Section: Miscellaneous

Case Report

# A MULTIDISCIPLINARY APPROACH TO THE MANAGEMENT OF SEVERE DIABETIC FOOT ULCER WITH SKELETAL INSTABILITY: A RARE CASE REPORT

**Premkumar E[1], Aravind P[2], Lakshminarasimman S[3]**

[1]Senior Consultant Surgeon, Chennai Diabetic Foot Care Centre, Chennai, India.
[2]Consultant General Surgeon, Chennai Diabetic Foot Care Centre, Chennai, India
[3]Clinical Project Associate, Chennai Diabetic Foot Care Centre, Chennai, India

*Received* : 16/03/2026
*Received in revised form* : 04/05/2026
*Accepted* : 20/05/2026

*Keywords:*
*Diabetic foot ulcer; Limb salvage; Ilizarov external fixation; Peripheral arterial disease; Negative-pressure wound therapy; Multidisciplinary management.*

Corresponding Author:
**Dr. Premkumar E,**
Email: prem.surgeon@gmail.com

DOI: 10.47009/jamp.2026.8.3.80

Source of Support: Nil,
Conflict of Interest: None declared

*Int J Acad Med Pharm*
2026; 8 (3); 439-446

## ABSTRACT

**Background:** Diabetic foot ulcers (DFUs) complicated by severe infection, peripheral arterial disease, extensive soft-tissue loss, and skeletal instability are among the leading causes of non-traumatic lower-limb amputation in diabetic patients. Successful limb salvage in such advanced cases requires prompt multidisciplinary intervention and staged reconstruction. **Case Presentation:** A 65-year-old male with a 25-year history of poorly controlled type 2 diabetes mellitus presented with progressive gangrenous ulceration of the right lower limb associated with severe pain, foul-smelling discharge, fever, peripheral neuropathy, and ischemic changes. The patient had previously undergone multiple debridements and angioplasty at another center, where major amputation had been advised. Clinical examination revealed circumferential necrotic ulceration extending from the mid-calf to the foot with exposed musculature and significant ankle instability. Radiographs demonstrated fractures of the distal tibia, fibula, and fifth metatarsal. Wound culture isolated multidrug-resistant Pseudomonas aeruginosa. **Intervention:** A staged multidisciplinary limb-salvage protocol was initiated, including strict glycemic control, culture-guided intravenous antibiotics, serial surgical debridement, endovascular revascularization, negative-pressure wound therapy, split-thickness skin grafting, hyperbaric oxygen therapy, and definitive stabilization using Ilizarov external fixation with tibiotalar arthrodesis. **Outcome:** Progressive wound healing with satisfactory graft uptake and resolution of systemic infection was achieved. The Ilizarov frame provided effective stabilization and offloading, allowing gradual mobilization. At 5-month follow-up, the patient retained a functional limb, achieved assisted ambulation, and avoided major amputation. **Conclusion:** This case demonstrates that even severe diabetic foot ulcers complicated by multidrug-resistant infection, ischemia, extensive tissue loss, and skeletal instability can be successfully managed through an aggressive staged multidisciplinary approach. Early revascularization, radical debridement, infection control, soft-tissue reconstruction, and biomechanical stabilization are critical for successful limb salvage and functional recovery.

## INTRODUCTION

Diabetes mellitus is a major global health problem associated with significant long-term microvascular and macrovascular complications.[1] Among these, diabetic foot ulcers (DFUs) represent one of the most severe and disabling complications, contributing substantially to morbidity, repeated hospitalization, reduced quality of life, and increased healthcare expenditure.[2] It is estimated that approximately 15–25% of diabetic patients develop foot ulcers during their lifetime, and nearly 75% of non-traumatic lower-limb amputations occur in patients with diabetes.[3,4] Peripheral neuropathy, peripheral arterial disease (PAD), impaired immunity, and poor glycemic control collectively contribute to the development and progression of diabetic foot infections and tissue necrosis.[5]

Advanced diabetic foot disease complicated by ischemia, multidrug-resistant infection, extensive soft-tissue loss, and skeletal instability poses a major reconstructive challenge. In such cases, major amputation is frequently considered inevitable because of the high risk of systemic sepsis, delayed


ISSN (O): 2687-5365; ISSN (P): 2753-6556

healing, and functional disability.[6] However, advances in vascular intervention, wound management, reconstructive surgery, and external fixation techniques have significantly improved the feasibility of limb salvage in carefully selected patients. [7,8]

Successful limb preservation requires a coordinated multidisciplinary approach involving endocrinologists, vascular surgeons, orthopedic surgeons, plastic surgeons, infectious disease specialists, wound-care teams, and rehabilitation specialists. [9-13] The primary goals of treatment include eradication of infection, restoration of vascular perfusion, preservation of viable soft tissue, correction of deformity, and restoration of functional ambulation.

Negative-pressure wound therapy (NPWT), split-thickness skin grafting (STSG), and hyperbaric oxygen therapy have emerged as valuable adjuncts in promoting wound healing and preparing complex wounds for definitive reconstruction.[12] Furthermore, the Ilizarov external fixation system has gained increasing importance in diabetic limb salvage because it provides stable fixation, deformity correction, offloading, and mechanical protection while allowing early mobilization.[7]

We report a rare and complex case of severe circumferential diabetic foot and lower-leg ulceration associated with multidrug-resistant Pseudomonas aeruginosa infection, peripheral arterial disease, extensive soft-tissue destruction, and skeletal instability successfully managed using a staged multidisciplinary limb-salvage protocol involving revascularization, serial debridement, NPWT, skin grafting, and Ilizarov-assisted arthrodesis.

## CASE PRESENTATION

A 65-year-old male with a 25-year history of poorly controlled type 2 diabetes mellitus presented to our tertiary care center with progressive gangrenous ulceration of the right lower limb. The patient presented with severe pain, foul-smelling purulent discharge, progressive swelling, inability to bear weight, and intermittent high-grade fever of several weeks' duration. He reported gradual worsening of the wound despite undergoing multiple surgical debridements and peripheral angioplasty at another institution, where major lower-limb amputation had been advised because of the severity of infection and tissue destruction. The patient subsequently sought a second opinion for possible limb salvage.

His past medical history was significant for long-standing diabetes mellitus, hypertension, and documented peripheral vascular disease. Medication adherence was poor, resulting in persistently uncontrolled glycemic status.

There was no significant history of smoking, alcohol abuse, or prior major lower-limb surgery.

On admission, the patient appeared toxic and febrile with a body temperature of 38.2°C. Local examination of the right lower limb revealed extensive circumferential ulceration extending from the mid-calf region to the toes. Large areas of full-thickness necrosis with exposed subcutaneous tissue and musculature were present. Extensive slough, purulent discharge, foul odor, and areas of gangrenous tissue were noted. The surrounding skin demonstrated edema, induration, and inflammatory changes suggestive of severe soft-tissue infection.

Vascular examination demonstrated weak distal pulses with delayed capillary refill, indicating compromised distal perfusion. Neurological assessment revealed markedly diminished protective sensation consistent with advanced diabetic peripheral neuropathy. Significant ankle instability and deformity were also observed due to extensive soft-tissue destruction and repeated debridement procedures.

Laboratory investigations revealed leukocytosis, anemia, elevated inflammatory markers, and uncontrolled hyperglycemia with a random blood glucose level of 221 mg/dL. Wound culture and sensitivity testing isolated multidrug-resistant Pseudomonas aeruginosa, which was sensitive to cefepime, doripenem, and tobramycin.

Radiographic evaluation of the right ankle demonstrated fractures involving the distal tibia and fibula associated with severe soft-tissue edema. Foot radiographs additionally revealed a displaced fracture of the fifth metatarsal at the metaphyseal-diaphyseal junction. Doppler ultrasonography of the right lower limb showed significantly reduced distal arterial flow in the posterior tibial artery, with absent flow in the distal one-third segment, findings suggestive of peripheral arterial disease amenable to endovascular revascularization.

Considering the severity of infection, ischemia, extensive soft-tissue loss, and skeletal instability, the limb was categorized as high risk for major amputation. After multidisciplinary evaluation and detailed counseling regarding the guarded prognosis, a staged limb-salvage strategy was planned.

**Figure 1: Extensive circumferential necrotic diabetic foot ulcer with exposed musculature and severe soft-tissue loss of the right lower limb.**

**Figure Notes:** Clinical photograph obtained at initial presentation showing extensive circumferential necrotic ulceration of the right lower limb with severe soft-tissue destruction, foul-smelling slough, and


ISSN (O): 2687-5365; ISSN (P): 2753-6556

exposed musculature. The lesion extended from the distal leg to the foot and was associated with advanced diabetic foot infection, ischemic changes, and extensive tissue loss prior to staged limb-salvage intervention.

**Figure 2: Deep necrotizing soft-tissue involvement of the right lower limb with widespread tissue loss consistent with severe diabetic foot infection.**

**Figure Notes:** Clinical photograph demonstrating extensive circumferential necrosis with deep soft-tissue involvement affecting the distal leg and ankle region. Extensive slough formation, gangrenous tissue changes, and exposed underlying structures were present, indicating advanced diabetic foot infection with severe tissue destruction and ischemic compromise prior to staged reconstructive management.

**Investigations**

Laboratory evaluation on admission demonstrated significant systemic infection and poor metabolic control. Hematological investigations revealed leukocytosis, anemia, and elevated inflammatory markers consistent with severe soft-tissue infection. Random blood glucose level was markedly elevated at 221 mg/dL, indicating uncontrolled diabetes mellitus.

Microbiological culture of wound specimens isolated multidrug-resistant Pseudomonas aeruginosa. Based on antimicrobial susceptibility testing, the organism demonstrated sensitivity to cefepime, doripenem, and tobramycin, while resistance to multiple other commonly used antibiotics was observed. Culture-directed intravenous antibiotic therapy was initiated with cefepime 2 g IV every 12 hours and tobramycin 5 mg/kg/day IV in divided doses under infectious disease supervision. The patient showed gradual clinical improvement following targeted antimicrobial therapy combined with serial debridement and vascular intervention.

**Antimicrobial susceptibility pattern of pseudomonas aeruginosa**

| S. No | Antimicrobial Class | Drug | MIC (µg/ml) | Interpretation | Resistance Status |
|---|---|---|---|---|---|
| 1 | Monobactam | Aztreonam | 6 | Resistant | Resistant |
| 2 | Cephalosporin (3rd gen) | Ceftazidime | 6 | Resistant | Resistant |
| 3 | Cephalosporin (4th gen) | Cefepime | 26 | Sensitive | Sensitive |
| 4 | Fluoroquinolone | Ciprofloxacin | 6 | Resistant | Resistant |
| 5 | Fluoroquinolone | Levofloxacin | 20 | Intermediate | Intermediate |
| 6 | Fluoroquinolone | Ofloxacin | 6 | Resistant | Resistant |
| 7 | Carbapenem | Doripenem | 24 | Sensitive | Sensitive |
| 8 | Carbapenem | Imipenem | 17 | Intermediate | Intermediate |
| 9 | Carbapenem | Meropenem | 6 | Resistant | Resistant |
| 10 | Penicillin / β-lactamase inhibitor | Piperacillin | 6 | Resistant | Resistant |
| 11 | Penicillin / β-lactamase inhibitor | Piperacillin/Tazobactam | 6 | Resistant | Resistant |
| 12 | Penicillin / β-lactamase inhibitor | Ticarcillin-Clavulanic acid | 6 | Resistant | Resistant |
| 13 | Aminoglycoside | Tobramycin | 23 | Sensitive | Sensitive |

**Figure 3: Anteroposterior and lateral radiographs of the right ankle demonstrating displaced distal tibia and fibula fractures associated with severe soft-tissue swelling.**

**Figure Notes:** Preoperative radiographs of the right ankle showing displaced fractures involving the distal tibia and fibula with surrounding soft-tissue edema and deformity. The skeletal instability was associated with extensive diabetic soft-tissue destruction and contributed significantly to impaired limb function and mechanical instability prior to definitive reconstruction.


ISSN (O): 2687-5365; ISSN (P): 2753-6556

**Figure 4: Dorsoplantar and oblique radiographs of the right foot demonstrating a displaced fracture of the fifth metatarsal at the metaphyseal-diaphyseal junction.**

**Figure Notes:** Preoperative radiographs of the right foot demonstrating displaced fracture of the fifth metatarsal associated with severe diabetic foot infection and surrounding soft-tissue swelling. The fracture contributed to structural instability and impaired weight-bearing capacity in the affected limb.

Plain radiographs of the right ankle demonstrated fractures involving the distal tibia and fibula associated with marked surrounding soft-tissue edema and deformity. Radiographs of the right foot additionally revealed a displaced fracture of the fifth metatarsal at the metaphyseal-diaphyseal junction.
Vascular assessment using Doppler ultrasonography of the right lower limb demonstrated reduced distal perfusion in the posterior tibial artery. The proximal two-thirds of the vessel showed a low-resistance flow pattern with preserved velocity, whereas no flow was detected in the distal one-third segment. These findings were suggestive of significant peripheral arterial disease with distal ischemia, although the vascular anatomy was considered amenable to endovascular revascularization.

**CLINICAL TIMELINE**

| Timeline | Clinical Event / Intervention |
|---|---|
| Several weeks before admission | Progressive right lower-limb ulceration with pain, foul-smelling discharge, swelling, and inability to bear weight |
| Prior treatment at outside hospital | Multiple surgical debridements and peripheral angioplasty performed; major amputation advised |
| Day 1 (Admission) | Multidisciplinary evaluation, laboratory investigations, wound culture, glycemic stabilization, intravenous antibiotics initiated |
| Day 2–7 | Serial surgical debridement of necrotic and infected soft tissue |
| First week | Doppler evaluation confirmed peripheral arterial disease with distal ischemia |
| First week | Endovascular revascularization/peripheral angioplasty performed |
| Week 2 | Negative-pressure wound therapy (VAC therapy) initiated |
| Week 3–4 | Progressive granulation tissue formation and infection control achieved |
| Approximately 2 months | Split-thickness skin grafting performed for definitive soft-tissue coverage |
| Subsequent period | Persistent ankle instability identified due to skeletal destruction |
| Later stage reconstruction | Tibiotalar arthrodesis with Ilizarov external fixation performed |
| Rehabilitation phase | Physiotherapy, protected weight-bearing, gait training, and hyperbaric oxygen therapy |
| 5-month follow-up | Functional limb preserved with satisfactory wound healing and assisted ambulation |

**Operative Technique and Management**

Considering the limb-threatening nature of the presentation, a staged multidisciplinary limb-salvage protocol was initiated with the primary objectives of infection eradication, restoration of vascular perfusion, preservation of viable soft tissue, correction of skeletal instability, and functional limb preservation.

**Early Clinical Stabilization**

On admission, the patient was managed in a multidisciplinary setting because of the severe infection and systemic involvement. Initial management focused on hemodynamic stabilization, strict glycemic control using insulin therapy, correction of anemia, electrolyte balance, and nutritional optimization. Empirical broad-spectrum intravenous antibiotics were initiated immediately after obtaining wound cultures and later modified according to culture and sensitivity reports. Daily wound assessment, sterile dressing changes, pain management, limb elevation, and strict offloading of the affected extremity were maintained throughout the stabilization period.

**Serial Surgical Debridement**

Given the extensive circumferential soft-tissue necrosis and persistent infection, multiple staged surgical debridements were performed under strict aseptic precautions. All necrotic skin, devitalized subcutaneous tissue, infected fascia, slough, and nonviable musculature were meticulously excised until healthy bleeding wound margins were obtained. Copious irrigation with normal saline and antiseptic solutions was performed during each procedure to reduce bacterial contamination and remove necrotic debris.
Sequential debridements were necessary because of the severity of tissue destruction and multidrug-resistant Pseudomonas aeruginosa infection. Deep tissue samples were repeatedly collected for microbiological evaluation to monitor infection control and guide antimicrobial therapy. Progressive reduction in necrotic burden and improvement in local wound condition was observed over serial procedures, ultimately resulting in a healthy wound bed suitable for reconstruction.

**Revascularization**


ISSN (O): 2687-5365; ISSN (P): 2753-6556

Vascular assessment demonstrated significant distal ischemia secondary to peripheral arterial disease. Doppler ultrasonography revealed reduced flow within the posterior tibial artery and absent flow in the distal one-third segment. To improve distal perfusion and enhance wound healing potential, the patient underwent endovascular peripheral angioplasty performed by the vascular surgery team. Distal blood flow was successfully restored without perioperative complications. Post-procedural vascular assessment demonstrated improvement in distal perfusion, capillary refill, and limb temperature. Revascularization played a crucial role in facilitating infection control, granulation tissue formation, graft viability, and overall limb preservation.

**Negative-Pressure Wound Therapy**

Following satisfactory debridement and infection control, negative-pressure wound therapy (NPWT/VAC therapy) was instituted between debridement sessions. VAC dressings were applied to promote granulation tissue formation, reduce tissue edema, improve local blood flow, and manage wound exudate.

Progressive development of healthy granulation tissue with reduction in wound slough and inflammatory changes was observed during therapy. NPWT significantly improved wound-bed preparation prior to definitive soft-tissue reconstruction.

**Soft-Tissue Reconstruction**

After achieving adequate infection control and healthy granulation tissue coverage, split-thickness skin grafting (STSG) was performed for definitive wound closure. The graft donor site was harvested using standard surgical technique, and the graft was secured over the prepared wound bed.

Postoperatively, graft viability and wound healing were closely monitored with serial dressing evaluations. Satisfactory graft uptake was observed over subsequent follow-up visits with progressive epithelialization of the wound surfaces.

**Ilizarov External Fixation and Arthrodesis**

Despite successful wound coverage, the patient continued to demonstrate significant ankle instability secondary to extensive soft-tissue destruction, skeletal involvement, and repeated debridement procedures. To address deformity correction, stabilization, and mechanical offloading, right tibiotalar arthrodesis was performed using an Ilizarov external fixation system.

The Ilizarov frame provided multiplanar stability while minimizing plantar pressure over the healing soft tissues. The construct facilitated deformity correction, protected the reconstructed limb, and allowed gradual mobilization during recovery.

**Figure 5: Application of Ilizarov external fixation for ankle stabilization and limb salvage following extensive diabetic foot and soft-tissue destruction.**

**Figure Notes:** Clinical photograph demonstrating the application of an Ilizarov external fixator to the right lower limb following staged debridement and reconstructive procedures. The frame provided mechanical stabilization, deformity correction, and offloading of the affected extremity while protecting the healing soft tissues and facilitating limb salvage in the setting of severe diabetic foot infection and skeletal instability.

**Adjunctive Therapy and Rehabilitation**

Adjunctive hyperbaric oxygen therapy was administered to improve tissue oxygenation, promote angiogenesis, and enhance wound healing in the ischemic diabetic limb. A structured physiotherapy and rehabilitation program was initiated focusing on gradual mobilization, muscle strengthening, gait training, and protected weight-bearing ambulation.

Regular wound surveillance, vascular follow-up, diabetic management, and pin-site care were continued throughout the recovery period as part of the multidisciplinary limb-salvage strategy.

**Outcome and follow-UP**

Following the staged multidisciplinary interventions, the patient demonstrated progressive clinical improvement with successful control of systemic and local infection. Serial wound assessments revealed healthy granulation tissue formation, reduction in wound size, and satisfactory response to negative-pressure wound therapy.

At approximately two months following split-thickness skin grafting, the majority of the wound surface demonstrated satisfactory graft uptake with progressive epithelialization and healthy surrounding tissue. Residual wound areas showed robust granulation tissue without evidence of recurrent necrosis or active infection. Systemic inflammatory signs, including fever and leukocytosis, resolved completely during the postoperative period.

Despite successful soft-tissue reconstruction, persistent ankle instability secondary to extensive


ISSN (O): 2687-5365; ISSN (P): 2753-6556

tissue destruction and skeletal involvement necessitated definitive stabilization. Subsequent tibiotalar arthrodesis using an Ilizarov external fixation system achieved satisfactory alignment, stability, and mechanical offloading of the affected limb. The external fixator additionally facilitated gradual mobilization while protecting the reconstructed soft tissues from excessive mechanical stress.

Postoperative rehabilitation included structured physiotherapy focusing on range-of-motion exercises, muscle strengthening, gait training, and progressive protected weight-bearing ambulation. Glycemic control improved significantly under endocrinology supervision with strict diabetic management throughout follow-up.

At five-month follow-up, the patient retained a functional salvaged limb with near-complete wound healing and satisfactory limb alignment. He was able to ambulate with assistance and perform activities of daily living independently with supportive aids. There was no evidence of recurrent deep infection, progressive ischemia, or need for major lower-limb amputation.

The patient continues to undergo regular outpatient follow-up for wound surveillance, vascular assessment, diabetic management, and rehabilitation monitoring as part of long-term limb preservation care.

**Figure 6: Clinical photograph following removal of the Ilizarov external fixation system demonstrating successful limb salvage with significant soft-tissue healing and maintained limb alignment.**

**Figure Notes:** Postoperative clinical image obtained after removal of the Ilizarov external fixator showing satisfactory wound healing with near-complete epithelialization and resolution of active infection. Residual post-inflammatory skin discoloration and healed soft-tissue defects are noted along the distal leg and foot. The patient retained a functional salvaged limb with maintained structural stability and improved soft-tissue integrity following staged multidisciplinary reconstruction.

## DISCUSSION

Diabetic foot ulcers (DFUs) remain one of the most devastating complications of diabetes mellitus and are associated with significant morbidity, repeated hospitalization, reduced quality of life, and increased risk of lower-limb amputation.[1] The coexistence of peripheral neuropathy, peripheral arterial disease (PAD), uncontrolled hyperglycemia, and severe infection creates a complex pathological environment that impairs wound healing and predisposes patients to progressive tissue necrosis.[2] Advanced diabetic foot disease complicated by multidrug-resistant infection, ischemia, extensive soft-tissue destruction, and skeletal instability represents a major reconstructive challenge and is frequently considered an indication for major amputation.[3,4]

The present case highlights the importance of a staged multidisciplinary limb-salvage approach in managing severe diabetic foot infections. Despite the extensive circumferential ulceration, multidrug-resistant Pseudomonas aeruginosa infection, vascular compromise, and associated fractures, successful limb preservation was achieved through coordinated intervention involving endocrinology, vascular surgery, orthopedic reconstruction, wound-care management, and rehabilitation services.[8]

Adequate glycemic control is a fundamental component in the management of diabetic wounds. Persistent hyperglycemia adversely affects leukocyte function, collagen synthesis, angiogenesis, and overall wound healing capacity.[10] In the present case, strict insulin-based glycemic optimization contributed significantly to infection control and tissue recovery. Similarly, correction of anemia and nutritional optimization improved the patient's physiological reserve and healing potential.[11]

Aggressive serial surgical debridement remains the cornerstone of management for infected diabetic wounds. Removal of all necrotic and infected tissues is essential to decrease bacterial burden, control local sepsis, and establish a viable wound bed suitable for reconstruction.[12] In our patient, multiple staged debridements were required because of the extensive circumferential soft-tissue involvement and persistent multidrug-resistant infection. Sequential debridement combined with culture-directed antibiotic therapy successfully controlled local and systemic infection.

Multidrug-resistant Pseudomonas aeruginosa infection significantly complicated treatment planning in this case. Such infections are associated with prolonged hospitalization, delayed wound healing, increased healthcare costs, and higher amputation rates.[6] Culture-guided intravenous antimicrobial therapy played a crucial role in infection eradication and prevention of proximal spread of sepsis.

Peripheral arterial disease is another major predictor of poor wound healing and limb loss in diabetic patients.[5] Restoration of adequate distal perfusion is essential for tissue viability, successful graft uptake, and long-term limb preservation. Endovascular revascularization through peripheral angioplasty substantially improved distal circulation in the present case and facilitated subsequent wound healing and reconstructive procedures. Current literature strongly supports early vascular intervention in ischemic diabetic foot ulcers to reduce


ISSN (O): 2687-5365; ISSN (P): 2753-6556

major amputation rates and improve clinical outcomes.[13,14]

Negative-pressure wound therapy (NPWT) has emerged as an effective adjunct in complex diabetic wound management.[12] NPWT promotes granulation tissue formation, reduces edema, improves local perfusion, and assists in wound-bed preparation prior to definitive soft-tissue coverage. In this patient, VAC therapy contributed significantly to the development of healthy granulation tissue and successful split-thickness skin graft uptake.

Extensive soft-tissue destruction and skeletal instability posed additional reconstructive challenges in the present case. The Ilizarov external fixation system provided stable fixation, deformity correction, and effective offloading while minimizing mechanical stress over healing tissues.[7] Ilizarov-assisted arthrodesis additionally facilitated gradual mobilization and protected the reconstructed limb during recovery. Previous studies have demonstrated that external fixation techniques can significantly reduce plantar pressure and improve outcomes in complex diabetic limb salvage procedures.

Adjunctive hyperbaric oxygen therapy may also provide benefits in selected ischemic diabetic wounds by enhancing oxygen delivery, angiogenesis, fibroblast proliferation, and leukocyte function. Although its routine use remains controversial, it served as a valuable adjunctive modality in this patient with severe ischemia and multidrug-resistant infection.

This case demonstrates that major amputation should not be considered inevitable even in advanced diabetic foot disease with severe infection, ischemia, and skeletal involvement. Successful outcomes can be achieved through early referral, aggressive staged intervention, multidisciplinary collaboration, and individualized reconstructive planning. Preservation of a functional limb not only improves mobility and independence but also significantly enhances overall quality of life and psychological well-being in diabetic patients.[15]

Nevertheless, limb-salvage procedures in advanced diabetic foot disease remain resource-intensive and require prolonged follow-up, patient compliance, meticulous wound surveillance, and coordinated multidisciplinary care. Early diagnosis, preventive foot care, patient education, and strict metabolic control remain essential strategies in reducing the incidence and severity of diabetic foot complications.[14]

**Limitations:** This report represents a single case of complex diabetic limb salvage; therefore, the findings may not be universally applicable to all patients with advanced diabetic foot disease. Clinical outcomes can vary significantly depending on factors such as glycemic control, vascular status, extent of infection, nutritional condition, associated comorbidities, and patient compliance with postoperative care. In addition, the follow-up duration of five months may not adequately reflect long-term functional outcomes, recurrence rates, or late complications including recurrent ulceration and osteomyelitis.

Another important limitation is that the multidisciplinary treatment strategy described in this case was highly resource-intensive and required access to specialized vascular intervention, advanced wound-care techniques, hyperbaric oxygen therapy, reconstructive procedures, and external fixation systems. Such comprehensive facilities may not be readily available in all healthcare settings, particularly in resource-limited centers. Nevertheless, the principles of aggressive infection control, timely revascularization, staged debridement, soft-tissue reconstruction, and mechanical offloading remain fundamental for successful limb salvage in severe diabetic foot disease.

## CONCLUSION

Severe diabetic foot ulcers complicated by multidrug-resistant infection, peripheral arterial disease, extensive soft-tissue loss, and skeletal instability remain a major cause of lower-limb amputation and functional disability. This case demonstrates that even advanced limb-threatening diabetic foot disease can be successfully managed through a timely staged multidisciplinary approach focused on infection eradication, restoration of vascular perfusion, soft-tissue reconstruction, and biomechanical stabilization.

Aggressive serial debridement, culture-directed antimicrobial therapy, endovascular revascularization, negative-pressure wound therapy, split-thickness skin grafting, and Ilizarov-assisted arthrodesis collectively contributed to successful limb salvage and functional recovery in this patient. Early referral to specialized multidisciplinary diabetic foot teams, individualized treatment planning, and comprehensive postoperative rehabilitation are essential to improve outcomes, reduce amputation rates, and preserve quality of life in high-risk diabetic patients.

## REFERENCES


1. Lim JZM, Ng NSL, Thomas C. Prevention and treatment of diabetic foot ulcers. J R Soc Med. 2017;110(3):104-109. doi:10.1177/0141076816688346
2. Grace VM, Rajesh RP. Concomitants of diabetic foot ulcer - A review. Curr Diabetes Rev. 2024;20(3):e050523216594. doi:10.2174/1573399819666230505142514
3. Rai V, Moellmer R, Agrawal DK. Clinically relevant experimental rodent models of diabetic foot ulcer. Mol Cell Biochem. 2022;477(4):1239-1247. doi:10.1007/s11010-022-04372-w
4. Luo Y, Liu C, Li C, Jin M, Pi L, Jin Z. The incidence of lower extremity amputation and its associated risk factors in patients with diabetic foot ulcers: A meta-analysis. Int Wound J. 2024;21(7):e14931. doi:10.1111/iwj.14931
5. de Jager E, Gunnarsson R, Ho YH. Disparities in advanced peripheral arterial disease presentation by socioeconomic status. World J Surg. 2022;46(6):1500-1507. doi:10.1007/s00268-022-06513-0




ISSN (O): 2687-5365; ISSN (P): 2753-6556

6. Zhao X, He H, Lu M. Amputation and reamputation for dry gangrene of both lower extremities in chronic kidney disease patients with calciphylaxis accompanied by multidrug-resistant bacterial infections: A case report and literature analysis. Medicine. 2026;105(3):e47239. doi:10.1097/MD.0000000000047239
7. Akkurt MO, Demirkale I, Öznur A. Partial calcanectomy and Ilizarov external fixation may reduce amputation need in severe diabetic calcaneal ulcers. Diabet Foot Ankle. 2017;8(1):1264699. doi:10.1080/2000625X.2017.1264699
8. Kadam D. Limb salvage surgery. Indian J Plast Surg. 2013;46(2):265-274. doi:10.4103/0970-0358.118603
9. O'Hara LM, Lydecker AD, Robinson GL, et al. Understanding patient preferences regarding limb salvage for diabetic foot ulcers: A discrete choice experiment. Diabetes Care. 2025;48(9):1517-1523. doi:10.2337/dc25-0478
10. Lee YM, Lin PR, Sia HK. Oral antidiabetic therapy versus early insulinization on glycemic control in newly diagnosed type 2 diabetes patients: A retrospective matched cohort study. Sci Rep. 2024;14(1):15491. doi:10.1038/s41598-024-66468-1
11. Ritz E, Laville M, Bilous RW, et al. Target level for hemoglobin correction in patients with diabetes and CKD: Primary results of the Anemia Correction in Diabetes (ACORD) Study. Am J Kidney Dis. 2007;49(2):194-207. doi:10.1053/j.ajkd.2006.11.032
12. Attinger CE, Janis JE, Steinberg J, Schwartz J, Al-Attar A, Couch K. Clinical approach to wounds: Debridement and wound bed preparation including the use of dressings and wound-healing adjuvants. Plast Reconstr Surg. 2006;117(Suppl):72S-109S. doi:10.1097/01.prs.0000225470.42514.8f
13. Hingorani A, LaMuraglia GM, Henke P, et al. The management of diabetic foot: A clinical practice guideline by the Society for Vascular Surgery in collaboration with the American Podiatric Medical Association and the Society for Vascular Medicine. J Vasc Surg. 2016;63(2 Suppl):3S-21S. doi:10.1016/j.jvs.2015.10.003
14. Schaper NC, van Netten JJ, Apelqvist J, Bus SA, Hinchliffe RJ, Lipsky BA. Practical guidelines on the prevention and management of diabetic foot disease (IWGDF 2019 update). Diabetes Metab Res Rev. 2020;36(S1):e3266. doi:10.1002/dmrr.3266
15. Armstrong DG, Boulton AJM, Bus SA. Diabetic foot ulcers and their recurrence. N Engl J Med. 2017;376(24):2367-2375. doi:10.1056/NEJMra1615439.


ISSN (O): 2687-5365; ISSN (P): 2753-6556