



Case Report

MODIFIED JONES PROCEDURE COMBINED WITH PERONEUS LONGUS-TO-BREVIS TENDON TRANSFER FOR A DIABETIC NEUROPATHIC PLANTAR FOREFOOT ULCER: A CASE REPORT

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ABSTRACT

Background: Neuropathic plantar forefoot ulcers in patients with diabetes mellitus are commonly associated with intrinsic muscle imbalance, hallux deformity, and abnormal plantar pressure. Although conservative management remains the first-line treatment, persistent mechanical overload may necessitate surgical correction to promote durable wound healing and prevent recurrence. We report the successful management of a diabetic neuropathic plantar forefoot ulcer using a modified Jones procedure combined with peroneus longus-to-peroneus brevis tendon transfer.

Case Presentation: A 40-year-old man with type 2 diabetes mellitus receiving oral hypoglycaemic therapy underwent a modified Jones procedure of the left great toe together with peroneus longus-to-peroneus brevis tendon transfer using the Pulvertaft technique for correction of a left foot deformity. Postoperative follow-up documented progressive wound healing without fresh complaints. Serial clinical assessments demonstrated a healthy surgical wound, normal range of motion, palpable distal pulses, and no evidence of clinical infection. Long-term postoperative management included wound care, neuropathic pain medication, customized diabetic footwear, regular foot moisturization, compression stockings, and optimization of diabetic control.

Discussion: Combined tendon-balancing procedures address the biomechanical abnormalities responsible for excessive plantar loading rather than treating the ulcer alone. Correction of hallux deformity together with reduction of first-ray plantar-flexion may facilitate ulcer healing and decrease the risk of recurrence in appropriately selected patients.

Conclusion: Modified Jones procedure combined with peroneus longus-to-peroneus brevis tendon transfer resulted in satisfactory short-term clinical and wound-healing outcomes in this patient with diabetes. This surgical approach may represent an effective offloading option for neuropathic plantar forefoot ulceration associated with structural deformity.

Keywords: Diabetes mellitus; diabetic foot; neuropathic ulcer; modified Jones procedure; peroneus longus tendon transfer; case report.

INTRODUCTION

Diabetes mellitus is a major global health challenge and is associated with a broad spectrum of microvascular and macrovascular complications, among which diabetic foot disease remains one of

the most debilitating. The International Diabetes Federation estimates that more than 530 million adults worldwide are living with diabetes, and this number is expected to continue rising over the coming decades. Diabetic foot ulcers (DFUs) develop in approximately 15–25% of patients with

diabetes during their lifetime and account for a substantial proportion of diabetes-related hospitalizations, healthcare expenditure, and non-traumatic lower-limb amputations. Despite advances in wound care and diabetic management, recurrent ulceration remains a significant clinical problem because the underlying biomechanical abnormalities are often left untreated.^[1,2]

The pathogenesis of diabetic plantar ulceration is multifactorial, involving peripheral sensory neuropathy, motor neuropathy, autonomic dysfunction, repetitive plantar pressure, limited joint mobility, and foot deformities. Peripheral neuropathy results in loss of protective sensation, allowing repetitive mechanical trauma to go unnoticed during daily activities. Motor neuropathy contributes to intrinsic muscle imbalance, leading to deformities such as claw toes, cavus foot, and hallux hyperextension. These structural abnormalities alter plantar pressure distribution, particularly beneath the first metatarsal head, creating focal areas of excessive loading that predispose patients to callus formation, skin breakdown, and chronic ulceration. Autonomic neuropathy further impairs skin integrity by reducing sweat gland function, resulting in dry, fissured skin that is more susceptible to injury and infection.^[3,4]

Neuropathic ulcers beneath the first metatarsal head represent a particularly challenging subset of diabetic foot ulcers because they are frequently associated with plantar-flexion of the first ray and hallux claw deformity. Persistent plantar pressure at this location delays ulcer healing despite optimal wound care. Conventional management includes glycaemic optimization, infection control, regular debridement, pressure offloading using total-contact casts or removable walkers, customized therapeutic footwear, and patient education regarding foot care. Although these conservative measures remain the cornerstone of treatment, recurrence rates remain high, especially when abnormal tendon forces and structural deformities continue to generate excessive plantar loading. Therefore, merely achieving wound closure without correcting the underlying biomechanical pathology may result in repeated ulceration and progressive foot destruction.^[5-7]

Surgical offloading procedures have emerged as an effective treatment option for selected patients with recurrent or non-healing neuropathic ulcers. Unlike conservative approaches that primarily address the ulcer itself, tendon-balancing procedures aim to eliminate the pathological mechanical forces responsible for ulcer formation.^[8] The modified Jones procedure is a well-established reconstructive technique used to correct hallux claw deformity by rebalancing the extensor mechanism of the great toe, thereby reducing abnormal dorsiflexion at the metatarsophalangeal joint and plantar pressure beneath the first metatarsal head.^[9,10] In addition, transfer of the peroneus longus tendon to the peroneus brevis decreases excessive plantar-flexion of the first ray while preserving lateral ankle

stability, resulting in a more physiological distribution of plantar loading during gait.^[11,12] The Pulvertaft weaving technique provides secure tendon-to-tendon fixation and facilitates effective tendon transfer.

Several studies have demonstrated that tendon-balancing procedures can improve ulcer healing and reduce recurrence in patients with diabetic neuropathic forefoot deformities. Comprehensive clinical assessment and identification of risk factors remain important components of diabetic foot management.^[13] Diabetes-related lower-extremity complications also contribute substantially to global disability and disease burden.^[14] Furthermore, development of foot ulceration and subsequent amputation are associated with substantial long-term morbidity and mortality.^[15] However, published literature describing the combined use of the modified Jones procedure with peroneus longus-to-peroneus brevis tendon transfer remains limited, and reports detailing postoperative clinical outcomes in such patients are relatively scarce. Consequently, further documentation of individual cases contributes valuable evidence regarding the role of biomechanical correction in the management of complex diabetic foot pathology.

Herein, we present the case of a 40-year-old man with type 2 diabetes mellitus who underwent a modified Jones procedure of the left great toe combined with peroneus longus-to-peroneus brevis tendon transfer using the Pulvertaft technique for correction of a neuropathic plantar forefoot ulcer. Postoperative follow-up demonstrated progressive wound healing, absence of clinical infection, preservation of foot function, and satisfactory recovery with continued use of customized diabetic footwear and comprehensive foot care. This case highlights the importance of addressing the underlying biomechanical abnormalities responsible for neuropathic ulceration and emphasizes the role of tendon-balancing surgery as an adjunct to comprehensive diabetic foot management.

Case Presentation

A 40-year-old man with a known history of type 2 diabetes mellitus, managed with oral hypoglycaemic agents, presented with a left foot pathology requiring surgical correction. The patient underwent a modified Jones procedure of the left great toe combined with transfer of the peroneus longus tendon to the peroneus brevis using the Pulvertaft tendon-weaving technique. The surgical intervention was performed to correct the underlying foot deformity and restore tendon balance. The diagnosis and operative procedure were documented in the postoperative clinical records.

The immediate postoperative period was uneventful. At the first documented follow-up on 16 July 2025, the patient presented for routine review and reported no fresh complaints. Clinical examination revealed that the operative wound was healthy, with no evidence of wound-related complications. The patient was advised to continue wound dressing at

home and return for further review after five days. Medical management included neuropathic pain medications, nutritional supplementation, antibiotic therapy, and proton pump inhibitor prophylaxis.

During the subsequent follow-up on 2 September 2025, the patient remained asymptomatic. Clinical examination demonstrated no evidence of infection, a well-healed wound, normal range of motion, and palpable distal pulses. Wound cleaning and dressing were performed. The patient was advised to continue regular diabetic medications and was prescribed vitamin supplementation, neuropathic pain medications, topical therapy, and foot-care measures, including the use of customized footwear, regular skin moisturization, and compression stockings.

At the latest documented follow-up on 11 December 2025, the patient continued to report no fresh complaints. Clinical assessment again demonstrated no clinical evidence of infection, a completely healed operative wound, normal foot and ankle range of motion, and intact distal peripheral pulses. The patient was advised to continue routine diabetic management together with customized indoor and outdoor footwear, regular foot moisturization, and compression stockings as part of long-term preventive care.

Throughout the available follow-up period, there was no documented postoperative wound infection, wound dehiscence, neurovascular compromise, or requirement for revision surgery. The patient demonstrated satisfactory wound healing and maintained good clinical recovery following the combined tendon-balancing procedure.



Figure 1: Clinical appearance of the neuropathic plantar forefoot ulcer beneath the first metatarsal head

Figure Notes:

(A) Plantar view of the left foot showing a localized ulcerated lesion with surrounding hyperkeratotic callus beneath the first metatarsal head.

(B) Oblique plantar view demonstrating the ulcer site and surrounding callused tissue in relation to the medial forefoot.

Surgical Technique

After obtaining written informed consent, the patient was taken to the operating theatre and placed in the supine position. Following administration of regional anaesthesia, a pneumatic tourniquet was applied to the proximal thigh after exsanguination of the limb. The left lower extremity was prepared and draped in a sterile fashion.

A dorsal longitudinal incision was made over the first ray to expose the extensor hallucis longus (EHL) tendon. The tendon was carefully identified, mobilized, and released distally while preserving adequate tendon length. The modified Jones procedure was then performed to correct the hallux deformity by rebalancing the extensor mechanism. Depending on the deformity, the tendon was transferred and secured to the neck of the first metatarsal using non-absorbable sutures with the hallux maintained in a corrected anatomical position. The corrected alignment of the first metatarsophalangeal joint was confirmed intraoperatively.

Attention was subsequently directed to the lateral aspect of the foot, where a longitudinal incision was made over the peroneal tendon sheath. Both the peroneus longus and peroneus brevis tendons were identified and carefully isolated. The peroneus longus tendon was divided distally and transferred to the peroneus brevis tendon using the **Pulvertaft tendon-weaving technique**. Multiple tendon passes were performed to achieve a secure fixation, and the repair was reinforced with interrupted non-absorbable sutures while maintaining appropriate physiological tension. This transfer reduced the plantar-flexion force acting on the first ray while preserving lateral ankle stability through augmentation of the peroneus brevis tendon.

After confirming satisfactory tendon tension, correction of the deformity, and unrestricted passive motion, the operative field was thoroughly irrigated with sterile saline. Haemostasis was achieved, and the wounds were closed in layers using absorbable sutures for the deep tissues and interrupted nylon sutures for the skin. Sterile dressings were applied, followed by immobilization of the foot in a well-padded below-knee posterior splint with the ankle maintained in a neutral position.

The patient tolerated the procedure well and was transferred to the recovery room in stable condition. A structured postoperative rehabilitation programme comprising wound care, glycaemic optimisation, protected weight-bearing, gradual mobilization, and customized diabetic footwear was subsequently initiated.

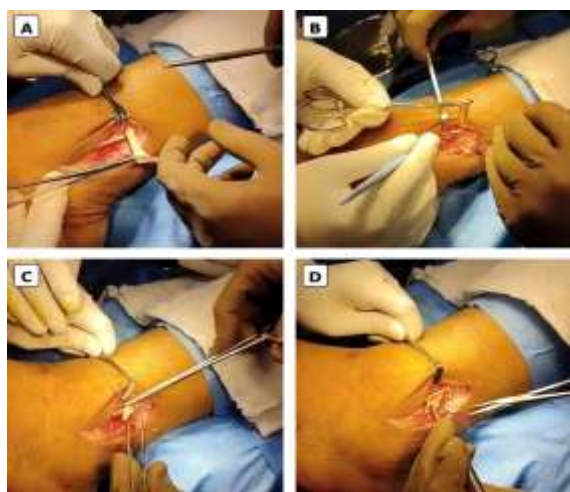


Figure 2: Intraoperative steps of peroneus longus-to-peroneus brevis tendon transfer using the Pulvertaft technique

Figure notes:

(A) Exposure and identification of the peroneal tendons.

(B) Mobilization and preparation of the peroneus longus tendon for transfer.

(C) Passage of the peroneus longus tendon through the peroneus brevis using the Pulvertaft tendon-weaving technique.

(D) Final appearance of the tendon transfer after achieving appropriate tension and fixation.

Clinical Findings

On postoperative follow-up, the patient was clinically stable and reported no fresh complaints. Examination of the left foot demonstrated a healthy operative wound with satisfactory progression of wound healing. Clinical assessment revealed no evidence of local infection, with the ISDA score indicating no infection during subsequent follow-up visits. The patient had normal range of motion of the foot and ankle, and distal peripheral pulses were palpable, indicating satisfactory peripheral perfusion. The surgical wound remained completely healed throughout the documented follow-up period, with no evidence of wound dehiscence, recurrent ulceration, or other wound-related complications.

The patient was reviewed periodically for wound assessment and postoperative recovery. Continued clinical improvement was observed, and no postoperative neurovascular deficits or signs of infection were documented in the available records. Long-term foot care, including the use of customized diabetic footwear, regular skin moisturization, and compression stockings, was advised to maintain foot health and reduce the risk of future complications.

Table 1: Timeline of Clinical Course

Date/Period	Clinical Event	Outcome/Management
Prior to first postoperative review	The patient, a 40-year-old man with type 2 diabetes mellitus on oral hypoglycaemic agents, underwent a modified Jones procedure of the left great toe combined with peroneus longus-to-peroneus brevis tendon transfer using the Pulvertaft technique for correction of the left foot deformity.	Surgical correction completed without documented intraoperative complications.
16 July 2025	First documented postoperative follow-up. The patient reported no fresh complaints. Clinical examination showed a healthy operative wound.	Home wound dressing advised. Pregabalin, duloxetine, antibiotics, nutritional supplements, and routine follow-up were prescribed.
2 September 2025	Follow-up examination demonstrated no clinical evidence of infection, healthy healed wound, normal range of motion, and palpable distal peripheral pulses.	Wound cleaning and dressing performed. Continued diabetic medications, customized footwear, regular moisturization, and compression stockings advised.
11 December 2025	Final documented follow-up. The patient remained asymptomatic, with no evidence of infection, complete wound healing, normal range of motion, and palpable distal pulses.	Continued long-term diabetic foot care, customized footwear, moisturization, compression stockings, and regular follow-up recommended.

Diagnostic Assessment

The diagnosis was established through clinical evaluation of the left foot and documented in the postoperative records as status post modified Jones procedure of the left great toe with peroneus longus-to-peroneus brevis tendon transfer using the Pulvertaft technique in a patient with type 2 diabetes mellitus receiving oral hypoglycaemic agents.

Serial postoperative clinical assessments were performed to monitor wound healing and detect complications. At each documented follow-up visit, the patient reported no fresh complaints. Examination consistently demonstrated a healthy

operative wound, no clinical evidence of infection (ISDA score: no infection), normal range of motion, and palpable distal peripheral pulses, indicating satisfactory wound healing and preserved peripheral perfusion.

The uploaded clinical records do not include the preoperative diagnostic work-up, including hematological or biochemical investigations (e.g., complete blood count, inflammatory markers, glycated haemoglobin), imaging studies (plain radiographs, magnetic resonance imaging, or Doppler ultrasonography), microbiological culture reports, neurological assessment, or ulcer

classification. Consequently, these findings cannot be reported from the available source documents and should be obtained from the original hospital records before manuscript submission.

Outcomes and Follow-up

The postoperative recovery was uneventful, and the patient demonstrated progressive clinical improvement throughout the documented follow-up period. At the first postoperative review on 16 July 2025, the patient reported no fresh complaints, and clinical examination revealed a healthy operative wound without evidence of wound-related complications. The patient was advised to continue wound dressing at home and was prescribed postoperative medications, including neuropathic pain management, antibiotics, and nutritional supplementation.

At the subsequent follow-up on 2 September 2025, the patient remained asymptomatic. Clinical examination demonstrated no evidence of infection (ISDA score: no infection), a well-healed operative wound, normal range of motion, and palpable distal peripheral pulses. Wound cleaning and dressing were performed, and the patient was advised to continue regular diabetic medications together with customized footwear for indoor and outdoor use, routine foot moisturization, and compression stockings as part of long-term diabetic foot care.

At the latest documented follow-up on 11 December 2025, the patient continued to report no new symptoms or complaints. Clinical evaluation confirmed a completely healed operative wound, absence of clinical infection, normal foot and ankle range of motion, and intact distal peripheral pulses. There was no documented wound breakdown, recurrent ulceration, tendon-related complication, neurovascular deficit, or need for revision surgery during the available follow-up period. The patient was advised to continue routine diabetic management, customized diabetic footwear, regular skin moisturization, compression stockings, and periodic clinical follow-up to minimize the risk of future diabetic foot complications.

DISCUSSION

Diabetic foot ulceration remains one of the most challenging complications of diabetes mellitus, contributing substantially to morbidity, healthcare utilization, and the risk of lower-extremity amputation. Neuropathic plantar ulcers frequently develop because of repetitive mechanical stress on areas of increased plantar pressure, particularly beneath the first metatarsal head. Structural deformities, including hallux clawing and first-ray plantar flexion, further increase focal loading and impair ulcer healing despite appropriate wound care. Consequently, successful management requires not only wound closure but also correction of the underlying biomechanical abnormalities responsible for recurrent tissue injury.^[1,2]

Conservative management, including glycaemic optimization, regular debridement, infection control, pressure offloading, and customized therapeutic footwear, remains the cornerstone of diabetic foot care.^[3,4] However, these approaches may not adequately address fixed deformities or abnormal tendon forces that perpetuate excessive plantar pressure. In such situations, tendon-balancing procedures have been advocated as effective surgical offloading strategies to redistribute plantar loads and reduce the likelihood of ulcer recurrence.^[5-7]

The modified Jones procedure is designed to correct hallux deformity by rebalancing the extensor mechanism of the great toe, thereby reducing abnormal dorsiflexion at the metatarsophalangeal joint and excessive plantar pressure beneath the first metatarsal head.^[8-10] Transfer of the peroneus longus tendon to the peroneus brevis further complements this correction by decreasing the plantar-flexion force acting on the first ray while maintaining lateral ankle stability.^[11,12] The Pulvertaft tendon-weaving technique provides a strong and reliable tendon-to-tendon repair, facilitating restoration of muscle balance and more physiological pressure distribution during gait. The combined procedure therefore addresses both the structural deformity and the abnormal biomechanics contributing to ulcer formation.

In the present case, the patient underwent a modified Jones procedure combined with peroneus longus-to-peroneus brevis tendon transfer and demonstrated progressive clinical improvement during follow-up. The available clinical records documented a healthy postoperative wound at the initial review, followed by complete wound healing, absence of clinical infection, normal range of motion, and palpable distal peripheral pulses at subsequent follow-up visits. No postoperative wound complications, recurrent ulceration, or need for revision surgery were documented during the available follow-up period.

These findings are consistent with previous reports demonstrating favorable outcomes following tendon-balancing procedures in diabetic neuropathic feet. Surgical correction of the deforming forces responsible for plantar overload has been associated with improved ulcer healing and reduced recurrence compared with wound care alone. Although the present report is limited to a single patient, the satisfactory postoperative course supports the role of biomechanical correction as an important adjunct to comprehensive diabetic foot management.

Long-term success after reconstructive foot surgery depends not only on the surgical procedure but also on continued preventive care. Throughout follow-up, the patient was advised to continue customized diabetic footwear, regular skin moisturization, compression stockings, and optimization of diabetic management. These measures are important for minimizing recurrent plantar pressure, preventing skin breakdown, and preserving foot function.^[13]

Diabetes-related lower-extremity complications impose a substantial global disability burden and have important consequences for patients' long-term health and quality of life.^[14] Furthermore, diabetic foot ulceration and amputation are associated with an increased risk of mortality, emphasizing the importance of preventive strategies and sustained multidisciplinary foot care.^[15]

This case has several limitations. The available records do not include detailed preoperative clinical findings, ulcer classification, laboratory investigations, imaging studies, operative notes, or quantitative functional outcome measures. Furthermore, the follow-up duration was limited, preventing assessment of long-term ulcer recurrence, gait mechanics, and patient-reported functional outcomes. Nevertheless, the documented postoperative recovery demonstrates that the combined modified Jones procedure and peroneus longus-to-peroneus brevis tendon transfer can achieve satisfactory short-term wound healing and clinical recovery in a patient with diabetes mellitus when integrated with comprehensive postoperative diabetic foot care.

CONCLUSION

This case demonstrates the successful short-term management of a patient with type 2 diabetes mellitus who underwent a modified Jones procedure combined with peroneus longus-to-peroneus brevis tendon transfer using the Pulvertaft technique. The postoperative course was characterized by progressive wound healing, absence of clinical infection, preservation of normal range of motion, and palpable distal peripheral pulses, without any documented wound-related complications or need for revision surgery during the available follow-up period.

This case highlights the importance of addressing the underlying biomechanical abnormalities responsible for diabetic foot pathology in addition to standard wound care. Combined tendon-balancing procedures may represent an effective surgical offloading strategy for carefully selected patients with diabetic foot deformities. Nevertheless, larger prospective studies with longer follow-up are required to evaluate long-term functional outcomes, ulcer recurrence, and durability of this reconstructive approach.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this case report.

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REFERENCES

1. Armstrong DG, Boulton AJM, Bus SA. Diabetic foot ulcers and their recurrence. *N Engl J Med*. 2017;376(24):2367-2375. doi:10.1056/NEJMr1615439.
2. Jeffcoate WJ, Vileikyte L, Boyko EJ, Armstrong DG, Boulton AJM. Current challenges and opportunities in the prevention and management of diabetic foot ulcers. *Diabetes Care*. 2018;41(4):645-652. doi:10.2337/dc17-1836.
3. Bus SA, Sacco ICN, Monteiro-Soares M, Raspovic A, Paton J, Rasmussen A, et al. Guidelines on the prevention of foot ulcers in persons with diabetes (IWGDF 2023 update). *Diabetes Metab Res Rev*. 2024;40(3):e3651. doi:10.1002/dmrr.3651.
4. Bus SA, van Netten JJ, Lavery LA, Monteiro-Soares M, Rasmussen A, Jubiz Y, et al. Practical guidelines on the prevention and management of diabetes-related foot disease (IWGDF 2023 update). *Diabetes Metab Res Rev*. 2024;40(3):e3657.
5. Bus SA, Armstrong DG, Gooday C, Jarl G, Caravaggi C, Viswanathan V, et al. Guidelines on offloading foot ulcers in persons with diabetes (IWGDF 2023 update). *Diabetes Metab Res Rev*. 2024;40(3):e3647. doi:10.1002/dmrr.3647.
6. Chen P, Campillo Vitorio N, Dhatriya K, Jeffcoate WJ, Lobmann R, McIntosh C, et al. Guidelines on interventions to enhance healing of foot ulcers in people with diabetes (IWGDF 2023 update). *Diabetes Metab Res Rev*. 2024;40(3):e3644. doi:10.1002/dmrr.3644.
7. Senneville E, Albalawi Z, van Asten SA, Abbas ZG, Allison G, Aragón-Sánchez J, et al. IWGDF/IDSA guidelines on the diagnosis and treatment of diabetes-related foot infections. *Clin Infect Dis*. 2023;77(7):e188-e231. doi:10.1093/cid/ciad527.
8. Dayer R, Assal M. Chronic diabetic ulcers under the first metatarsal head treated by staged tendon balancing: a prospective cohort study. *J Bone Joint Surg Br*. 2009;91(4):487-493. doi:10.1302/0301-620X.91B4.21598.
9. Lui TH. Arthroscopically assisted modified Jones procedure. *Arthrosc Tech*. 2016;5(6):e1401-e1406. doi:10.1016/j.eats.2016.08.012.
10. Kadel NJ, Donaldson-Fletcher EA, Hansen ST Jr, Sangeorzan BJ. Alternative to the modified Jones procedure: outcomes of flexor hallucis longus tendon transfer for correction of clawed hallux. *Foot Ankle Int*. 2005;26(12):1021-1026. doi:10.1177/107110070502601204.
11. Burkhard MD, Wirth SH, Andronic O, Viehöfer AF, Imhoff FB, Fröhlich S. Clinical and functional outcomes of peroneus longus to brevis tendon transfer. *Foot Ankle Int*. 2021;42(6):699-705. doi:10.1177/1071100720982592.
12. Chlebinkas D, Lui TH. Tendoscopic peroneus longus to brevis tendon transfer technique for flexible cavovarus deformity with medial forefoot overload and chronic diabetic foot ulceration. *Arthrosc Tech*. 2025;14:103246.
13. Boulton AJM, Armstrong DG, Albert SF, Frykberg RG, Hellman R, Kirkman MS, et al. Comprehensive foot examination and risk assessment. *Diabetes Care*. 2008;31(8):1679-1685. doi:10.2337/dc08-9021.
14. Zhang Y, Lazzarini PA, McPhail SM, van Netten JJ, Armstrong DG, Pacella RE. Global disability burdens of diabetes-related lower-extremity complications in 1990 and 2016. *Diabetes Care*. 2020;43(5):964-974. doi:10.2337/dc19-1614.
15. Jupiter DC, Thorud JC, Buckley CJ, Shibuya N. The impact of foot ulceration and amputation on mortality in diabetic patients: a systematic review. *Int Wound J*. 2016;13(5):892-903. doi:10.1111/iwj.12404.