

Risk Factors for Acute Limb Ischemia

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ABSTRACT

Acute limb ischemia (ALI) is a vascular emergency characterized by a sudden decrease in arterial blood flow to a limb, primarily caused by embolism, thrombosis, or underlying atherosclerotic disease. It presents with the "six Ps"—pain, pallor, pulselessness, poikilothermia, paresthesia, and paralysis—and requires immediate intervention to prevent irreversible tissue damage and limb loss. Key risk factors include smoking, diabetes, hypertension, dyslipidemia, advanced age, chronic kidney disease, atrial fibrillation, and prior revascularization procedures. Demographically, ALI is more prevalent among older adults, Black individuals, and males, with disparities influenced by socioeconomic factors and healthcare access. Rapid diagnosis and treatment are essential to improving outcomes and reducing morbidity and mortality associated with this life- and limb-threatening condition.

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INTRODUCTION

Acute Limb Ischemia (ALI), is defined as a sudden decrease in arterial perfusion to an extremity that threatens limb viability and function, typically with symptom duration less than two weeks.[1-4] The pathophysiology involves abrupt occlusion of an artery, most commonly due to embolism, in situ thrombosis (often superimposed on underlying atherosclerotic disease or prior revascularization), trauma, or less commonly, arterial dissection, aneurysm thrombosis, or vasculitis.[1-2][4-5]

Clinically, ALI presents with the classic "six Ps": pain, pallor, pulselessness, poikilothermia (coolness), paresthesia, and paralysis. These findings reflect the rapid onset of tissue hypoperfusion and ischemia, with progression from sensory symptoms (pain, paresthesia) to motor deficits (weakness, paralysis) and ultimately irreversible tissue damage if not promptly treated.[1-3] The severity and urgency are further stratified using the Rutherford classification, which distinguishes between viable, threatened (marginally or immediately), and irreversibly damaged limbs based on clinical findings and Doppler signals.[1]

ALI is a vascular emergency with high rates of morbidity, limb loss, and mortality if not rapidly recognized and managed. Immediate systemic anticoagulation (typically with intravenous unfractionated heparin) and urgent vascular specialist consultation for revascularization are standard initial steps.[2][4-5] Imaging modalities such as computed

tomography angiography (CTA) or Doppler ultrasound are used to confirm diagnosis and guide intervention.[2-3][5]

In summary, acute arterial insufficiency (ALI) is a sudden, severe reduction in arterial blood flow to a limb, most often due to embolic or thrombotic occlusion, and requires rapid diagnosis and intervention to prevent irreversible tissue loss and systemic complications.[1-5]

RISK FACTORS

The most common risk factors for developing acute arterial insufficiency are those associated with atherosclerotic disease and thromboembolic events. The medical literature consistently identifies the following as major contributors:

- **Cigarette smoking:** Smoking is the single most potent modifiable risk factor, with a particularly strong association with peripheral artery disease and acute limb ischemia. Its impact on incident disease is greater than for other vascular beds, and risk persists for decades after cessation.[1-4]
- **Diabetes mellitus:** Diabetes confers a 2- to 4-fold increased risk for peripheral arterial disease and is strongly associated with progression to critical limb ischemia and acute arterial events.[1-4]
- **Hypertension:** Elevated blood pressure is a universal risk factor for atherosclerosis and is independently associated with both chronic and acute arterial insufficiency.[1-5]

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- **Dyslipidemia:** Hypercholesterolemia and other lipid disorders contribute to atherosclerotic plaque formation and are common in patients with arterial insufficiency.[2-4][6]
- **Older age:** Incidence rises sharply with age, particularly after 50 years, and is highest in those over 80.[2-4]
- **Chronic kidney disease:** Renal dysfunction is associated with more diffuse and severe arterial disease, especially in the infrapopliteal distribution.[3-4]
- **Previous peripheral revascularization:** Prior surgical or endovascular intervention is a strong predictor of subsequent acute limb ischemia, likely due to underlying disease severity and procedural complications.[7]
- **Atrial fibrillation:** Cardioembolic events from atrial fibrillation are a recognized cause of acute arterial occlusion, particularly in the absence of underlying atherosclerosis.[7]
- **Elevated inflammatory markers and thrombophilia:** Increased levels of inflammatory biomarkers, lipoprotein(a), and genetic predisposition to thrombosis are associated with higher risk.[2][4]
- **Race/ethnicity:** Black individuals have a higher prevalence of peripheral artery disease and its complications compared to other groups, even after adjustment for traditional risk factors.[2][4]

Other less common etiologies for acute arterial insufficiency include vasculitis, trauma, and rare arteriopathies, but the overwhelming majority of cases are attributable to the above risk factors, particularly those driving atherosclerosis and thrombosis.[3-4]

In summary, the development of acute arterial insufficiency is most strongly linked to smoking, diabetes, hypertension, dyslipidemia, older age, chronic kidney disease, prior revascularization, and atrial fibrillation, with additional contributions from genetic and inflammatory factors.[1-7]

The demographic factors most strongly associated with the development of acute arterial insufficiency—typically manifesting as acute presentations of peripheral artery disease—are advanced age, Black race, and male sex. Age is the most significant driver, with prevalence and incidence rising sharply after age 50 and reaching approximately 20% in those aged 80 and older.[1-2] Black individuals have nearly twice the prevalence of peripheral artery disease compared to White individuals, with lifetime risk estimates of 30% in Black men and 27.6% in Black women, compared to 19% in White men and women.[1] Hispanic individuals also have elevated risk compared to White individuals, though less than Black individuals.[1] While the overall prevalence of peripheral artery disease is similar between men and women after age 55, men are more likely to present with classic symptoms and more severe disease.[2-4]

In addition to these demographic factors, socioeconomic status and access to care contribute to disparities in both incidence and outcomes, particularly among women and racial/ethnic minorities, who are more likely to be underdiagnosed and undertreated.[5] These demographic

associations are independent of, but often compounded by, traditional risk factors such as smoking and diabetes, which have a disproportionately strong impact on the development of acute arterial insufficiency.[1-2][4][6]

CONCLUSION

In conclusion, acute arterial insufficiency (ALI) is a critical medical emergency characterized by a sudden reduction in blood flow to a limb, predominantly caused by embolism or thrombosis related to atherosclerotic disease. Prompt recognition and treatment are essential to prevent irreversible tissue damage, limb loss, and systemic complications. The development of ALI is strongly associated with modifiable risk factors such as smoking, diabetes, hypertension, dyslipidemia, and underlying conditions like atrial fibrillation and chronic kidney disease. Demographically, advanced age, Black race, and male sex are significant factors that increase susceptibility, with disparities influenced further by socioeconomic and healthcare access issues. Understanding these risk factors and demographic influences is vital for early diagnosis, targeted prevention, and effective management of this vascular emergency.

REFERENCES

- I. Acosta, S., Du, Y., Borné, Y., & Gottsäter, A. (2025). Differences in Risk Factor Profiles for Peripheral Artery Disease Compared to Coronary, Cerebral and Carotid Artery. *Scientific Reports*, 15(1), 3864. <https://doi.org/10.1038/s41598-025-88516-0>
- II. Polonsky, T. S., & McDermott, M. M. (2021). Lower Extremity Peripheral Artery Disease Without Chronic Limb-Threatening Ischemia: A Review. *JAMA*, 325(21), 2188-2198. <https://doi.org/10.1001/jama.2021.2126>
- III. Farber, A., & Eberhardt, R. T. (2016). The Current State of Critical Limb Ischemia: A Systematic Review. *JAMA Surgery*, 151(11), 1070-1077. <https://doi.org/10.1001/jamasurg.2016.2018>
- IV. Kullo, I. J., & Rooke, T. W. (2016). Peripheral Artery Disease. *The New England Journal of Medicine*, 374(9), 861-871. <https://doi.org/10.1056/NEJMcpl507631>
- V. Poisson, S. N., Hills, N. K., Sidney, S., & Fullerton, H. J. (2022). Prevalence of Atherosclerotic Risk Factors Among Children and Young Adults With Arterial Ischemic Stroke. *JAMA Neurology*, 79(9), 901-910. <https://doi.org/10.1001/jamaneurol.2022.2077>
- VI. Singer, A. J., Tassiopoulos, A., & Kirsner, R. S. (2017). Evaluation and Management of Lower-Extremity Ulcers. *The New England Journal of Medicine*, 377(16), 1559-1567. <https://doi.org/10.1056/NEJMr1615243>
- VII. Hess, C. N., Huang, Z., Patel, M. R., et al. (2019). Acute Limb Ischemia in Peripheral Artery Disease.

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Circulation, 140(7), 556-565.
<https://doi.org/10.1161/CIRCULATIONAHA.119.039773>
VIII.