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SPECIAL COMMUNICATION

Toward an Interdisciplinary Approach to Diabetic Limbs in the Era of Functional Limb Preservation: “Can We Preserve This Limb?” Meets “Should We Preserve This Limb?”

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The Term “Critical Limb Ischemia” is Outdated and Misapplied to Chronic Ischemia in the High-Risk Limb

Critical limb ischemia (CLI) is a term created in 1982 to be applied to patients with limb threatening chronic ischemia—specifically excluding people with diabetes.\textsuperscript{1,2} Indeed, CLI was critical. If not re-vascularized, CLI inevitably led to major amputation. As diabetes was, at the time, infrequent, this was more of an afterthought. As diabetes continued to increase in prevalence, the work of three pioneers, Frank W. Veith and Frank LoGerfo and George Andros during the 1970s and 1980s took on increasing importance.\textsuperscript{3-6} These surgeon-scientists helped to demonstrate that distal bypass surgery (to crural or pedal arteries) could be clinically successful even in people with diabetes.\textsuperscript{2-5} This success finally defeated the weakly proven, yet steadily carved, theory of some sort of non-treatable diabetic micro-angiopathy,\textsuperscript{5} opening a new and hopeful era for diabetic patients presenting with toes, feet gangrene or non-healing ulcers. Unfortunately, we continued to define them as “CLI” and adopted classic classifications like Fontaine and Rutherford.\textsuperscript{7,8}

Technology Meets Teams

At the beginning of the 1990s very few endovascular innovations existed.\textsuperscript{9} As endovascular therapy grew in prominence, diabetes grew in prevalence. This brought podiatric and vascular surgeons together to develop interdisciplinary teams.\textsuperscript{9-11} These two disciplines began to co-evolve with one another in some centers. In doing so, they began not only sharing clinic and operating time, but also sharing ideas about patient care and clinical research.

Limb Salvage is an Objective but Should Not Necessarily be an Outcome Measure

As documented in national registries the increase in these teams has led to a reduction in high level amputation while the “minor” amputation rate, has generally increased due to the rapidly
evolving wound care professional groups and protective pressure offloading technologies and strategies.\textsuperscript{12,13} It became obvious that classification systems designed primarily for tissue loss (used by podiatric surgery and other wound healing specialists) were not entirely helpful for vascular surgeons. Similarly, classifications that focused primarily on vascular disease were not entirely helpful to podiatric surgeons. This created an opportunity for innovation. Responding to this, Mills, et al., in 2014 proposed new Society for Vascular Surgery (SVS) guidelines, the Wound, Ischemia, foot Infection (WIFI) score, finally integrating clinical data from infection, vascular hemodynamic and wound characteristics, with a well-defined stratification of the 1-year risk of amputation.\textsuperscript{6} This classification, in numerous studies has been shown to be highly predictive of amputation. It also showed the significant interplay of tissue loss, infection and ischemia.\textsuperscript{6} “Can we preserve this limb?” was able to be highlighted by a WIFI Score. But how helpful is the WIFI Score as a stand-alone tool?

**Preservation of Function as a Shared Objective**

When performing an assessment for a threatened limb, one can think of two surveys (Figure 1). The first can assess for short or mid-term limb threat using an assessment of severity of tissue loss, ischemia and infection (WIFI scoring).\textsuperscript{7,8} In essence, this asks the practical question “Can we preserve this limb”. Equally as important, the second survey consists of assessing functional impairment.\textsuperscript{14} In essence, this asks “Should we preserve this limb?” Both surveys are highly individualized and will change with advancing therapies. For vascular intervention, a schematic summary of decision making is shown in Figure 2, where it is suggested that revascularization techniques, granting long term efficacy should be preferred where functionality is preserved, and a long course of wound healing or reconstructive foot surgery are foreseen.
Conclusion

In conclusion, we now find ourselves at a point where, with enough attention, most high-risk limbs are salvageable. However, limb salvage without pragmatic functional preservation is a false idol as seen in Figure 3. A marriage of these two concepts with them co-evolving over time with an interdisciplinary team is a goal that is worth a life’s work.

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References


WIFI Assessment

*Can* we preserve this limb?

Function Assessment

*Should* we preserve this limb?

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Figure 1: Wound, Ischemia, Foot Infection and Function – Primary and Secondary Limb Survey
Figure 2: Example of revascularization guided by degree of functional impairment
Figure 3: Role of reconstructive and function preserving foot surgery in managing diabetic foot complications