Case Report

Repeated Ultrasound-Guided Lumbar Sympathetic Block for Refractory Painful Diabetic Peripheral Neuropathy: The First Case from Mzuzu Central Hospital, Malawi

Junyi Ren[1,2], Francis Masoo[2], Yingpu Zhu[*3,4]

1.Department of Anesthesiology, Baoji Central Hospital, Baoji, China
2. Department of Anesthesiology, Mzuzu Central Hospital, Mzuzu, Malawi
3. Department of Endocrine, Xi'an Xidian Group Hospital, Xi'an, China
4. Department of Medicine, Mzuzu Central Hospital, Mzuzu, Malawi

*** Corresponding Author:Yingpu Zhu**; E-mail: zypjade-96722@163.com

Abstract

Background

Painful diabetic peripheral neuropathy (PDPN) is a common complication of diabetes mellitus characterized by chronic neuropathic pain, sleep disturbance, and impaired quality of life. Although pharmacological therapies remain the cornerstone of treatment, many patients experience inadequate symptom control. Access to advanced interventional pain management techniques, including radiofrequency ablation and neuromodulation, remains limited in many healthcare settings. We report the first case of ultrasound-guided lumbar sympathetic block (LSB) performed for refractory PDPN at Mzuzu Central Hospital, Malawi.

Case Presentation

A 19-year-old woman with a 9-year history of type 1 diabetes mellitus presented with bilateral lower-limb neuropathic pain that had persisted for 6 years and progressively worsened over the preceding 3 years. Symptoms were more severe in the right lower limb, with a baseline Numerical Rating Scale (NRS) score of 8/10. Clinical features included burning pain, stabbing pain, numbness, allodynia, sleep disturbance, and impaired mobility. The Douleur Neuropathique 4 (DN4) score was 8/10. Previous treatment with amitriptyline, gabapentin, vitamin B supplementation, diclofenac, and tramadol failed to provide satisfactory symptom relief.

The patient underwent four ultrasound-guided right lumbar sympathetic blocks using 10 mL of 1% lidocaine between May 15 and May 25, 2026. Pain intensity decreased from an NRS score of 8 to 4 immediately after the first procedure and from 5 to 1 after the second procedure. Complete pain relief was achieved before the third procedure and was maintained throughout the two-week follow-up period. Skin temperature increased by approximately 0.9–1.0°C after each block. No procedure-related complications were observed.

Conclusion

Repeated ultrasound-guided lumbar sympathetic block provided substantial and sustained pain relief in refractory PDPN. This minimally invasive, low-cost, and reproducible technique may represent a practical therapeutic option for selected patients with refractory neuropathic pain and may be particularly valuable in settings where access to advanced pain interventions is limited.

Keywords: painful diabetic peripheral neuropathy; lumbar sympathetic block; ultrasound guidance; neuropathic pain; Malawi

Introduction

Diabetes mellitus represents a growing public health challenge worldwide, particularly in low- and middle-income countries. The increasing prevalence of diabetes has been accompanied by a rising burden of chronic complications, among which diabetic peripheral neuropathy is one of the most common. Painful diabetic peripheral neuropathy (PDPN) affects approximately 20–30% of patients with diabetic neuropathy and is characterized by chronic neuropathic pain, including burning pain, stabbing pain, paresthesia, allodynia, hyperalgesia, and sleep disturbance[1,2].

The impact of PDPN extends beyond pain itself. Persistent neuropathic symptoms often impair sleep quality, mobility, work productivity, psychological well-being, and overall quality of life. Despite long-term pharmacological treatment, many patients continue to experience inadequate symptom control. Current treatment recommendations include gabapentinoids, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants, and selected opioid medications[3,4]. However, therapeutic efficacy is frequently incomplete, and treatment-limiting adverse effects are common.

The pathophysiology of PDPN is complex and multifactorial. Proposed mechanisms include metabolic injury, oxidative stress, microvascular dysfunction, peripheral nerve ischemia, central sensitization, and autonomic nervous system abnormalities[1,3,5,6]. Increasing evidence suggests that sympathetic nervous system dysfunction may contribute to neuropathic pain generation in selected patients[7,8]. Lumbar sympathetic blockade has therefore emerged as a potential therapeutic option for refractory cases.

In high-resource healthcare systems, patients with treatment-resistant neuropathic pain may have access to radiofrequency ablation, spinal cord stimulation, peripheral nerve stimulation, and other advanced neuromodulation techniques. However, such technologies remain largely unavailable in many parts of

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sub-Saharan Africa because of financial and infrastructure constraints.

Malawi is a low-income country in southeastern Africa where specialized pain services are scarce. Mzuzu Central Hospital is the principal referral hospital serving northern Malawi and provides care for a large population with limited access to advanced pain management interventions. To our knowledge, this report describes the first ultrasound-guided lumbar sympathetic block performed for PDPN at Mzuzu Central Hospital, Malawi. A literature search of PubMed, Google Scholar, African Index Medicus, and the Malawi Medical Journal identified no previously published reports of ultrasound-guided lumbar sympathetic blockade for PDPN from Malawi.

Case Presentation

A 19-year-old woman presented to the anesthesiology and pain service at Mzuzu Central Hospital with severe chronic neuropathic pain affecting both lower extremities. The patient had been diagnosed with type 1 diabetes mellitus 9 years previously and was receiving insulin therapy. Neuropathic symptoms had initially developed approximately 6 years before presentation and had progressively worsened over the preceding 3 years.

Pain involved both lower limbs but was clearly asymmetric. Although symptoms were present bilaterally, the right lower limb was substantially more painful and functionally disabling than the left. The patient described burning pain, stabbing pain, numbness, tingling sensations, and allodynia. Even light touch occasionally provoked discomfort. Pain severity in the right lower limb was rated as 8/10 on the Numerical Rating Scale (NRS). The Douleur Neuropathique 4 (DN4) score was 8/10, supporting a neuropathic pain mechanism[9].

Symptoms were particularly severe during nighttime hours. The patient reported awakening three to five times per night because of pain. Sleep quality had deteriorated substantially over recent years, leading to daytime fatigue and reduced activity levels.

The patient's mobility was also significantly affected. Walking speed was reduced, gait was cautious, and prolonged walking was avoided because of worsening discomfort. Although she remained independently ambulatory, pain had become a major limitation in daily life.

The patient denied smoking and alcohol consumption. Height was 174 cm, weight was 81 kg, and body mass index was 26.75 kg/m^2. Physical examination demonstrated sensory abnormalities involving both lower extremities. Allodynia was present. Chronic skin hyperpigmentation of the lower limbs was observed. The patient had previously been diagnosed with diabetic autonomic neuropathy. Laboratory evaluation performed approximately one month before intervention revealed an HbA1c level of 7.37%. Previous treatment had included amitriptyline, gabapentin, vitamin B supplementation, diclofenac, and tramadol. Despite prolonged use of multiple medications, symptom control remained unsatisfactory.

Therapeutic Intervention

After discussion of available treatment options, the patient elected to undergo ultrasound-guided lumbar sympathetic blockade. Because neuropathic symptoms were present in both lower extremities but were considerably more severe in the right lower limb, the right side was selected as the initial treatment target.

Written informed consent for the procedure was obtained before intervention. Four ultrasound-guided right lumbar sympathetic blocks were performed on May 15, May 18, May 22, and May 25, 2026.

The patient was positioned in the right lateral decubitus position with slight flexion of both knees. Standard monitoring, including electrocardiography, non-invasive blood pressure monitoring, and pulse oximetry, was applied throughout the procedure. Intravenous access was established before needle placement.

A low-frequency curved ultrasound transducer (2–5 MHz) was placed transversely above the iliac crest, and the needle was introduced using an in-plane approach (Figure 1A). A characteristic shamrock sign was identified at the L3 vertebral level using a technique previously described for ultrasound-guided lumbar sympathetic blockade.10,11 The psoas major muscle (PM), quadratus lumborum muscle (QL), erector spinae muscle (ESM), and vertebral body (VB) were identified under ultrasound guidance. The lumbar sympathetic block was performed using an ultrasound-guided shamrock approach, which allowed reliable visualization of the target anatomy and needle trajectory (Figure 1B).

Under real-time ultrasound guidance, a 22-gauge, 5-inch needle was advanced from a posterolateral to an anteromedial direction toward the anteromedial aspect of the psoas major muscle adjacent to the lumbar sympathetic chain. After negative aspiration for blood and cerebrospinal fluid, 10 mL of 1% lidocaine was injected incrementally while observing spread of local anesthetic within the target region.

All four procedures were completed successfully without technical difficulty. No vascular puncture, neurological symptoms, local anesthetic toxicity, or hemodynamic instability occurred during treatment.

Because of the long history of refractory neuropathic pain and the favorable response observed after the first two procedures, two additional blocks were performed to consolidate the therapeutic effect and reduce the risk of symptom recurrence.

Outcome and Follow-Up

The patient demonstrated progressive improvement throughout the treatment course.

Immediately following the first lumbar sympathetic block, pain intensity decreased from NRS 8 to NRS 4. Prior to the second procedure, pain remained improved compared with baseline, with an NRS score of 5. Following the second lumbar sympathetic block, pain again decreased to NRS 1. By the time of the third procedure, the patient reported complete pain relief, with an NRS score of 0. Complete pain relief was maintained before the fourth procedure and throughout subsequent follow-up.

Progressive reduction in right lower limb pain scores throughout treatment and follow-up is illustrated in Figure 2.

In addition to pain reduction, the patient reported noticeable warming of the right lower limb after each intervention. Objective skin temperature measurements demonstrated an increase of approximately 0.9–1.0°C after each procedure, supporting successful sympathetic blockade and improved peripheral perfusion (Figure 3).

Sleep quality improved substantially during treatment.

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Table 1. Patient Characteristics

Variable	Value
Age	19 years
Sex	Female
Height	174 cm
Weight	81 kg
BMI	26.75 kg/m²
Diabetes Type	Type 1 Diabetes Mellitus
Duration of Diabetes	9 years
Duration of Neuropathic Pain	6 years
Predominant Pain Side	Right
Baseline NRS (Right Lower Limb)	8/10
DN4 Score	8/10
HbA1c	7.37%
Diabetic Autonomic Neuropathy	Present
Sleep Disturbance	Awakening 3–5 times/night
Walking Limitation	Present
Previous Treatments	Amitriptyline, Gabapentin, Vitamin B, Diclofenac, Tramadol
Response to Previous Treatment	Unsatisfactory

Table 2. Treatment Timeline and Outcomes

Session	Date	Pre-NRS	Post-NRS	Temperature Before (°C)	Temperature After (°C)
1	15 May 2026	8	4	32.2	33.2
2	18 May 2026	5	1	32.3	33.2
3	22 May 2026	0	0	32.5	33.4
4	25 May 2026	0	0	32.5	33.4

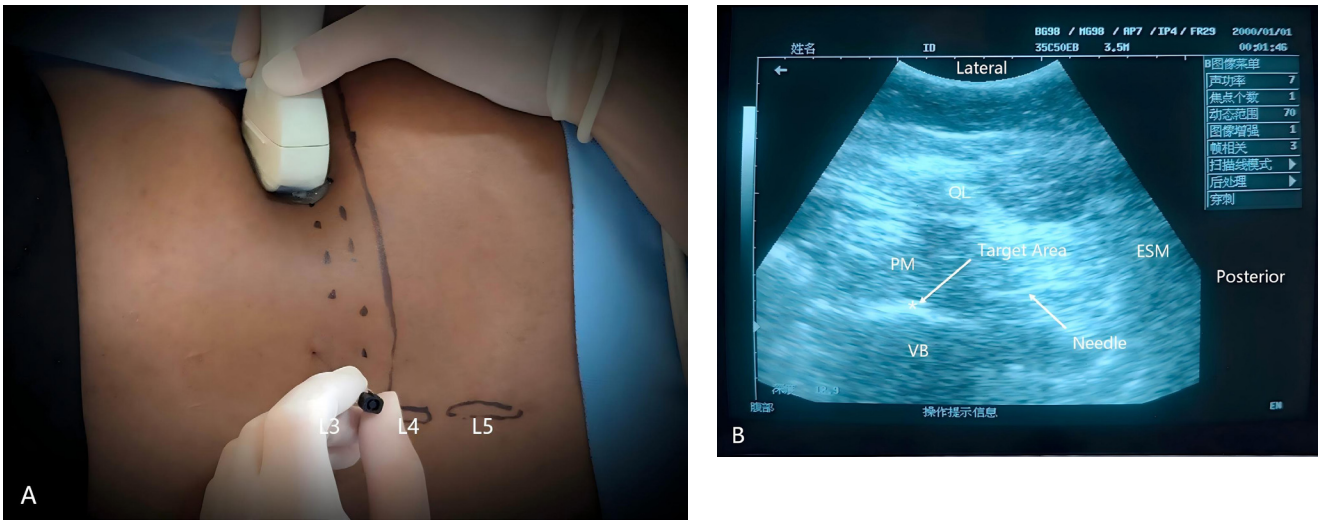

Figure 1. Ultrasound-guided lumbar sympathetic block.

(A) Position of the low-frequency curved ultrasound transducer above the iliac crest and the direction of needle insertion.

(B) Representative ultrasound image obtained using a low-frequency curved transducer positioned above the iliac crest at the L3 level. PM = psoas major muscle; QL = quadratus lumborum muscle; ESM = erector spinae muscle; VB = vertebral body. The needle was advanced using an in-plane approach toward the target area adjacent to the lumbar sympathetic chain.

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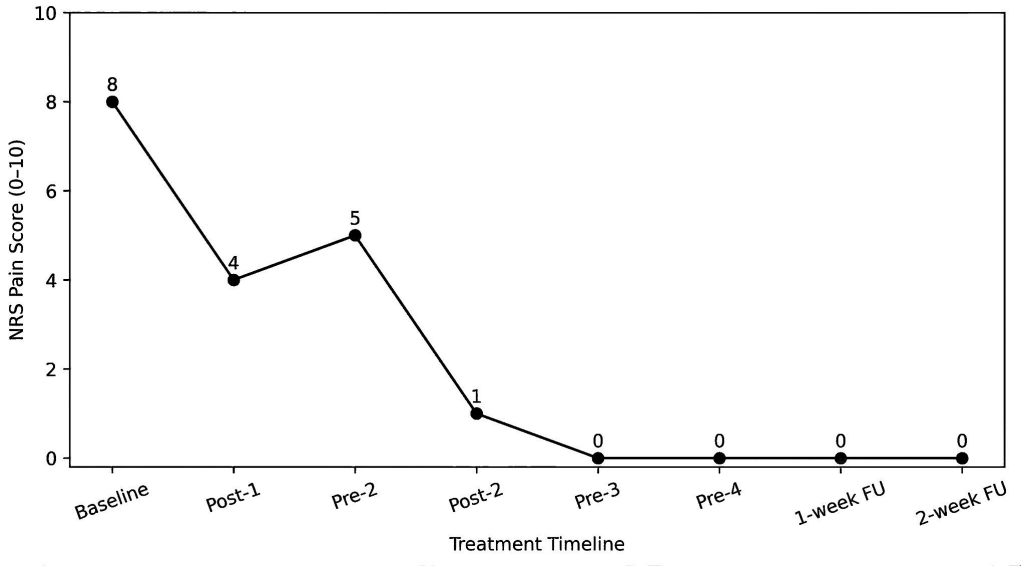

Figure 2. Changes in right lower limb NRS pain score during treatment and follow-up.

Pain intensity was assessed using the Numerical Rating Scale (NRS, 0–10). The NRS score decreased from 8 to 4 after the first procedure and from 5 to 1 after the second procedure. Complete pain relief (NRS 0) was achieved before the third procedure and maintained throughout treatment, one-week follow-up, and two-week follow-up.

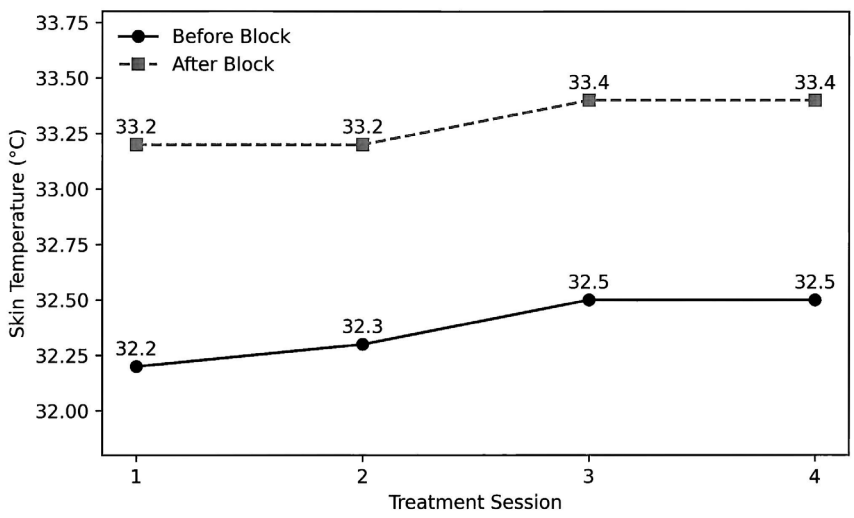

Figure 3. Changes in right lower limb skin temperature before and after repeated ultrasound-guided lumbar sympathetic blocks.

Skin temperature was measured immediately before and after each treatment session. A consistent increase of approximately 0.9–1.0°C was observed following each lumbar sympathetic block, indicating successful sympathetic blockade and improved peripheral perfusion of the affected limb.

Before intervention, the patient reported awakening three to five times nightly because of pain. Following the second procedure, nocturnal awakenings became infrequent. After completion of treatment, uninterrupted sleep was reported.

Functional improvement was also observed. Prior to intervention, walking speed was reduced and prolonged ambulation was avoided because of pain. Following treatment, walking became more comfortable and activity tolerance improved.

No procedure-related complications were observed during treatment or follow-up. Specifically, no hypotension, vascular injury, infection, neurological deficit, local anesthetic systemic toxicity, or other adverse events were observed.

Treatment outcomes are summarized in Table 2.

At one-week follow-up, the patient remained pain-free (NRS 0), reported uninterrupted sleep, and demonstrated improved walking ability. At two-week follow-up, complete pain relief persisted without recurrence. No delayed complications were identified.

Discussion

This case demonstrates the successful treatment of refractory painful diabetic peripheral neuropathy (PDPN) using repeated ultrasound-guided lumbar sympathetic block in a young woman treated at a referral hospital in Malawi. To our knowledge, this report describes the first ultrasound-guided lumbar sympathetic block performed for PDPN at Mzuzu Central Hospital, Malawi, and may represent the first published case report from Malawi describing ultrasound-guided lumbar sympathetic blockade for painful diabetic peripheral neuropathy. A literature search of PubMed, Google Scholar, African Index Medicus, and the Malawi Medical Journal identified no similar published reports. Despite a six-year history of neuropathic pain and failure of multiple pharmacological therapies, the patient achieved complete pain relief following four ultrasound-guided lumbar sympathetic blocks, accompanied by objective increases in skin temperature, improved sleep quality, and enhanced mobility.

PDPN is a common and disabling complication of diabetes mellitus that frequently remains inadequately controlled despite long-term pharmacological treatment[1,3]. The pathophysiology is multifactorial and includes metabolic injury, oxidative stress, microvascular dysfunction, peripheral nerve ischemia, inflammation, and central sensitization. Increasing evidence suggests that autonomic nervous system dysfunction may also contribute to neuropathic pain generation[7,8]. Sympathetic nervous system abnormalities may impair peripheral microcirculation, promote sympathetically maintained pain, and amplify pain perception through peripheral and central sensitization mechanisms. Lumbar sympathetic blockade interrupts sympathetic efferent activity to the lower extremities and may improve pain through restoration of peripheral blood flow, reduction

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of sympathetic-sensory coupling, and modulation of sensitization pathways[7,8].

Several observations in the present case support a meaningful therapeutic effect. The patient had a DN4 score of 8/10 and documented diabetic autonomic neuropathy, suggesting substantial neuropathic and sympathetic involvement. Objective skin temperature increased by approximately 0.9–1.0°C following each procedure, indicating successful sympathetic blockade and improved peripheral perfusion. These physiological changes were accompanied by progressive clinical improvement in pain intensity, sleep quality, and walking ability. Lidocaine was selected because it was inexpensive, readily available, and familiar to clinicians at our institution. The favorable outcome suggests that effective sympathetic blockade can be achieved using commonly available agents in resource-limited healthcare environments.

Although neuropathic symptoms were present in both lower limbs, pain severity was markedly asymmetric, with the right lower limb representing the primary source of disability. Consequently, unilateral right-sided treatment was selected as the initial therapeutic strategy. Another noteworthy observation was the cumulative benefit of repeated blockade. Pain intensity progressively decreased throughout treatment and complete pain relief was achieved before the third procedure. Nevertheless, two additional blocks were performed because of the prolonged history of refractory symptoms and concern regarding early recurrence. This strategy appeared successful, as complete pain relief was maintained throughout follow-up. At present, there is no established consensus regarding the optimal number or frequency of lumbar sympathetic blocks for PDPN. In the present case, repeated blocks were performed because of the favorable clinical response observed after the initial procedures and the prolonged history of refractory symptoms.

The most distinctive aspect of this report may be its setting. Access to specialized pain medicine services remains limited throughout much of sub-Saharan Africa, and advanced interventions such as radiofrequency ablation, spinal cord stimulation, and neuromodulation are often unavailable. This case demonstrates that ultrasound-guided lumbar sympathetic blockade can be successfully implemented in a low-resource African referral hospital using equipment already available in many centers. The technique is inexpensive, radiation-free, and reproducible, making it particularly attractive in resource-limited settings. Nevertheless, this report describes only a single patient with limited follow-up, and electrophysiological confirmation was unavailable because of local resource constraints. The relatively short two-week follow-up period is an important limitation of this report. Longer-term follow-up is needed to determine the durability of treatment effects and to establish optimal treatment protocols for lumbar sympathetic blockade in PDPN.

Conclusion

This case demonstrates that repeated ultrasound-guided lumbar sympathetic block can provide substantial and sustained pain relief in selected patients with refractory painful diabetic peripheral neuropathy. In the present patient, treatment was associated with complete pain relief, objective improvement in lower-limb skin temperature, restoration of sleep quality, and improved mobility without procedure-related complications.

To our knowledge, this is the first reported case of ultrasound-guided lumbar sympathetic blockade for PDPN at Mzuzu Central Hospital, Malawi. This case highlights the potential role of sympathetic blockade as a practical and accessible interventional pain management strategy for selected patients with refractory diabetic neuropathic pain, particularly in settings where access to advanced pain interventions is limited.

Although larger prospective studies with longer follow-up are required to confirm long-term efficacy and establish optimal treatment protocols, ultrasound-guided lumbar sympathetic blockade may represent a valuable adjunctive treatment option for carefully selected patients with refractory PDPN.

Declarations

This case report was prepared in accordance with the CARE Guidelines[12]. Written informed consent for treatment and publication was obtained from the patient. According to local institutional policy, formal ethics committee approval was not required for publication of a single anonymized case report. No external funding was received. The authors declare no competing interests. Yingpu Zhu was responsible for clinical evaluation and management of the patient. Junyi Ren and Francis Masoo performed the ultrasound-guided lumbar sympathetic block procedures and contributed to data collection. Junyi Ren analyzed the clinical data, conducted the literature review, and drafted the manuscript. All authors reviewed and approved the final version.

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