



Heel Wounds Predict Poor Outcomes After Infrapopliteal Revascularization

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Disclosures

- No disclosures

Background

- PAD with tissue loss carries high risk of limb loss and mortality
- Tibial disease present in [%] of patients with tissue loss
 - Rates of limb loss with tibial disease approach 20% at 3 years
- Treatment of these patients is complex and must take anatomic and clinical factors into consideration
- Wound severity known to correlate with amputation rates
 - Wlfl scoring has helped to delineate this risk
- Presence of a heel wound can reflect overall comorbidity burden, but its effect on clinical outcomes after revascularization not well studied

Objective

To determine whether patients with heel wounds are at higher risk of mortality, major amputation, or failure to heal their wounds compared to patients with forefoot wounds undergoing revascularization for infrapopliteal arterial disease.

Methods

- Retrospective review of patients presenting between 2006 and 2013
 - Ischemic foot ulceration
 - Infrapopliteal arterial disease
 - Underwent pedal bypass or endovascular tibial intervention
- Subdivided into heel wound and forefoot wound groups
 - More proximal wounds excluded
- Primary outcome: major amputation or death
- Secondary outcomes: mortality, amputation, wound healing

Results

- 380 patients identified
- 46 heel wounds, 334 forefoot wounds
- 101 bypasses, 279 endovascular interventions
- No association between wound location and treatment modality

Baseline Characteristics

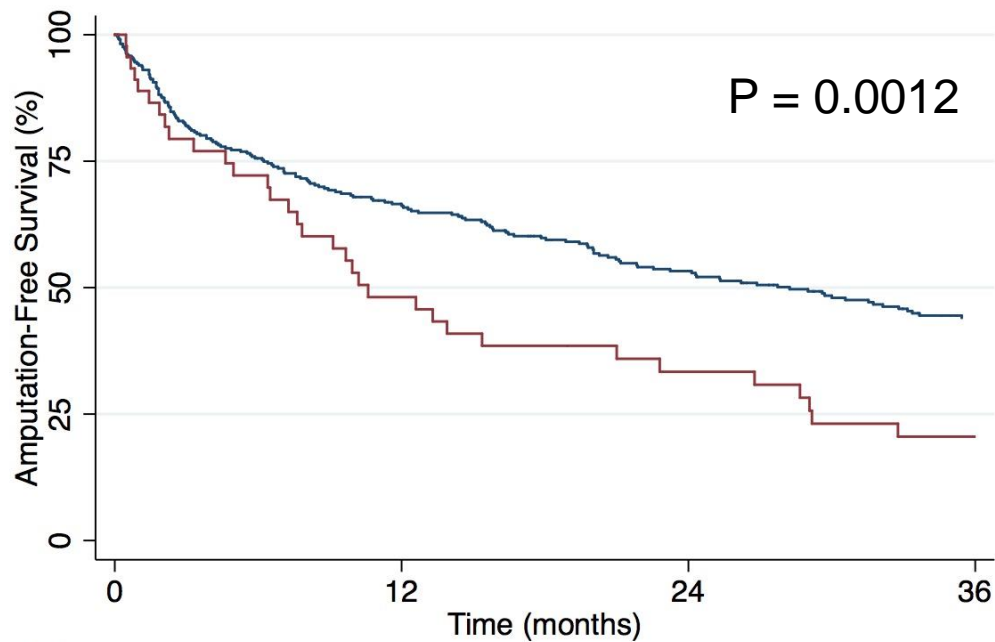
	Forefoot N = 334	Heel N = 46	P-value
Age	72.9 (11.7)	70.5 (12.2)	0.20
Male	68.9%	69.6%	0.92
White	85.6%	78.3%	0.19
HTN	88.3%	95.7%	0.133
HLD	59.0%	45.7%	0.087
DM	77.3%	91.3%	0.028
CAD	68.9%	71.7%	0.692
Stroke/TIA	22.5%	32.6%	0.129
COPD	16.2%	17.4%	0.833
CKD	44.3%	67.4%	0.004
ESRD	21.6%	34.8%	0.046

	Forefoot N = 334	Heel N = 46	P-value
Ever smoker	52.4%	41.3%	0.158
Medications			
Antiplatelet	72.2%	69.6%	0.714
Anticoagulant	22.8%	28.3%	0.408
Statin	54.8%	56.5%	0.825
Beta-blocker	68.0%	69.6%	0.827
Prior procedure	19.2%	17.4%	0.774
Open	11.1%	4.4%	0.200
Endovascular	10.8%	15.2%	0.373
Wfl scores			
Wound	1.86 (0.57)	2.59 (0.54)	<0.0001
Ischemia	1.93 (1.13)	1.88 (1.07)	0.803
Foot Infection	0.78 (0.84)	0.61 (0.83)	0.183

30-Day Outcomes

	Forefoot wound	Heel wound	P-value
Median LOS	4 days	4.5 days	0.89
Death	3.0%	4.3%	0.63
Major amputation	3.0%	4.3%	0.63
Myocardial infarction	1.2%	4.3%	0.13
Acute kidney injury	5.4%	10.9%	0.15
Pneumonia	2.4%	6.5%	0.13
Ambulatory at discharge	75.0%	75.6%	0.94
Discharge to nursing facility	26.9%	39.1%	0.088

Major Amputation-Free Survival



Number at risk					
Forefoot	333	191	137	94	
Heel	46	20	13	7	



	Forefoot	Heel
6 mo	75.2%	69.8%
1 yr	66.2%	45.7%
3 yr	43.8%	17.8%

Univariate Predictors – Amputation-free survival

Predictor	Univariate HR	P-value
Heel vs. forefoot wound	1.76	0.001
Endo vs. bypass	1.86	0.0002
Age (per year)	1.02	0.006
ESRD	2.03	<0.0001
COPD	1.88	0.0001
CKD	1.66	0.0001
CAD	1.32	0.054
Smoking	0.76	0.031
DM	0.72	0.036
Hyperlipidemia	0.65	0.0007

Multivariate Predictors – Amputation-free survival

	Bypass		Endo		Endo vs. Bypass	
	HR	P-value	HR	P-value	HR	P-value
Forefoot	1	(Ref)	2.12	<0.001	2.12	<0.001
Heel	3.61	0.001	2.59	<0.001	0.72	0.398
Heel vs. Forefoot	3.61	0.001	1.22	0.33		

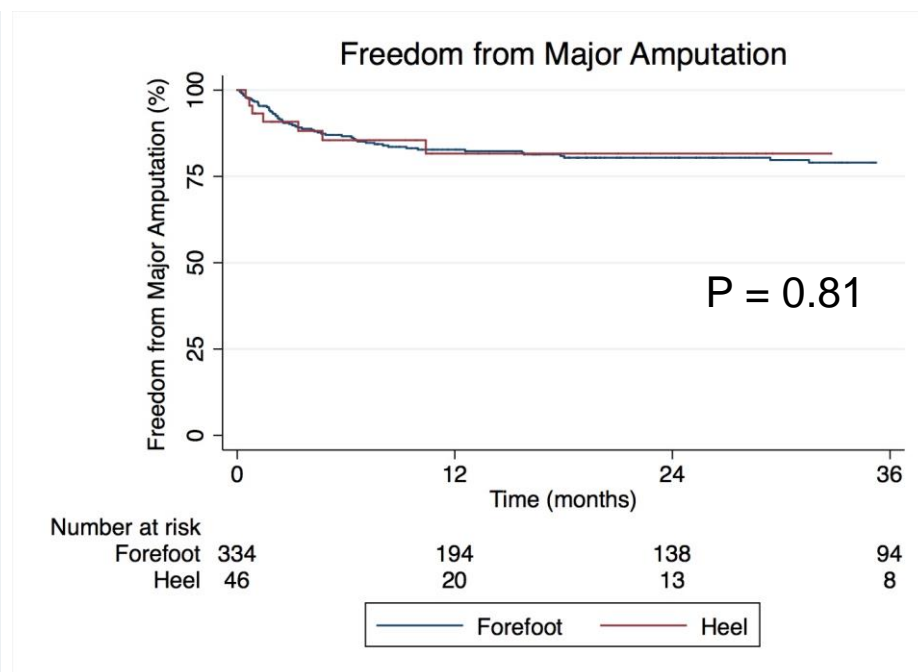
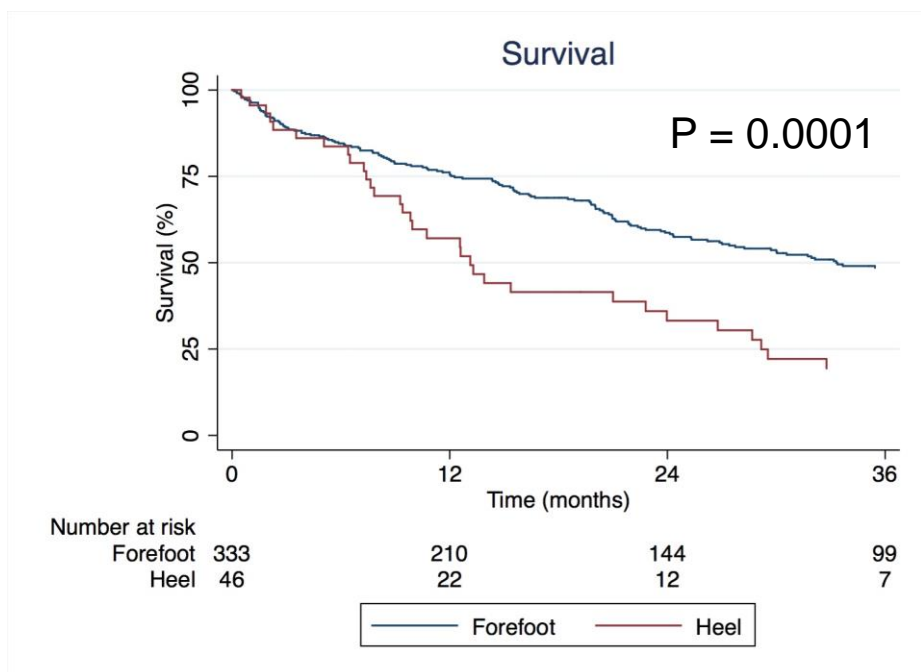
Interaction observed between wound location and treatment modality

P-value for interaction = 0.02

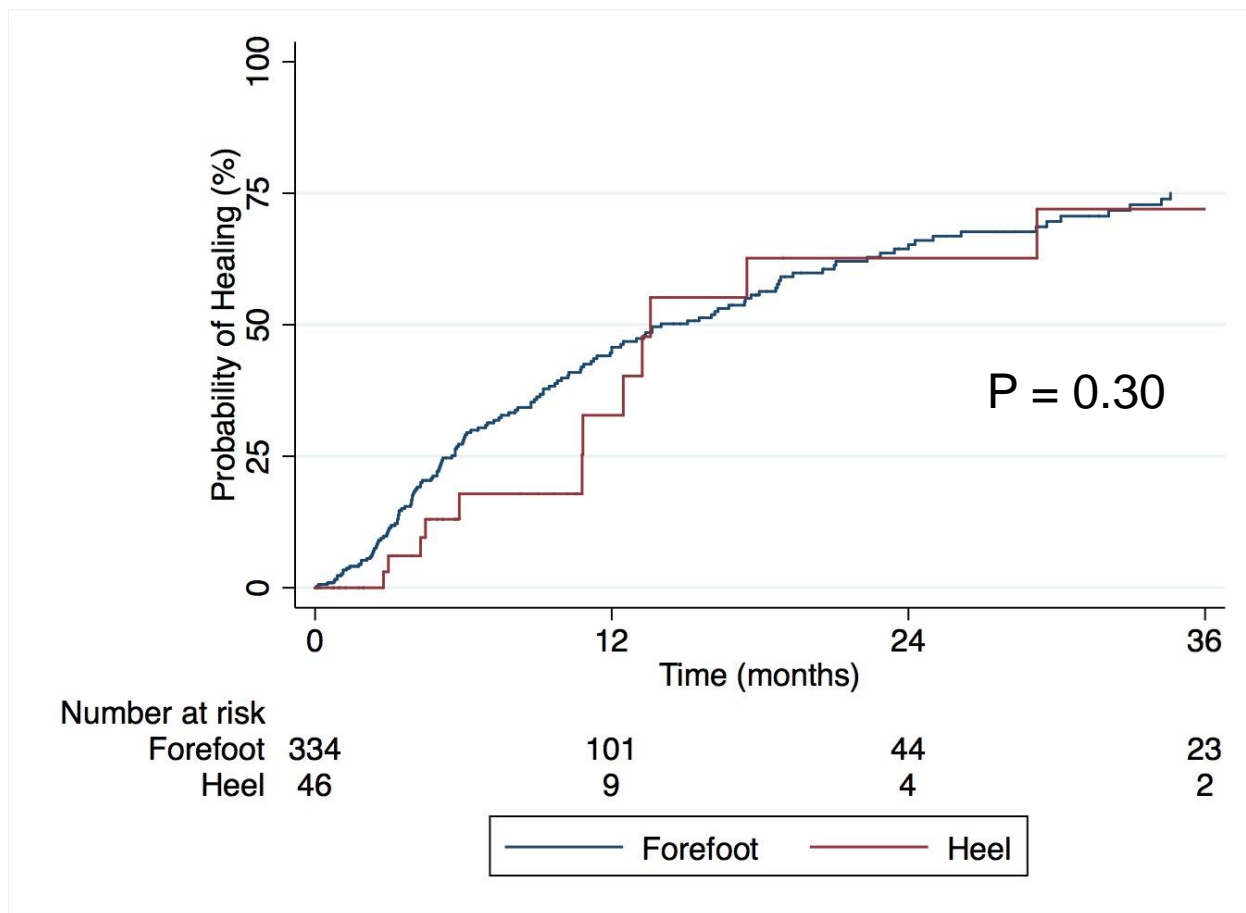
Independent Multivariate Predictors - Mortality

Predictor	Multivariate HR	P-value
Age (per year)	1.03	<.001
ESRD	2.49	<.001
COPD	1.89	<.001
Smoking	0.69	.009
Hyperlipidemia	0.63	<.001

Survival and Freedom from Amputation



Wound Healing



Patency

Bypass

	Primary (%)		Primary Assisted (%)		Secondary (%)	
	1 yr	3 yr	1 yr	3 yr	1 yr	3 yr
Forefoot	53.9	41.6	77.9	74.0	79.0	74.9
Heel	47.1	47.1	58.9	58.9	54.9	54.9
P-value	0.97		0.27		0.25	

Endovascular Intervention

	Primary (%)		Primary Assisted (%)		Secondary (%)	
	1 yr	3 yr	1 yr	3 yr	1 yr	3 yr
Forefoot	36.0	27.5	49.0	40.0	73.3	65.4
Heel	35.5	17.7	46.1	46.1	55.9	55.9
P-value	0.59		0.57		0.37	

Limitations

- Incomplete data on wound characteristics
- Incomplete data on wound care
- Selection bias
 - Choice of bypass vs. endovascular therapy
 - Choice of revascularization vs. wound care or primary amputation

Conclusions

- In the setting of infrapopliteal arterial disease, patients presenting with an ischemic heel ulcer are at increased risk of mortality compared to those with a forefoot ulcer
- This is despite similar limb-related outcomes including wound healing, amputation, and patency rates
- This mortality difference should be taken into consideration when deciding how to manage patients presenting with heel wounds

Thank you

