

AGEING ARTERIES AND FRAGILE LEGS: PERIPHERAL ARTERY DISEASE IN OLDER ADULTS

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Abstract: Peripheral artery disease is a common manifestation of systemic atherosclerosis and contributes to impaired mobility and functional decline in older adults. In this population, peripheral artery disease rarely occurs in isolation and commonly coexists with multimorbidity, frailty, sarcopenia, malnutrition, cognitive impairment, depression, visual impairment, and reduced physical capacity. These coexisting conditions may alter the clinical presentation of peripheral artery disease, compromise engagement in exercise therapy, impair foot inspection and protection, delay recognition of tissue injury, and contribute to poorer physical function, loss of independence, and lower health-related quality of life. This narrative review examines peripheral artery disease in older adults through the interplay between vascular insufficiency and geriatric vulnerability. The review was based on a focused synthesis of recent clinical guidelines, consensus documents, systematic reviews, meta-analyses, and selected clinical studies, with particular emphasis on functional impairment, frailty, sarcopenia, exercise therapy, cognitive impairment, depression, preventive foot care, and wound healing. Structured exercise, particularly intermittent walking, remains a central component of non-pharmacological management in chronic symptomatic peripheral artery disease. In older adults, frailty, sarcopenia, impaired mobility, comorbidities, and cognitive difficulties may reduce the feasibility of conventional walking-based programmes. The exercise modality, intensity, and level of supervision should therefore be adapted to the patient's functional capacity and tolerance. Preventive foot care and early recognition of tissue injury are important components of peripheral artery disease management. In older adults, practical barriers such as visual impairment or difficulty reaching the feet may compromise regular foot inspection and routine care. Non-healing wounds require early vascular assessment and coordinated management, including revascularisation when feasible, infection control, pressure offloading, and local wound care. Assessment should therefore address the patient's practical capacity for self-care and the need for additional support from family members, caregivers, or a multidisciplinary team. Cognitive impairment and depression may further influence adherence, self-management, and participation in treatment. Cognitive difficulties can interfere with the understanding and recall of recommendations concerning exercise, medication, and foot protection, while depression may reduce motivation and engagement in physical activity and preventive care. Communication and treatment plans may therefore need to be simplified and reinforced when cognitive or physical limitations restrict the patient's ability to implement recommendations in daily life. Management of peripheral artery disease in older adults should extend beyond vascular disease and include functional ability, geriatric vulnerability, capacity for daily self-care, and available support. Incorporating these factors into clinical decision-making may help align treatment goals and management strategies with each patient's needs and priorities, thereby supporting mobility, independence, and quality of life.

Keywords: peripheral artery disease; older adults; frailty; structured exercise; geriatric assessment.

1. INTRODUCTION

Peripheral artery disease (PAD) is a common atherosclerotic cardiovascular disease associated with impaired walking performance and functional status, reduced health-related quality of life, and increased risks of myocardial infarction, stroke, amputation, and death (Gornik et al., 2024). The global number of people living with PAD increased substantially between 1990 and 2019, a trend likely driven largely by population growth and ageing. In 2019, an estimated 113 million people aged 40 years or older had PAD, and prevalence reached 14.91% among those aged 80–84 years (GBD 2019 Peripheral Artery Disease Collaborators, 2023).

Lower-extremity PAD is characterised by atherosclerotic stenosis or occlusion of the arteries supplying the legs, with consequent impairment of limb perfusion. In clinical practice, diagnosis is based on history, vascular examination, and physiological testing; the resting ankle–brachial index is the recommended first-line non-invasive test, with a value of ≤ 0.90 considered abnormal (Gornik et al., 2024; Mazzolai, Teixeira-Tura, et al., 2024). Imaging is used when further anatomical definition is required, particularly when revascularisation is

being considered. However, the clinical relevance of PAD in older adults extends beyond arterial anatomy and haemodynamic measurements. PAD may impair walking performance and functional status even when typical claudication is absent, and these limitations are particularly important in later life, when preservation of mobility and independence is a major therapeutic goal (Gornik et al., 2024).

Older adults with PAD have a higher prevalence of multimorbidity and polypharmacy, and geriatric syndromes such as frailty, sarcopenia, malnutrition, and mobility impairment may obscure symptoms and complicate management. Among the clinically relevant coexisting conditions and risk amplifiers are diabetes, hypertension, chronic kidney disease, neuropathy, and depression, while visual impairment and physical limitations may reduce the ability to perform preventive foot care (Gornik et al., 2024). This narrative review therefore examines PAD in older adults as an interaction between vascular disease and geriatric vulnerability, with particular attention to functional status, frailty, sarcopenia, nutrition, adapted exercise, cognition, depression, foot care, and wound management.

2. MATERIALS AND METHODS

This narrative review was based on a focused synthesis of recent clinical guidelines, consensus documents, systematic reviews, meta-analyses, and selected randomised and observational studies addressing lower-extremity PAD in the context of ageing, with particular emphasis on structured exercise, frailty, sarcopenia, cognition, depression, foot care, and wound prevention and management. Priority was given to recent international recommendations and publications directly relevant to the practical management of older adults. The review was not designed as a systematic review or meta-analysis, but as a clinically oriented synthesis.

3. FUNCTIONAL IMPAIRMENT AND GERIATRIC VULNERABILITY

Typical intermittent claudication is characterised by exertional pain or discomfort in the buttock, thigh, calf, or foot that is relieved by rest. However, only a proportion of patients with PAD report typical claudication; others have atypical exertional leg symptoms or report no leg symptoms. Reduced walking capacity or self-limitation of activity may prevent symptoms from being provoked, while musculoskeletal or spinal disorders may complicate their interpretation. Impaired walking performance may therefore be present even in the absence of typical claudication (Gornik et al., 2024; Mazzolai, Teixido-Tura, et al., 2024).

The functional consequences of PAD extend beyond symptom-limited walking distance. Patients may have reduced lower-limb muscle strength, endurance, and physical performance, contributing to impaired mobility and gait. Poorer functional status is associated with lower health-related quality of life and predicts further mobility loss. In older adults, multimorbidity, pre-existing mobility limitations, and geriatric syndromes may further accentuate these effects (Gornik et al., 2024; Mazzolai, Teixido-Tura, et al., 2024; Pizzimenti et al., 2020).

Frailty is a multidimensional geriatric syndrome, whereas sarcopenia is a progressive skeletal muscle disorder defined primarily by low muscle strength. Low muscle quantity or quality confirms sarcopenia, and poor physical performance indicates severe disease. Malnutrition is closely associated with the sarcopenia phenotype and low muscle mass (Cruz-Jentoft et al., 2019). In older patients with PAD, geriatric syndromes may obscure vascular symptoms and complicate management, while frailty and sarcopenia are associated with increased risks of adverse cardiovascular, limb, and survival outcomes. Their assessment can support safer, patient-centred treatment decisions, particularly when revascularisation or amputation is being considered (Gornik et al., 2024).

4. INDIVIDUALISING STRUCTURED EXERCISE

Structured exercise is a core component of care for patients with chronic symptomatic PAD. Supervised exercise therapy improves walking performance, functional status, and health-related quality of life. When supervised treatment is unavailable or not feasible, a structured community- or home-based programme incorporating behavioural support should be offered rather than general advice to “walk more” (Gornik et al., 2024; Mazzolai, Belch, et al., 2024).

Intermittent walking remains the traditional basis of structured exercise. Programmes should generally include at least three sessions per week, a minimum of 30 minutes per session, and a duration of at least three months, with gradual progression according to tolerance. Walking is the preferred modality, although alternative forms of training may be used when it is not feasible (Mazzolai, Belch, et al., 2024).

Randomised trials further support the importance of programme structure and intensity. In the MOSAIC trial, a home-based walking intervention incorporating behaviour-change support improved six-minute walking distance compared with usual care. In the LITE trial, low-intensity walking without ischaemic leg symptoms was less effective than higher-intensity walking and did not significantly improve six-minute walking distance compared with the non-exercise control (Bearne et al., 2022; McDermott et al., 2021).

These findings do not mean that every older patient should be required to exercise to the point of severe claudication pain. Frailty, sarcopenia, mobility impairment, comorbidities, and individual tolerance may limit conventional walking programmes. Exercise intensity should therefore be progressed gradually, while cycling,

arm ergometry, resistance exercise, or combined modalities may be considered when walking is poorly tolerated or not feasible (Gornik et al., 2024; Mazzolai, Belch, et al., 2024).

5. FOOT CARE, WOUND MANAGEMENT, AND SELF-CARE CAPACITY

Preventive foot care is an integral component of PAD management. Patients should be educated about daily washing and careful drying, nail and skin care, avoidance of barefoot walking, and the use of appropriately fitting footwear. Clinical foot inspection at each visit and at least annual comprehensive foot evaluation are recommended. In older adults, these recommendations should be matched to the patient's practical ability to perform self-care. Visual impairment or physical limitations that make it difficult to reach the feet may hinder independent foot inspection and routine care; using a mirror and involving family members or caregivers may therefore be necessary (Gornik et al., 2024). When a non-healing wound or other features of chronic limb-threatening ischaemia are present, early vascular assessment is essential. Management should combine revascularisation when feasible with prompt treatment of infection, debridement when indicated, pressure offloading, and local wound care, ideally within a multispecialty vascular team (Gornik et al., 2024; Mazzolai, Teixido-Tura, et al., 2024).

Frailty in patients with chronic limb-threatening ischaemia or diabetes-related foot ulcers is associated with more severe presentation and higher risks of readmission, amputation, and death. However, heterogeneity in frailty assessment and study quality limits the certainty of these findings (Fernando et al., 2023).

6. COGNITION, DEPRESSION, AND SUPPORT IN DAILY MANAGEMENT

PAD is associated with cognitive impairment and dementia, although the available evidence is largely observational and most included studies were at high risk of bias. Memory and processing speed were the cognitive domains most frequently associated with PAD. Difficulties involving attention, memory, decision-making, organisation, and planning may hinder patients' understanding of and adherence to medical therapy, lifestyle changes, and structured exercise. Recognition of cognitive impairment may therefore prompt earlier assessment and simpler, more effective communication strategies (Cheshire et al., 2025).

Depression may further complicate daily management. A systematic review and meta-analysis found that depression was associated with a 20% higher risk of major adverse limb events, but not with mortality or major adverse cardiovascular events; however, the certainty of evidence was very low. Depression has also been associated with smoking, lower physical activity, barriers to lifestyle change, and lower adherence to medical treatment. Screening for depressive symptoms may therefore be considered when engagement with treatment is difficult (Abi-Jaoudé et al., 2022).

When cognitive or physical limitations reduce the ability to carry out recommendations, communication should be simplified and family members or caregivers may need to be involved, particularly in preventive foot care. Assessment should therefore consider not only whether recommendations were explained, but whether the patient has the capacity and support required to implement them in daily life (Cheshire et al., 2025; Gornik et al., 2024).

7. CONCLUSION

Peripheral artery disease in older adults should be understood not only as impaired limb perfusion but also as a condition whose clinical impact is shaped by mobility, muscle strength, frailty, cognition, depression, and capacity for self-care. Structured exercise remains a central component of treatment, but its modality, intensity, and supervision should be adapted to functional capacity and individual tolerance. Preventive foot care and wound management should include assessment of whether the patient can inspect and protect the feet and whether adequate support is available. Integrating vascular treatment with geriatric assessment and patient-centred goals may make management strategies more feasible and help preserve mobility, independence, and health-related quality of life.

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