

Association Between Medial Arterial Calcification (MAC) Score in Pedal Arteries and Healing Outcomes in Diabetic Foot Ulcers: A Retrospective Study

EASD 2026

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INTRODUCTION

Medial arterial calcification (MAC) in pedal arteries is a common finding among people with type 2 diabetes (T2D), which might impair distal perfusion, thereby contributing to poor wound healing. Understanding its prognostic significance might enhance clinical decision-making in the management of diabetic foot ulcer (DFU).

AIM

To assess the relationship between pedal artery MAC score and healing outcomes in people with T2D with DFUs.

METHOD

We conducted a retrospective review of 233 people (160 males, 73 females; mean age 57.1±10.3) with T2D with DFUs treated between 2015-2025. The MAC scores were calculated from the X-ray of the foot (AP and lateral view) and graded as absent (grade 0), mild (grades 1-2) and moderate to severe (grades 3-5). Healing outcomes at 6 months and rates of lower limb amputation (major and minor) were recorded.

RESULTS

Healing outcomes at six months decreased progressively with higher MAC scores. Participants with a MAC score of 0 demonstrated the highest healing rate (86.4%, 95/110), followed by those with MAC scores of 1–2 (74.6%, 44/59), while the lowest healing rate was observed in those with MAC scores of 3–5 (70.3%, 45/64) ($p = 0.027$). A similar gradient was observed for amputation rates, which increased with worsening MAC category: 6.4% in MAC 0, 11.9% in MAC 1–2, and 20.3% in MAC 3–5 ($p = 0.021$).

In the univariate analysis, several clinical factors—including duration of ulcer, Wagner grade, peripheral vascular disease, peripheral neuropathy, smoking status, BMI, eGFR, and HbA1c—were not significantly associated with wound healing. In contrast, older age ($p = 0.003$), longer duration of diabetes ($p = 0.001$), and higher MAC score ($p < 0.001$) were all significant predictors of delayed healing. Binary logistic regression demonstrated that the overall multivariable model was statistically significant ($\chi^2 = 23.909$, $p = 0.021$) and showed excellent calibration (Hosmer–Lemeshow $p = 0.979$). After adjustment for covariates, only the MAC score remained an independent predictor of delayed wound healing ($p = 0.012$), with a hazard ratio of 0.76 (95% CI: 0.61–0.94), indicating that higher MAC classifications were associated with progressively lower probabilities of healing.

MAC Score	Total ulcer	Healed ulcer	Percentage of healing	P-value
0	110	95	86.4%	0.027
1-2	59	44	74.6%	
3-5	64	45	70.3%	
MAC Score	Total ulcer	Amputation	Percentage of Amputation	P-value
0	110	7	6.4%	0.021
1-2	59	7	11.9%	
3-5	64	13	20.3%	



Source: Ref 5



Source: Own Patient

CONCLUSIONS

Greater severity of medial arterial calcification is clearly associated with poorer healing outcomes in individuals with diabetic foot ulcers, reinforcing the concept that MAC burden plays a meaningful role in wound prognosis. These findings highlight the potential value of incorporating MAC scoring into routine clinical assessment, as it may help identify patients at higher risk for delayed healing or adverse outcomes. Systematic evaluation of pedal arterial calcification could therefore enhance risk stratification, inform timely therapeutic decisions, and support more individualized management strategies in diabetic foot care.

ACKNOWLEDGEMENTS

Dr. Om Tantia and all the staffs of Department of Diabetology, ILS Hospital, Saltlake, Kolkata

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