PEDAL ARTERIAL CALCIFICATION SCORE IS ASSOCIATED WITH HEMODYNAMIC CHANGE AND MAJOR AMPUTATION AFTER REVASCULARIZATION IN DIABETIC PATIENTS WITH CHRONIC LIMB-THREATENING ISCHEMIA

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Purpose: Pedal medial arterial calcification (pMAC) is driven by diabetes mellitus (DM) and end-stage renal disease (ESRD) and is associated with major amputation in CLTI. We hypothesize this association is related to unresolved distal ischemia. We investigated relationships across pMAC score, hemodynamic change, and major amputation in patients with CLTI.

Methods: This is a single-institution retrospective study of 306 patients who underwent technically successful infrainguinal revascularization for CLTI (2011-2020) and had foot x-rays for blinded pMAC scoring. pMAC scores ranged from 0-5 based on assessment of calcification in five pedal arterial segments. Technical success was defined as restoration of in-line flow through the target artery pathway to the foot. Toe pressure measurements within 90 days before and 60 days after revascularization were used to calculate change in WIfI ischemia grade after revascularization. Ischemia grade (0-3) was calculated based on toe pressures using the SVS WIfI staging system.

Results: Diabetes (223/306; 73%) was independently associated with higher pMAC score [OR 3.8 (2.1-7.1), p<0.0001]. In the DM subgroup, pMAC scores were trichotomized as 0-1 (67; 30%), 2-4 (99; 44%), and 5 (57; 26%). Complete pre- and post-revascularization toe pressures were available in 101/223 (46%) patients with DM. 56/101 (55%) had improvement to their WIfI ischemia grade after revascularization, while 45/101 (45%) had no improvement. In a logistic multiple regression model, the only factor independently associated with failure to improve the WIfI ischemia grade after revascularization was pMAC 5 [OR 4.4 (1.3-15.6), p=0.02]. Among those with DM, 49 (22%) underwent major amputation. Preoperative factors independently associated with major amputation were WIfI stage 4 and high pMAC. However, after further adjusting for hemodynamic change after revascularization, the only factor independently associated with major amputation was failure to improve the WIfI ischemia grade after technically successful revascularization [HR 7.2 (2.1-25.3), p=0.002] (Figure 1).

Conclusions: The pMAC score is a simple and practical tool independently associated with major amputation after technically successful infrainguinal revascularization in CLTI. These data suggest that persistent distal ischemia after revascularization is the mechanism underlying the relationship between pMAC and major amputation in diabetic patients with CLTI.
Figure 1. Unimproved WIfI ischemia grade after technically successful infrainguinal revascularization is associated with major amputation. It is the only factor independently associated with major amputation in a model also including pMAC and WIfI stage.