



Rethinking Mobility In PAD Patient Care: The Potential Of Targeted Exercise

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A critical gap exists in Peripheral Artery Disease (PAD) management, particularly for patients with wounds. While the benefits of exercise, especially walking, are well-established for PAD patients, those with critical limb ischemia (CLI) or critical limb-threatening ischemia (CLTI) often find traditional walking exercises unfeasible due to the location of their wounds. This creates a paradoxical situation where limited mobility potentially impacts not just circulation and wound healing, but overall health, including mental well-being and survival.

Movement, even in its smallest forms, plays a crucial role in maintaining and improving overall circulation throughout the body. When patients engage in any form of physical activity, it stimulates blood flow, forcing the heart to pump more efficiently. This increased circulation not only benefits the legs, but also enhances cardiovascular health as a whole. Moreover, the impact of movement extends

beyond physical well-being. Studies have shown that immobility and prolonged bed rest can lead to depression, highlighting the profound connection between physical activity and mental health. For PAD patients with wounds who cannot engage in traditional walking exercises, implementing targeted, low-impact movements becomes essential. These adapted exercises can help maintain circulation, support wound healing and, crucially, safeguard leg, heart and mental health during the recovery process.

Contrasting Cases

The story of 'Valerie', a recent patient, starkly illustrates this point. After two years of multiple revascularization procedures and advanced care to heal her wounds, during which doctors advised her not to walk, Valerie finally rang the bell for a healed wound on the first Monday of March, 2025. She started walking again, but by Friday,

she had suffered a fatal stroke. This tragic outcome underscores that it's not just limb healing at stake with lack of mobility, but overall circulation and life itself.

Kevin Morgan's story offers a contrasting narrative of innovation and resilience.¹ At 66, this marathon runner was told by his doctor that his leg arteries were too calcified for surgical intervention. Undeterred, Kevin developed an innovative approach to maintain mobility. He created a foot-strengthening routine focused on building collateral vessels in his feet, including an exercise he terms "Yoga Toes," which involves repeatedly spreading and contracting his toes. Fifteen years post-diagnosis, at 81, Kevin has not only managed his PAD but has competed twice in the *World Triathlon* for his age group.

Kevin's success highlights an opportunity we have in adding to the treatment plan for PAD patients, especially those with CLI/CLTI. While we know that walking is excellent medicine for PAD, many of these patients find themselves unable to engage in traditional walking exercises due to their wounds.

Challenges

This creates a challenging situation where limited mobility can impact circulation, potentially affecting wound healing. These patients often face a vicious cycle of immobility and decreased blood flow, potentially leading to a higher need for revascularization procedures. While direct studies on the correlation between immobility and revascularization rates in CLI patients with wounds are limited, several factors suggest this relationship:

1. Impaired Collateral Development: Immobility in CLI patients may hinder the development of collateral circulation. Baum et al. noted that reduced exercise capacity in PAD patients is associated with alterations in capillary ultrastructure and mitochondrial volume density in skeletal muscle.² This suggests that lack of movement could impair the body's natural ability to form new blood vessels around blocked arteries.

- 2. Metabolic Dysfunction:** CLI patients with wounds often experience significant metabolic dysfunction in the affected limb. Lindegaard Pedersen et al. observed mitochondrial dysfunction in calf muscles of patients with combined peripheral arterial disease and diabetes type 2.³ Immobility may exacerbate this metabolic impairment, potentially necessitating more frequent revascularization interventions.
- 3. Impaired Wound Healing:** The combination of reduced blood flow and immobility can significantly impair wound healing in CLI patients. This may lead to a higher risk of infection and tissue loss, potentially increasing the need for revascularization procedures to salvage the limb.
- 4. Vascular Remodeling:** Regular movement and exercise are known to promote positive vascular remodeling in the lower extremities. In the absence of this mobility, CLI patients may experience negative vascular remodeling, potentially leading to a higher rate of restenosis after initial revascularization procedures.

While these factors strongly suggest a link between immobility and increased need for revascularization in CLI patients with wounds, it is important to note that direct clinical studies on this specific correlation are needed. Future research should focus on quantifying this relationship to guide treatment strategies for this high-risk patient group.

The potential link between immobility and increased revascularization needs in CLI patients underscores the importance of developing targeted exercise interventions for these patients. Health-care providers may want to consider innovative approaches to maintain or improve mobility in CLI patients with wounds, when they cannot walk at a pace that improves their collateral circulation. This could include the types of targeted exercises and movement strategies offered by recent studies for patients with special mobility needs.

As examples: Chuter et al. found that simple ankle rotations and flexions significantly increased popliteal artery blood flow in PAD patients;⁴ Saval et al. demonstrated that low-impact seated pedal exercises

improved calf muscle hemoglobin oxygen saturation in PAD patients with type 2 diabetes.⁵

Parmenter et al. found that lower-body resistance training improved walking performance in PAD patients, with participants showing a 1-minute increase in pain-free walking time and a 1.5-minute increase in maximum walking time after a 24-week program.⁶

Health-care providers are exploring innovative movement strategies for PAD patients with wounds. Dr. Nik Patel, an Interventional Radiologist with AVA Vascular in Southern California, has implemented an exercise regimen for his PAD patients that mimics the action of pressing and releasing a car's accelerator pedal. While formal studies are pending, Dr. Patel reports observing improvements and a potential delay in the need for repeated interventions.

John Scallions, a nurse practitioner at Southern Vascular and Interventional Pain Management, with clinics in Mississippi and Tennessee, has been incorporating foot cycles into his care plan for patients with wounds, aiming to improve circulation until they can resume more traditional exercises. This approach aligns with the findings of Saval et al., demonstrating the potential benefits of seated pedal exercises for patients with limited mobility.

At the Global PAD Association, through our collaboration with Dr. Chris Seenan, recipient of our world-renowned *Walking Therapy Researcher of the Year 2024-2025* award, we have encouraged our patients to engage in simple, yet creative movement solutions. These include tracing the alphabet with their feet and rocking up onto their tippy toes and back on their heels while sitting to pump the calves. These exercises can be performed even when traditional walking or weight bearing is not advised, to assist in increasing circulation and muscle engagement.

Innovation not only comes from health-care professionals, but from the patients themselves through necessity. Douglas Salisbury, one of our patients, shared a particularly innovative approach to his circulatory challenges. While hospitalized and unable to walk, he placed two towels on the

floor and pushed each one back and forth 30 times an hour. At home, he continues this practice using paper plates while watching TV, ensuring consistent movement throughout the day.

Moving Forward

Given these insights, there are several areas where the PAD/CLI care community could focus its efforts:

- 1. Development of Tailored Exercise Protocols:** Creating evidence-based exercise regimens specifically designed for PAD/CLI patients with wounds that do not allow weight bearing, focusing on improving overall circulation while prioritizing wound healing and patient safety.
- 2. Knowledge Sharing:** Facilitating the exchange of best practices and experiences across our network of health-care providers to accelerate learning and implementation of effective strategies.
- 3. Patient Education:** Developing comprehensive educational materials to inform PAD patients about the critical importance of movement, even when traditional exercises are not feasible, and providing them with safe, alternative movement options.
- 4. Research Support:** Advocating for, and participating in, robust clinical studies regarding non-weight bearing exercises in order to establish the efficacy of alternative exercise methods and potentially integrate them into standard care protocols.
- 5. Interdisciplinary Collaboration:** Encouraging collaboration between vascular medicine, physical therapy, wound care, and other relevant fields in order to develop more comprehensive care strategies that address both limb health and overall patient well-being.

The innovative approaches of patients like Kevin Morgan and Douglas Salisbury, combined with emerging research on targeted exercises for those with limited mobility, highlight promising avenues for advancing PAD management. By exploring novel movement interventions, health-care providers may significantly improve outcomes for patients

unable to engage in traditional walking or weight bearing exercises, potentially enhancing both limb preservation and overall survival rates.

This paradigm shift in PAD care could redefine the approach to patient mobility, especially for those with wounds and severe walking and weight bearing limitations. Preliminary evidence and patient reports provide a compelling rationale for further investigation into alternative exercise strategies. As dedicated professionals in the field of PAD treatment, health-care providers are uniquely positioned to lead this shift in approach. The goal should be to ensure that all patients, regardless of mobility limitations, have access to effective movement-based interventions that can significantly improve their health outcomes and quality of life.

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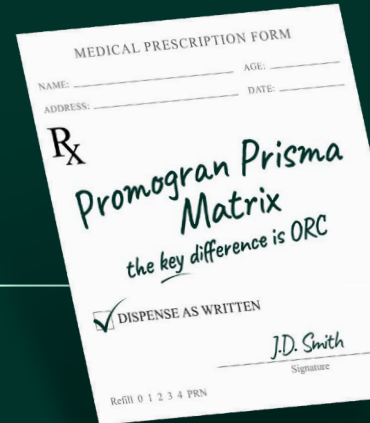
References

1. Morgan KT. Peripheral artery disease training plan: building everyday heroes. Amazon; 2025. Independently published; 2025. Available at: <https://www.amazon.com/dp/B0FR9V1FQL>
2. Baum O, et al. Capillary ultrastructure and mitochondrial volume density in skeletal muscle in relation to reduced exercise capacity of patients with intermittent claudication. *Am J Physiol Regul Integr Comp Physiol.* 2016;310(10):R943-R951.
3. Lindegaard Pedersen BJ, et al. Mitochondrial dysfunction in calf muscles of patients with combined peripheral arterial disease and diabetes type 2. *Int J Mol Sci.* 2019;20(12):3050.
4. Chuter VH, et al. The efficacy of a supervised and a home-based core strengthening program in adults with poor core stability: a three-arm randomized controlled trial. *Br J Sports Med.* 2019;53(18):1163-1171.
5. Saval MA, et al. Effect of seated active leg movement on regional arterial stiffness and blood flow in older adults with type 2 diabetes. *J Appl Physiol.* 2021;130(1):133-142.
6. Parmenter BJ, Raymond J, Dinnen P, Lusby RJ, et al. High-intensity progressive resistance training improves flat-ground walking in older adults with symptomatic peripheral arterial disease. *J Am Geriatr Soc* 2013;61(11):1964-1970. doi.org/10.1111/jgs.12500



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1. Chowdhry S.A., et al. Use of oxidized regenerated cellulose/collagen dressings versus standard of care over multiple wound types: a systematic review and meta-analysis. *Int. Wound J.* 2021. 2. Chen, Y.; Du, P.; Lv, G. A meta-analysis examined the effect of oxidized regenerated cellulose/collagen dressing on the management of chronic skin wounds. *Int. Wound J.* 2023; 20(5):1544-1551. doi:10.1111/iwj.14009CHENET AL.1551. 3. Snyder, R., et al. A Retrospective Study of Sequential Therapy with Advanced Wound Care Products versus Saline Gauze Dressings: Comparing Healing and Cost. *Ostomy Wound Management.* 2010; 56(11A):9-15. 4. Cullen, B.; et al. Early adoption of collagen/ORC therapies improves clinical outcome. Paper presented at: Wounds UK Harrogate, 2011. 5. Gottrup, F.; Cullen, B.; Karlsmark, T.; Bischoff-Mikkelsen, M.; Nisbet, L.; Gibson, M. Randomized controlled trial on collagen/oxidized regenerated cellulose/silver treatment. *Wound Repair & Regeneration.* 2013; 21:1-10. 6. Veves, A.; Sheehan, P.; Pham, H.T. A randomised controlled trial of Promogran (a collagen/ oxidized regenerated cellulose dressing) vs standard treatment in the management of diabetic foot ulcers. *Arch. Surg.* 2002; 137(7):822-827. 7. Vin, F.; Teot, L. and Meaume, S. (2002) The healing properties of Promogran in venous leg ulcers. *J. Wound Care.* 11, 335-341. 8. Bourdillon, K.A.; Delury, C.; Cullen, B. Biofilms and delayed healing – an *in vitro* evaluation of silver and iodine containing dressings and their effect on bacterial and human cells. *International Wound Journal.* 2017. ISSN 1742-4801. 9. Cullen B, Watt P, Lundqvist C, et al. The role of oxidized regenerated cellulose/collagen in chronic wound repair and its potential mechanism of action. *Int J Biochem Cell Biol.* 2002; 34(12):1544-1556.