

The effect of calcified digital arteries identified in foot x-rays on limb salvage in a Veteran population with diabetes.

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INTRODUCTION

- Medial arterial calcification (MAC) in the lower extremity has known associations with major lower extremity amputation. It is thought that stiff arterial walls are incapable of expanding in response to physiologic stimuli such as infection or trauma.
- Studies have shown that MAC is predictive of amputation, associated with lower TBI measurements, and lower success rates of angioplasty.
- Foot x-rays are a routine part of the diabetic foot work-up, and calcified arteries are frequently incidentally encountered, but its clinical significance is currently unknown.

OBJECTIVE

- We modified the criteria for the presence of calcified arteries in toes of patients' first minor amputation and studied their post-operative outcomes in a cohort of veterans with diabetes from the Palo Alto Veterans Affairs podiatry clinic.

METHODS

- We retrospectively reviewed 152 radiographs of patients who received their first minor amputation defined as any amputation distal to the ankle performed by the department of Podiatry at the Veterans Affairs Palo Alto Health Care System between 2003 and 2013.
- Study outcomes were time to major amputation defined as amputation above the ankle and death over a 5-year follow-up period.
- Two groups were created, those with calcified digital arteries and those without.
- The criteria for calcified digital arteries on plain radiographic films (Fig. 1) are as follows:
 - Must have a linear "pipe-stem" appearance¹³
 - Visible distal to the level of the metatarsophalangeal joints
 - Must be seen within 30 seconds, contrast may be adjusted

METHODS (continued)



Figure 1. Extensive digital artery calcification clearly demonstrated in the anteroposterior foot radiographic films

RESULTS

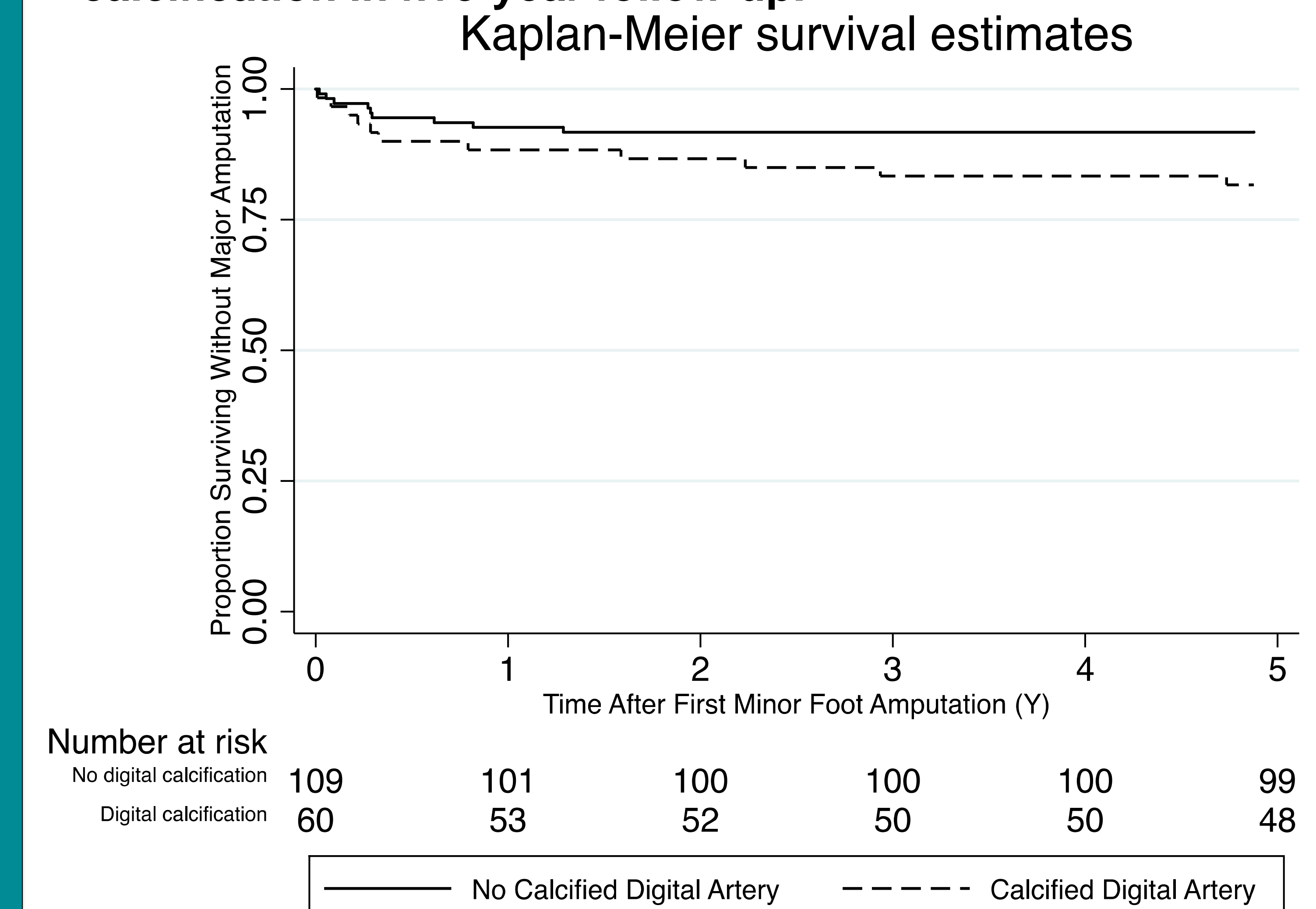
Table 1. Number of events and adjusted hazard ratios for participants with calcified digital arteries as identified on plain film radiography from separate Cox Regression analyses by outcome of interest.

Outcome	# Events (%)		Adjusted Hazard Ratio ^a (95% CI)	P-value
	Presence of digital artery calcification N=59	Absence of digital artery calcification N=93		
Major Amputation	11 (19)	6 (9)	3.15 (1.05 – 9.40)	0.04
Mortality	20 (34)	29 (30)	1.15 (0.63 – 2.11)	0.65

^a Adjusted for indication for index procedure

RESULTS (continued)

Figure 2. Kaplan-Meier Survival Curve for major amputation in participants with and without digital artery calcification in five-year follow-up.



- Presence of calcified digital arteries had higher risk for major leg amputation within 5 years with an adjusted hazard ratio of 3.15 (1.05 – 9.40) (P=.04).
- Risk of death among those with or without identified digital artery calcifications failed to reach statistical significance (P=.50).
- The total five year all-cause mortality is 31.6%.

CONCLUSION

- This is the first step in evaluating the clinical importance of calcified digital arteries.
- We found that its presence indicates a 3-fold increase in receiving a major limb amputation within 5 years after a minor foot amputation, indicating a risk for limb salvage failure.

CLINICAL RELEVANCE

- In patients where calcified arteries render vessels non-compressible, presence of calcified digital arteries should be considered a risk factor for limb salvage failure.