity, originating at the hallux (Fig. 1), extending 5–10 cm, with visible larvae (Fig. 2). Capillary glucose measured 450 mg/dL. Upon admission, the hospital initiated wound cleansing and ordered complete blood count and basic metabolic panel.

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Fig. 1 Ulcerated lesion on the right foot with deep tissue involvement and larval infestation, consistent with Meggitt-Wagner stage III–IV diabetic foot.

Fig. 2 Clinical detail of infected diabetic foot ulcer showing signs of myiasis and severe infection prior to treatment initiation.

Laboratory results revealed hemoglobin of 10 g/dL, elevated white blood cells (14,83 $\times 10^9$/L), decreased red blood cells (3,4 $\times 10^{12}$/L), neutrophilia (81,9 %), and elevated platelets (643 $\times 10^9$/L; PT 0.50). Given the neutrophilic predominance—characteristic of bacterial infection—a wound secretion culture and antibiotic susceptibility testing were ordered. Biochemical analysis showed markedly elevated glucose (433,08 mg/dL), low LDH (149,39 U/L), and electrolyte imbalances: ionized calcium 1.10 mmol/L, chloride 93 mmol/L, normal potassium, and sodium 126 mmol/L.

Culture and antibiogram of foot secretion isolated *Escherichia coli*, confirming secondary bacterial infection. The isolate was resistant to ampicillin, clindamycin, tetracycline, and vancomycin, but susceptible to cefuroxime, imipenem, levofloxacin, and norfloxacin.

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Doppler ultrasound of the right lower extremity revealed inflammatory lymphadenopathy (largest node: 38 mm). Venous system showed normal distribution, spontaneous phasic flow, and significant reflux in the common and superficial femoral veins during Valsalva maneuver, with mild saphenofemoral junction reflux. Subcutaneous varicose veins were noted in the calf. No superficial or deep venous thrombosis was observed. Arteries exhibited regular caliber with variable intimal thickening (1,4 mm); arterial flow velocities were adequate throughout, including pedal arteries.

Treatment was initiated with daily wound dressings, intravenous hydration (100 mL/h normal saline), oxacillin 1 g every 6 hours, and clindamycin 600 mg every 8 hours. A follow-up blood test revealed alarming findings: red blood cell count dropped to 2,96 $\times 10^{12}$/L and hemoglobin to 8,5 g/dL, indicating worsening anemia. The patient's emotional state deteriorated due to his foot condition, leading to poor nutritional intake and disease exacerbation. Neutrophils normalized (63,1 %), white blood cells decreased to 9,49 $\times 10^{9}$/L, platelets remained elevated (509 $\times 10^{9}$/L), PT improved to 0,39, and glucose normalized to 69,96 mg/dL.

Clinical evolution: Within two days, the *E. coli* infection was controlled. Tissue tone and appearance improved (Fig. 3), partial vascular recovery was observed, and amputation was avoided. The patient remains anemic but continues outpatient treatment.

Fig. 3 Favorable clinical evolution of diabetic foot after comprehensive treatment, showing improved tissue appearance and absence of active infection.

DISCUSSION

In diabetic patients, poor hygiene and delayed wound healing create conditions conducive to ulcer infection. Flies may deposit eggs in open wounds; these hatch into larvae that colonize affected tissue—a condition known as myiasis—aggravating infection and impairing healing.[5]

The presence of larvae indicates problems with wound care and attention. Prevention includes maintaining good hygiene, caring for wounds, and seeking medical attention. In cases of myiasis, removal of the larvae and wound treatment are required. Diligent foot care is essential to prevent complications in people with diabetes.[6] These eggs hatch into larvae, which develop in the

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affected tissue, worsening the infection and hindering healing. Myiasis highlights the importance of hygiene and proper wound care in diabetic patients to prevent complications.

Bacterial complications in the diabetic foot represent a significant threat to patients' health, and their importance is heightened by growing concerns about bacterial resistance. Diabetes, with its harmful effects on the immune system, blood circulation, and skin integrity, creates a favorable environment for bacterial infections, which can have serious consequences.[7]

In the context of the diabetic foot, bacteria—especially staphylococci and streptococci—can enter through small injuries, ulcers, or cuts in the feet, taking advantage of the combination of neuropathy and poor circulation. These infections can spread rapidly due to the immune system's difficulty in effectively combating bacteria in a compromised environment.[8]

Bacterial resistance, a phenomenon in which bacteria develop the ability to withstand the effects of antibiotics, further complicates the management of infections in the diabetic foot. Frequent and prolonged exposure to antibiotics, common in cases of recurrent infections, creates a favorable ground for the development of resistant bacterial strains.[9] The importance of bacterial complications in the diabetic foot lies in the potential threat of more severe conditions, such as cellulitis, osteomyelitis (bone infection), and gangrene. These complications may require more aggressive interventions, such as surgeries to drain abscesses or even amputations to prevent the spread of infection.[10]

The emotional state of a patient plays a crucial role in their recovery process. There are significant links between mental and physical health, evident in various aspects. Emotions can directly affect the immune system, influence treatment adherence and resilience, reduce pain perception, and contribute to faster recovery.[11] A positive emotional state is commonly associated with greater motivation, participation in rehabilitation, and adoption of healthy habits. On the other hand, stress, anxiety, and depression can have negative effects, increasing the risk of complications and prolonging recovery time. Emotional support, provided by the social network and healthcare professionals, also plays a crucial role in the recovery process. Altogether, addressing both emotional and physical aspects is essential to promote comprehensive recovery and improve the patient's quality of life.[12]

Escherichia coli bacteremia—entry into the bloodstream—can trigger sepsis, a life-threatening systemic inflammatory response. It typically originates from localized infections, presenting with fever, chills, and potentially septic shock. Diagnosis relies on blood cultures, and treatment requires antibiotics tailored to susceptibility profiles.[13,14]

Pathogenic *E. coli* strains possess virulence factors enabling host cell adhesion, toxin production, tissue invasion, and immune evasion. Genetic variability contributes to diverse pathogenic mechanisms—such as uropathogenic or enterohemorrhagic strains. Understanding pathogenesis is vital for effective prevention and treatment strategies.[15]

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CONCLUSIONS

The patient was admitted with advanced diabetic foot, classified as Meggitt-Wagner stage III–IV, featuring an infected ulcer with larval infestation due to fly oviposition and egg hatching—consistent with myiasis. He also developed a secondary *Escherichia coli* infection, likely acquired through exposure to contaminated water in Sucumbíos Province—a region with inadequate water purification systems. The patient responded favorably to targeted antibiotic therapy, showing no antimicrobial resistance. Within two days, clinical improvement allowed avoidance of amputation, with partial recovery of tissue tone and vascularization. However, he developed severe anemia linked to emotional distress, which negatively impacted nutritional intake and immune response, worsening his clinical condition.

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