Critical Limb Ischemia

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KEYWORDS

• Critical limb ischemia • Diagnosis • Management • Endovascular • Guidelines • Review

KEY POINTS

- Certain patient populations should be screened for peripheral artery disease.
- Critical limb ischemia is becoming increasingly prevalent. A high index of suspicion is warranted and early referral is recommended.
- Meticulous history and physical examination are necessary.
- Arterial profile is performed for patients suspected with peripheral artery disease or critical limb ischemia.
- Once critical limb ischemia is confirmed, lesion location and severity should be promptly diagnosed.
- In addition to guideline-directed medical therapy, different revascularization options are weighed.
- Coronary artery disease is the major cause of death in the critical limb ischemia population.

DEFINITION AND PREVALENCE OF CRITICAL LIMB ISCHEMIA

Critical limb ischemia (CLI), the most advanced form of peripheral artery disease (PAD), carries grave implications with regard to morbidity and mortality. This article is a comprehensive review of CLI, including different treatment options and current review of the literature. PAD has been estimated to reduce quality of life in about 2 million symptomatic Americans, and millions more Americans without claudication are likely to suffer PAD-associated impairment.

This impairment leads to significant morbidity and health care expenditures. Perhaps, more importantly, PAD is a powerful independent predictor of coronary artery disease (CAD) and cerebrovascular disease events and mortality (**Fig. 1**).[1]

The incidence of CLI in the United States is estimated at 1% of the population aged $\geq$50 years and at approximately double that rate in those older than 70 years. Within 1 year of CLI diagnosis, 40% to 50% of diabetics will experience an amputation, and 20% to 25% will die. The estimated cost for treating CLI in the United States alone is $10 to $20 billion per year, but just a 25% reduction in amputations could save $2.9 to $3.0 billion annually.[2]

CLI is defined as limb pain that occurs at rest or impending limb loss that is caused by severe compromise of blood flow to the affected extremity. The term *CLI* should be used for patients with chronic ischemic rest pain, ulcers, or gangrene attributable to objectively proven arterial occlusive disease. The term *CLI* implies chronicity and is to be distinguished from acute limb ischemia. CLI is defined by most vascular clinicians as those patients in whom the untreated natural history would lead to major limb amputation within 6 months.[3]

CAUSES OF CRITICAL LIMB ISCHEMIA

CLI is usually caused by atherosclerosis; however, it can also be caused by atheroembolic or thromboembolic disease, vasculitis, in situ thrombosis related to hypercoagulable states, thromboangiitis obliterans, cystic adventitial disease, or trauma.

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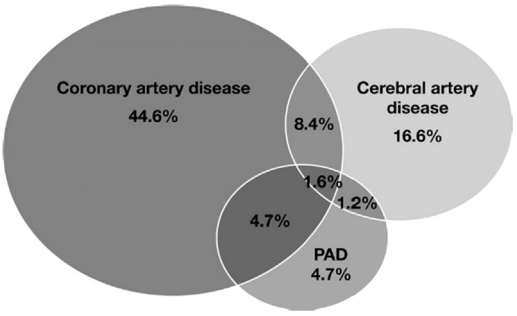

Fig. 1. Prevalence overlap of different vascular territories in peripheral arterial disease (PAD). (*From* Norgren L, Hiatt WR, Dormandy JA, et al. Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II). J Vasc Surg 2007;45(Suppl S):S12A; with permission.)

Factors that increase the risk of limb loss in patients with CLI include:

- Factors that reduce blood supply
  - Diabetes mellitus
  - Severe renal failure
  - Severe heart failure, shock
  - Vasospastic diseases
  - Smoking
- Factors that increase demand for blood flow to the microvascular bed
  - Infection (cellulitis, osteomyelitis)
  - Skin breakdown
  - Trauma

CLASSIFICATION OF PERIPHERAL ARTERY DISEASE AND CRITICAL LIMB ISCHEMIA

Fontaine's Stages and Rutherford's Categories are used to classify the degree of ischemia and salvageability of the limb (Table 1). CLI is a component of the more advanced stages. Given the 3- to 5-fold increase in cardiovascular (CV) mortality in patients with CLI compared to those without, this should prompt clinicians to recognize the ideal care strategies to optimize risk factors and be aware of the possibility of CAD, cerebrovascular disease, and aortic aneurysmal disease.

NEW CLASSIFICATION OF CRITICAL LIMB ISCHEMIA

CLI was first defined in 1982. The purpose of these 2 prior classification systems was to classify risk of amputation and benefit of revascularization. Over the last 40 years, diabetes has become increasingly prevalent, and there has been significant advent of revascularization strategies, especially endovascular therapy. The Society of Vascular Surgery Lower Extremity Guidelines Committee created a comprehensive new classification termed the *Society of Vascular Surgery (SVS) Lower Extremity Threatened Limb Classification System* (Table 2). This classification system includes 3 factors: wound, ischemia, and foot infection (SVS WIfI).[4]

The SVS grade from each table is then categorized into 5 clinical stages in ascending order: very low, low, moderate, high, and unsalvageable foot. These categories provide risk stratification of amputation risk at 1 year and estimated likelihood of benefit of revascularization (assuming infection can be controlled first).

EVALUATION OF CRITICAL LIMB ISCHEMIA PATIENTS

History

- Patients with CLI present with ischemic rest pain with or without skin changes, which is worse when supine and tends to lessen when the extremity is in the dependent position.

Table 1
Classification of peripheral arterial disease and critical limb ischemia

Fontaine		Rutherford		
Stage	**Clinical**	**Grade**	**Category**	**Clinical**
I	Asymptomatic	0	0	Asymptomatic
IIa	Mild claudication	I	1	Mild claudication
IIb	Moderate-severe claudication	I	2	Moderate claudication
		I	3	Severe claudication
III	Rest pain	II	4	Rest pain
IV	Ulcers or gangrene	III	5	Minor tissue loss
		IV	6	Ulcers or gangrene

From Norgren L, Hiatt WR, Dormandy JA, et al. Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II). J Vasc Surg 2007;45(Suppl S):S29A; with permission.