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EDITORIAL/COMMENTARY

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The STEMI of the Limb: Have We Failed to Inspire the Next Generation of Vascular Cardiologists?

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Peripheral arterial disease (PAD) remains an underrecognized component of cardiovascular medicine despite its enormous cardiovascular and limb consequences. Chronic limb-threatening ischemia (CLTI), its most severe manifestation, provides an opportunity to rethink how vascular disease is introduced to cardiovascular trainees. This editorial proposes that “CLTI is the STEMI of the limb” can serve as a memorable educational analogy—not a pathophysiologic equivalence—to engage young cardiologists, reinforce PAD as a cardiovascular disease, and rebuild interest in vascular medicine and limb preservation.

Cardiology has been remarkably successful at inspiring young physicians to pursue its most challenging subspecialties.

A first-year cardiovascular fellow quickly experiences the intensity of a STEMI activation. Fellows see the urgency of cardiogenic shock. They become fascinated by structural heart disease, complex coronary intervention, electrophysiology, advanced heart failure, and multimodality imaging.

Ask that same fellow about CLTI, however, and the response is often very different.

For many trainees, CLTI remains somewhere at the margins of cardiovascular medicine: a disease encountered briefly during fellowship or perceived predominantly as the domain of vascular surgery, wound care, podiatry, or another specialty.

That disconnect should concern us.

PAD is unequivocally cardiovascular disease. It is predominantly an atherosclerotic disorder, carries substantial cardiovascular morbidity and mortality, and its most advanced manifestation threatens not only mobility and independence but life and limb.[1,2]

Yet despite the enormous burden of PAD, we have struggled to create the same enthusiasm for vascular disease among young cardiologists that we have created for virtually every major subspecialty within contemporary cardiovascular medicine. Perhaps the problem is not simply how much vascular medicine we teach; perhaps it is how we teach young cardiologists to think about it. And perhaps we should begin with a concept every cardiology fellow already understands:

CLTI is the STEMI of the limb.

The analogy is intentionally provocative. It is also intentionally an analogy. A STEMI is most often an acute thrombotic coronary event. CLTI is generally the culmination of chronic progressive arterial insufficiency associated with ischemic rest pain, nonhealing wounds, or gangrene.[1,2] They are not pathophysiologically equivalent, and we should not pretend otherwise. But as an educational comparison, they share something fundamental: Ischemia threatens viable tissue. With STEMI, myocardium is threatened. With CLTI, tissue and, ultimately, the functional limb is threatened. Both require recognition of ischemia, an understanding of anatomy and physiology, appropriate medical therapy and, in selected patients, timely revascularization. The 2024 multisociety guideline for lower-extremity PAD specifically recommends revascularization

(endovascular, surgical, or hybrid) to prevent limb loss in patients with CLTI and emphasizes strategies to heal wounds, minimize tissue loss, relieve pain, and preserve a functional limb.[1] Cardiology has built an extraordinary culture around myocardial salvage. Perhaps it is time we create similar excitement around limb salvage.

We Know How to Make Cardiovascular Disease Compelling

Consider how we introduce STEMI to a trainee. The language itself communicates urgency: *Time is muscle.*

Every fellow learns to recognize ST-segment elevation. Hospitals measure door-to-balloon time.

Systems of care are built around rapid diagnosis and reperfusion. We activate teams. We study anatomy. We learn wires, catheters, pharmacology, hemodynamics, mechanical support, and management of complications. And from the beginning of cardiovascular training, the mission is obvious: *Recognize ischemia. Restore blood flow. Save myocardium. Save the patient.* Now consider a patient with CLTI. The patient may present with ischemic rest pain, a nonhealing ulcer, or gangrene. Perfusion has become inadequate to sustain tissue integrity. Without successful treatment, the trajectory may include progressive tissue loss, infection, major amputation, loss of independence, and death.[1,2] The stakes are extraordinary. In a contemporary analysis of Medicare beneficiaries with CLTI, 1-year survival was only 77.7%.[3] And once major amputation occurs, the prognosis becomes even more sobering. In a study of more than 186,000 Medicare patients with PAD undergoing major lower-extremity amputation, mortality reached 48.3% at 1 year and 70.9% at 3 years.[4] These are not the outcomes of a benign disease affecting an expendable vascular territory. They represent advanced cardiovascular disease.

The clinical mission should therefore be equally understandable: *Recognize ischemia. Restore blood flow when appropriate. Heal the wound. Save the limb. Preserve mobility and independence.* Perhaps our language should reflect that urgency. If time is muscle in STEMI, then in CLTI, time is tissue.

Speak the Language Young Cardiologists Already Understand

Young cardiologists do not need vascular disease simplified.

They need an intellectual doorway into it.

We already have one.

STEMI → CLTI

Myocardium at risk → Limb and tissue at risk

Time is muscle → Time is tissue

MACE → MACE + MALE

CTO → Femoropopliteal, tibial, and pedal CTO

Coronary physiology → Ankle-brachial index, toe pressure, waveform analysis, and limb perfusion assessment

Echocardiography → Vascular duplex ultrasound

Shock team → Multidisciplinary limb-salvage team

CAD → PAD

The comparisons are deliberately imperfect.

A tibial CTO is not simply a left anterior descending CTO below the waist. Toe pressure is not fractional flow reserve. CLTI should not be managed like STEMI. The purpose of these comparisons is different. They allow trainees to recognize the intellectual continuity of cardiovascular medicine throughout the circulation. The underlying disease frequently shares the same biology: atherosclerosis, inflammation, thrombosis, diabetes, dyslipidemia, hypertension, renal disease, and smoking exposure.[1,5] The vascular territory changes. Our responsibility to recognize cardiovascular disease should not.

Why Does Cardiovascular Training Seem to Stop at the Heart?

Modern cardiovascular training is extraordinary in its depth. We characterize myocardial tissue with cardiac magnetic resonance. We interrogate coronary physiology lesion by lesion. We map electrical circuits to millimeters. We replace valves through catheters. We mechanically support failing ventricles. We perform increasingly complex coronary CTO interventions.

Yet a cardiovascular fellow may complete training considerably less comfortable evaluating a patient with a nonhealing ischemic wound, interpreting toe pressures, understanding a lower-extremity arterial duplex examination, or developing a comprehensive strategy for a patient with CLTI.

That gap is especially striking because the formal cardiovascular training framework already recognizes vascular medicine as an important component of cardiovascular competency.[6] The 2023 advanced training statement for interventional cardiology goes even further, explicitly incorporating coronary, peripheral vascular, and structural heart interventions within the breadth of interventional cardiovascular training.[7] The framework exists. The identity has not necessarily followed. When a fellow encounters severe aortic stenosis, the response may be: *Could structural heart be my career?* When they encounter atrial fibrillation: *Could I become an electrophysiologist?* When they see a challenging coronary CTO: *Could I become a complex coronary interventionist?* When they encounter CLTI, too often the intellectual response ends with: Call vascular surgery. That consultation may be entirely appropriate.

Vascular surgeons are indispensable partners in the treatment of advanced PAD and CLTI. The problem is not the consultation. The problem is when consultation replaces cardiovascular curiosity.

This Cannot Become a Turf War

Any attempt to re-engage cardiology in vascular disease will fail if it becomes an argument over ownership. No specialty owns PAD. CLTI is among the clearest examples in medicine of a disease that benefits from multidisciplinary care. Depending on the patient, successful treatment may require vascular surgery, interventional cardiology, vascular medicine, interventional radiology, podiatry, wound care, infectious disease, endocrinology, nursing, rehabilitation, and other disciplines.[1,2] The question should therefore never be: *Who owns PAD?* A much better question is: *Why wouldn't every cardiologist feel responsible for recognizing it?* Cardiologists already manage much of the biology driving outcomes in these patients. Atherosclerosis, dyslipidemia, hypertension, diabetes, cardiometabolic disease, smoking. Thrombosis, antiplatelet and antithrombotic therapy, coronary disease, heart failure, chronic kidney disease, polyvascular disease. PAD is associated with major systemic cardiovascular risk, and contemporary treatment requires aggressive guideline-directed medical therapy in addition to limb-directed care.[1,5] Yet medical therapy in PAD continues to be underused compared with the attention afforded to coronary disease.[8]

Interestingly, a recent randomized trial demonstrated that a multidisciplinary vascular care team substantially improved achievement of lipid goals among patients with PAD compared with education alone.[9] That finding reinforces an important concept: *These patients need more cardiovascular engagement, not less.*

CLTI May Be the Gateway

If our objective is to make vascular medicine compelling to the next generation, CLTI may be the ideal place to start. Not because CLTI represents all vascular medicine. It does not. But because CLTI makes the consequences of arterial disease immediately visible. A coronary stenosis appears on a monitor. CLTI may present as a wound that will not heal. Gangrene. Rest pain that prevents sleep. A patient who can no longer work or walk normally. A family confronting the possibility of amputation. Then comes the opportunity to alter that trajectory.

Imagine the experience of a cardiovascular fellow encountering the patient from the beginning.

Examine the foot. Take the history. Understand why the wound is not healing. Review the ankle-brachial index.

Study the waveforms and toe pressure. Interpret the duplex. Examine the angiogram. Understand the anatomy. Discuss surgical and endovascular options.

Understand why one strategy may be preferable to another. Participate in the revascularization when appropriate. Optimize cardiovascular risk reduction. Then see that same patient several weeks later. The wound is closing. The pain has resolved. The patient is walking. The foot is still there. That is an extraordinarily powerful cardiovascular experience. It is also one that young cardiologists may not see often enough.

Recruit Fellows Before They Choose Their Identity

If we wait until advanced interventional cardiology fellowship to expose physicians meaningfully to vascular medicine, we may be arriving too late. By then many trainees have already chosen their professional identities. Structural heart. complex coronary intervention, complete high-risk indicated percutaneous coronary intervention. Electrophysiology, advanced imaging, heart failure, prevention.

If we hope to build a vascular cardiology workforce, meaningful exposure needs to occur earlier during general cardiovascular fellowship, while trainees are still deciding what kind of cardiologists they want to become. The objective should not be to convert every fellow into a peripheral interventionist; that would be neither realistic nor desirable. The objective should be twofold.

First, every cardiologist should graduate recognizing PAD and CLTI as important cardiovascular diseases for which they share responsibility. Second, a subset of fellows should receive enough meaningful exposure to vascular medicine that some of them eventually say: *This is what I want to do.* That requires more than another lecture entitled "Peripheral Arterial Disease". Let trainees spend time in a vascular laboratory. Teach them vascular physiology. Show them duplex imaging. Expose them to CLTI clinic. Allow them to participate in limb-salvage conferences. Introduce them to vascular clinical trials. Show them complex endovascular procedures. Show them bypass surgery. Show them wound healing. Most importantly, let them meet physicians who are passionate about vascular medicine. Mentorship matters. Young physicians are attracted not simply to diseases. They are attracted to missions.

Limb preservation is an extraordinary mission.

Perhaps "Peripheral" Is Part of the Problem

Even our terminology may unintentionally reinforce the problem. "Peripheral" is anatomically accurate. Culturally, however, the word can imply something distant from the center. Secondary. Less important. PAD is anything but peripheral to cardiovascular outcomes. A patient with lower-extremity PAD frequently has disease throughout the vascular system, and polyvascular involvement identifies patients at particularly high cardiovascular risk.[1,5] Perhaps we should increasingly speak to trainees about panvascular cardiovascular medicine. The future vascular cardiologist should not simply be someone who knows how to cross a superficial femoral artery lesion. The discipline encompasses atherosclerosis, vascular biology, thrombosis, vascular imaging, exercise therapy, prevention, antithrombotic treatment, wound perfusion, limb preservation, venous disease, polyvascular risk, clinical investigation, and—in appropriately trained physicians—endovascular intervention. That is not a narrow career. It is an extraordinarily broad cardiovascular one.

The Forgotten Circulation

Cardiology has spent decades expanding the limits of what cardiovascular medicine can accomplish. We open acutely occluded coronary arteries. We replace valves without surgery. We ablate complex arrhythmias. We mechanically support failing ventricles. We intervene on coronary lesions that once seemed impossible to treat. Perhaps one of our next challenges does not require discovering another part of the heart. Perhaps it requires rediscovering the rest of the circulation. This is not a call to compete with vascular surgeons. It is not an argument that cardiologists should own PAD. And it is certainly not an argument that every cardiologist should perform peripheral interventions. It is a call to make vascular disease visible again within cardiovascular medicine. We should show young cardiologists its physiology. Its complexity. Its imaging. Its pharmacology. Its technology. Its multidisciplinary nature. And above all, its human consequences. A patient does not experience a left arterial descending stenosis as "cardiology" and a superficial femoral artery occlusion as "vascular". The patient experiences cardiovascular disease. Perhaps our trainees should learn to see it the same way. And perhaps the first step is giving them a comparison they will remember:

CLTI is the STEMI of the limb. Not because the two diseases are identical. But because tissue is threatened, time matters, expertise matters, and the outcome can change a life.

Time is muscle.

Time is tissue.

If we want a new generation of cardiologists to become passionate about vascular disease, we must first give them a reason to care. Saving a limb is a powerful place to begin. ■

Affiliations and Disclosures

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