Novel Chronic Total Occlusion Scoring System in Predicting Outcome: Is it Ready for PRIME Time?

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In this issue of the *Journal of Critical Limb Ischemia*, Mustapha et al analyzed multicenter data in patients with symptomatic peripheral vascular disease (PVD)/critical limb ischemia (CLI) in relation to the presence and location of chronic total occlusion (CTO).[1] Besides usual patient characteristics, such as risk factors and comorbidities, lesions were also graded according to the novel PRIME scoring system, together with lesion characteristics, such as length and calcification.

While endovascular treatment has been shown to be efficacious in the treatment of CLI and is widely adopted as a first-line treatment option, the relationship between lesion characteristics and their impact of limb salvage and mortality has not been adequately addressed.[2] To this end, CTO (compared with non-CTO disease) presents not only as a technical challenge, but likely represents more severe underlying systemic disease, chronicity, more-profound ischemia, and the end stage of the CLI spectrum, with the attendant mortality and limb-loss implications.

The study population resembles a real-world practice with an elderly population (mean age, 69.9 years) and with the majority exhibiting risk factors, such as hypertension, dyslipidemia, diabetes, and coronary artery disease. While the number of dialysis-dependent patients is low (5.4%), more than half of the study population had renal impairment of stage 3A and higher. Additionally, the high proportion of calcification (86.0%) and long lesion lengths (mean, 200 mm) is reflective of the real-world experience in such a population.

The authors found significant increased 1-year survival in patients with above-the-knee (ATK)-CTO (PRIME 1 and 2) vs multilevel (PRIME 3 and 6) and below-the-knee (BTK)-CTO (PRIME 4 and 5) (97.1% vs 86.2% vs 83.6%, respectively).[1] This is in part due to the older age and significantly higher incidence of diabetes and end-stage renal failure in patients with BTK-CTOs.[1] However, it also reflects that more extensive disease (multilevel) and more distal disease (BTK-CTO) portends a different disease trajectory. The findings are consistent with the 2 meta-analyses by Katsanos et al, which indicated that all-cause death at 1 year was higher in patients with infrapopliteal disease vs femoropopliteal disease (8.0% vs 2.3%, respectively).[3,4]

The authors also reported that patients with BTK-CTOs had a higher 1-year amputation rate compared with patients with ATK-CTOs (10% vs 1%, respectively).[1] One could postulate that the higher incidence of diabetes and end-stage renal failure in patients with BTK-CTOs predisposes this group to concomitant small artery disease (SAD). Ferraresi et al found that these patients are susceptible to SAD (disease involving pedal-plantar arch and small arteries arising from it), resulting in the failure of the "distribution" system of the foot.[5] Rashid et al showed that the quality of pedal arch positively impacted wound healing and time to healing after open surgical infrapopliteal bypass.[6] Similarly, Troisi et al showed pedal arch status also positively impacted time to healing, limb salvage, and survival in diabetic patients with foot wounds undergoing infrainguinal endovascular revascularization.[7] In the presence of SAD, reconstitution of flow to the wound-angiosome is crucial for healing as the failure of the distribution system isolates every angiosome, which would impact wound healing.

In conclusion, the authors should be congratulated in highlighting that location and extent of CTO are unique risk factors with definite impact in the context of endovascular treatment of CLI. The data presented suggest that more distal and more extensive disease portends a different trajectory than more proximal disease, and this knowledge could be utilized in patient risk stratification, treatment strategy development, and future trial designs.

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