




**Outcomes of interventions for PAD in African American Female Patients and Asian patients: Are they different and why?: Can anything be done about it?**

Caron Rockman MD  
Northern Regional Chair,  
Hackensack University Medical Center  
Professor of Surgery  
Hackensack Meridian School of Medicine





No Disclosures




**Acknowledgements**

Molly Ratner, MD<sup>1</sup>, Moira Mcgevna, BS<sup>1</sup>, Jason Zhang, MD<sup>1</sup>, Chukwuma Nwachukwu, MD<sup>1</sup>, Katherine Teter, MD<sup>1</sup>, Mikel Sadek, MD<sup>1</sup>, Glenn Jacobowitz, MD<sup>1</sup>, Thomas Maldonado, MD<sup>1</sup>, Sheila Blumberg, MD<sup>2</sup>, Caron B Rockman, MD<sup>1</sup>


1. Division of Vascular and Endovascular Surgery, NYU Grossman School of Medicine
2. Division of Vascular Surgery, NYU Langone Hospital-Brooklyn


Eastern Vascular Society, Charleston, SC  
September 21, 2024



**Background**


- ❖ Peripheral artery disease (PAD) impacts millions of Americans
- ❖ Studies have suggested that PAD disproportionately affects ethnic minority populations, particularly Black patients who tend to present with severe forms of disease and are at higher risk of limb loss
- ❖ Sex-based differences in PAD are more equivocal
- ❖ Paucity of literature examining Black women
- ❖ Minorities and females have been under-represented in trials, limiting applicability to these populations






**Study Objective**


- ❖ To elucidate the outcomes of black and white women with PAD who underwent an endovascular first approach to revascularization
- ❖ Outcomes focused on incidence of:
  - Major adverse limb events (MALE)
  - Amputation free survival
  - Time to reintervention or amputation

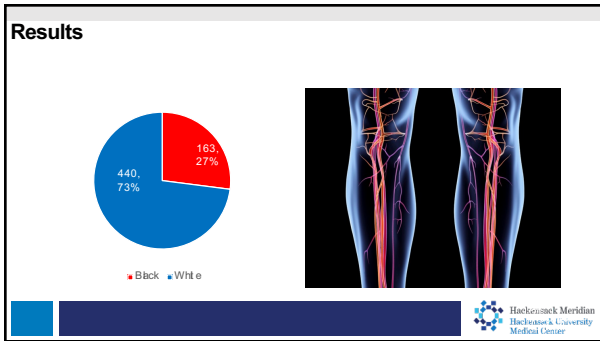


**Methods**

- ❖ Single center retrospective analysis of New York University Langone Health's institutional Vascular Quality Initiative (VQI) database
- ❖ Prospectively maintained registry of clinical and procedural information
- ❖ White and Black female patients were included if they underwent initial endovascular revascularization between 2013-2022
- ❖ Patients excluded if index operation at NYU was open surgery







### Baseline Characteristics

There were a total of 603 patients who met inclusion criteria, 163 were black and 440 were white

VARIABLE	BLACK (163)	WHITE (440)	P VALUE
Age	67.32 +/- 13.25	75.41 +/- 10.86	<.001
Current Smoker	33 (20.2%)	76 (17.3%)	.40
Former Smoker	54 (33.1%)	167 (38%)	.28
Hypertension	145 (89.0%)	395 (89.8%)	.77
Hyperlipidemia	116 (72%)	329 (75.1%)	.45
Diabetes	103 (63.8%)	188 (42.7%)	<.001
Coronary Artery Disease	44 (27.2%)	110 (25.0%)	.59
CABG	11 (6.7%)	44 (10%)	.22
PCI	28 (17.2%)	89 (20.3%)	.39
Arrhythmia	13 (8.1%)	77 (17.5%)	.01
CHF	22 (13.6%)	53 (12.0%)	.61
Stroke	10 (6.6%)	72 (15.7%)	.01
Clot	26 (16.1%)	48 (10.9%)	.09

Hackensack Meridian  
Hackensack University  
Medical Center

### Baseline Characteristics

VARIABLE	BLACK (163)	WHITE (440)	P VALUE
Neurocystosis	29 (17.8%)	14 (3.2%)	<.001
Autoimmune Disease	32 (19.6%)	54 (12.3%)	.02
Hypercoagulable Disorder	22 (13.5%)	15 (3.4%)	<.001
Prior LE Intervention	49 (30.1%)	111 (25.2%)	.23
Prior Amputation (minor or major)	24 (14.8%)	38 (8.7%)	.03

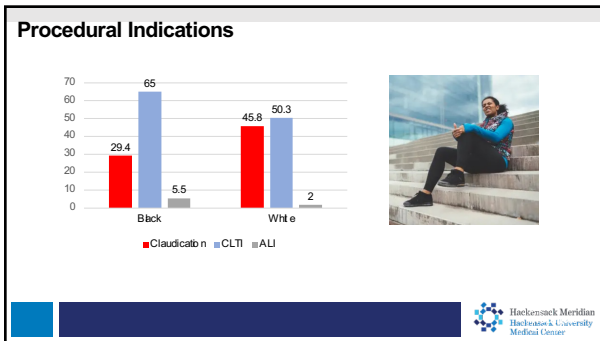
Hackensack Meridian  
Hackensack University  
Medical Center

### Baseline Characteristics

Medical management

VARIABLE	BLACK (163)	WHITE (440)	P VALUE
Medications			
Aspirin	90 (55.2%)	272 (61.8%)	.14
Statins	105 (64.4%)	301 (68.6%)	.34
ACE-Inhibitor	78 (48.0%)	227 (51.7%)	.21
Anticoagulation	27 (16.6%)	83 (18.9%)	.51
Antiplatelet	48 (29.4%)	159 (36.1%)	.12
Clostrazol	8 (4.9%)	40 (9.1%)	.09
Beta-blocker	59 (36.2%)	243 (55.3%)	<.001

Hackensack Meridian  
Hackensack University  
Medical Center



### Procedural Outcomes

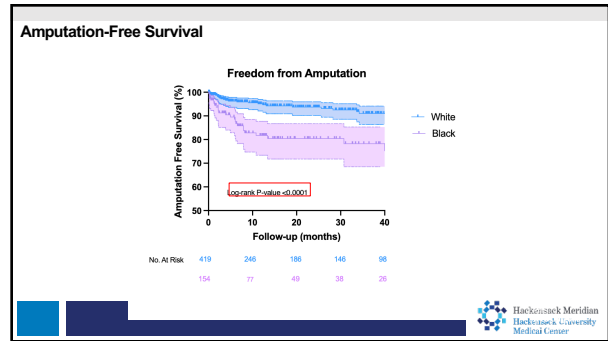
	Black	White	P-value
Technical Success	152 (93.8%)	408 (92.7%)	.593
Fibral Intervention	96 (58.9%)	141 (32.0%)	<.001
Complications			
Cardiac	3 (1.9%)	7 (1.6%)	.824
Pulmonary	1 (0.6%)	5 (1.1%)	.57
Renal	1 (0.6%)	1 (0.2%)	.46
Postop thrombosis	0 (0.0%)	5 (1.1%)	.17
Postop embolism	1 (0.6%)	1 (0.2%)	.46
Target lesion dissection	3 (1.9%)	13 (3%)	.46
Perforation	0	2 (0.5%)	.39
Stenosis/Occlusion	1 (0.6%)	1 (0.2%)	.46
Amputation During Intervention	18 (11%)	14 (3.2%)	<.001
Major	4 (2.5%)	2 (0.5%)	.03
Planned	11 (6.7%)	10 (2.3%)	.01
Mortality	0	3 (0.7%)	.29

Hackensack Meridian  
Hackensack University  
Medical Center

**Long-Term Outcomes**

	Black	White	P Value
Mean Follow-up (months)	22.17 +/- 28.35	24.55 +/- 27.01	.36
Reintervention	69 (42.9%)	153 (35.3%)	.08
Within 30 days	15 (21.7%)	27 (17.8%)	.49
Within 1 year	57 (82.6%)	98 (64.5%)	.01
Number of Reintervention	1.71 +/- 1.24	1.88 +/- 1.41	.38
Time to first reintervention (mo)	14.81 +/- 15.97	21.97 +/- 24.37	.05
Bypass	10 (6.1%)	33 (7.5%)	.56
Ipsilateral Amputation	34 (20.9%)	54 (12.5%)	.01
Ipsilateral Major Amputation	24 (14.7%)	28 (6.4%)	<.01
Time to amputation (mo)	5.96 +/- 7.54	13.43 +/- 25.56	.02
Contralateral Intervention	48 (30.4%)	98 (22.5%)	.05
Contralateral Amputation	17 (10.8%)	16 (3.7%)	<.001
MALE	34 (20.9%)	61 (13.9%)	.04
Major Reintervention	16 (9.8%)	45 (10.2%)	.88
Long Term Mortality	29 (18.1%)	77 (17.7%)	.91

Hackensack Meridian  
Hackensack University  
Medical Center



**CLTI Sub-analysis: demographics**

VARIABLE	BLACK (n=106)	WHITE (n=220)	P VALUE
Age	68.01 +/- 12.58	77.20 +/- 10.49	<.001
Current Smoker	15 (14.2%)	27 (12.3%)	.64
Former Smoker	33 (31.1%)	67 (30.5%)	.90
Hypertension	98 (92.5%)	196 (89.1%)	.34
Hyperlipidemia	77 (74.5%)	158 (71.8%)	.78
Diabetes	76 (74.5%)	117 (53.2%)	<.001
CAD	28 (26.4%)	61 (27.7%)	.80
CABG	5 (4.7%)	27 (12.3%)	.03
PCI	18 (17.9%)	46 (21.0%)	.52
Arrhythmia	10 (9.5%)	51 (23.2%)	<.001
CHF	18 (17%)	36 (16.4%)	.09
CVD	20 (19%)	24 (10.9%)	.05
Renovascular Disease	24 (22.6%)	12 (5.5%)	<.001
Prior LE Intervention	29 (27.4%)	52 (23.6%)	.47
Prior Amputation	21 (20.0%)	30 (13.7%)	.15
Autoimmune Condition	18 (17.0%)	31 (14.1%)	.49

Hackensack Meridian  
Hackensack University  
Medical Center

**CLTI Sub-analysis: medical management**

VARIABLE	BLACK (n=106)	WHITE (n=220)	P VALUE
Aspirin	58 (54.7%)	132 (60.0%)	.37
Statins	72 (67.9%)	135 (61.8%)	.27
ACE-inhibitor	49 (45.3%)	113 (51.8%)	.29
Anticoagulation	18 (17.0%)	53 (24.1%)	.15
Antiplatelet	27 (25.5%)	67 (30.5%)	.35
Clonidine	4 (3.8%)	11 (5.0%)	.63
Beta-blocker	49 (46.2%)	132 (60.8%)	.01

Hackensack Meridian  
Hackensack University  
Medical Center

**CLTI Perioperative Outcomes**

	Black	White	P-value
Technical Success	96 (91.4%)	196 (89.1%)	.80
Tibial Intervention	72 (67.9%)	106 (48.2%)	<.001
Complications			
Cardiac	2 (1.9%)	5 (2.3%)	.83
Pulm	1 (1.0%)	3 (1.4%)	.75
Renal	0 (0%)	1 (0.5%)	.49
Postop thrombosis	0 (0%)	2 (1.0%)	.62
Postop embolism	0	0	
Target lesion dissection	2 (2%)	5 (2.3%)	.40
Perforation	0 (0%)	1 (0.5%)	.49
Stenosis/Occlusion	0	0	
Amputation During Admission	15 (14.2%)	13 (5.9%)	.01
Major	3 (2.8%)	1 (0.5%)	.07
Planned	9 (8.4%)	10 (4.5%)	.20
Mortality	0 (0%)	2 (0.9%)	.33
Postop Meds			
ASA	69 (65.1%)	137 (62.6%)	.66
Anticoagulation	23 (21.7%)	61 (27.9%)	.24
Antiplatelet	51 (48.1%)	111 (50.7%)	.66
Statin	82 (77.4%)	146 (66.7%)	.05
ACE	51 (48.1%)	104 (47.4%)	.92

Hackensack Meridian  
Hackensack University  
Medical Center



**CLTI Long Term Outcomes**

	Black	White	P Value
Mean Vascular Follow-up (months)	17.35 +/- 22.88	20.09 +/- 24.29	.33
Reintervention	49 (47.1%)	77 (35.8%)	.05
Within 30 days	12 (24.5%)	20 (26.3%)	.82
Within 1 year	42 (85.7%)	51 (67.1%)	.02
Number of Reint	1.87 +/- 1.20	1.59 +/- 1.14	.38
Mean time to first reintervention (mo)	12.47 +/- 16.29	18.87 +/- 24.09	.27
Bypass	9 (8.5%)	22 (10.0%)	.66
Ipsilateral Amputation	29 (27.9%)	46 (21.2%)	.19
Ipsilateral Major Amputation	18 (17.3%)	22 (10%)	<.001
Time to amp	4.84 +/- 4.13	12.80 +/- 26.11	.04
Contralateral Intervention	30 (29.4%)	45 (20.8%)	.09
Contralateral Amputation	14 (13.9%)	11 (5.1%)	.01
Reoperation	25 (23.8%)	39 (17.7%)	.21
MALE	25 (23.8%)	39 (17.7%)	.21
Major Reintervention	9 (8.5%)	25 (11.4%)	.42
Wortality at most recent follow-up	22 (21.2%)	51 (23.7%)	.61

Hackensack Meridian  
Hackensack University  
Medical Center


### Multivariate Analysis for Factors Related to MALE

	OR	95% Confidence Interval	P value
Current Smoker	1.91	1.08 - 3.38	0.03
CLTI	2.77	1.58 - 4.86	<.001
MI	3.37	1.25 - 9.13	0.02
White	0.80	0.5 - 1.4	0.42
ESRD	1.45	0.6 - 3.3	0.38
Hypercoagulable Disorder	0.54	0.24 - 1.24	0.14
Preoperative Anticoagulation	1.11	0.62 - 2.00	0.73
Preoperative Antiplatelet	0.73	0.42 - 1.27	0.27
Prior PCI	0.83	0.43 - 1.61	0.58
Prior LE intervention	2.26	1.32 - 3.86	<.01
Prior Amputation	1.06	0.51 - 2.17	0.88
Tibial Intervention	1.67	0.98-2.86	0.06

### Conclusions

- ❖ Limited data on the intersectionality between race and sex for PAD patients
- ❖ Black women presented with more advanced, distal forms of disease despite presenting at younger ages
- ❖ Black women were more likely to experience a MALE and had shorter amputation free survival
- ❖ Race itself was not an independent predictor of adverse events
- ❖ Suggests that other factors such as lack of access to care and awareness may be important contributors
- ❖ Black women were more likely to present with diabetes and renal failure
- ❖ Critical to consider aggressive primary prevention and risk factor modification in these populations at risk




### Asian race and PAD

Asian race is associated with peripheral arterial disease severity and postoperative outcomes

Report from: 2023 Vascular Quality Initiative (VQI) Study Group. *J Vasc Med Biol*. 2023;35(4):e0000000. doi:10.1177/104990912311555555. © 2023 Vascular Quality Initiative. Published by Sage Publications, Inc.

- ❖ VQI study
- ❖ Compared 80,312 White and 1689 Asian patients who underwent PVI in US, Canada and Singapore
- ❖ Asian patients had a higher rate of emergent intervention
- ❖ Asian patients had a higher rate of CLTI
- ❖ Asian patients had a higher rate of in-hospital death
- ❖ Asian race associate with a greater risk of loss of primary patency at 18 months


### Asian race and PAD

Asian race is associated with peripheral arterial disease severity and postoperative outcomes

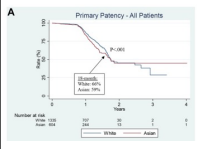
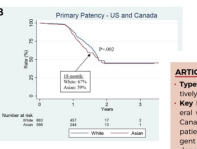
Report from: 2023 Vascular Quality Initiative (VQI) Study Group. *J Vasc Med Biol*. 2023;35(4):e0000000. doi:10.1177/104990912311555555. © 2023 Vascular Quality Initiative. Published by Sage Publications, Inc.

**Table 3. Logistic regression analyses of outcomes by race within propensity-matched cohorts**

	All patients	United States and Canada		
	OR (95% CI)	P value	OR (95% CI)	P value
Emergent intervention	1.3 (1.1-1.4)	<.001	1.4 (1.0-2.0)	.03
CLTI	1.2 (1.1-1.4)	<.001	1.0 (0.7-1.5)	.07
Preoperative DAPT	0.6 (0.5-0.8)	<.001	1.0 (0.7-1.5)	.07
In-hospital death	2.7 (2.0-3.8)	<.001	1.4 (0.9-2.2)	.08
18-month primary patency	2.6 (1.8-4.0)	<.001	2.5 (1.5-4.0)	.0006



### Asian race and PAD

**ARTICLE HIGHLIGHTS**

**Type of Research:** Retrospective analysis of prospectively collected Vascular Quality Initiative data

**Key Findings:** Among patients undergoing peripheral vascular intervention across the United States, Canada, and Singapore, when compared with White patients, Asian patients have a greater risk of emergent intervention (odds ratio [OR], 1.3; 95% confidence interval [CI], 1.1-1.4), reoperation (OR, 2.7; 95% CI, 2.0-3.8), in-hospital death (OR, 2.6; 95% CI, 1.5-4.4), and worse primary patency at 18 months (hazard ratio, 1.5; 95% CI, 1.2-1.8).

**Take Home Message:** Asian patients present with more severe peripheral arterial disease and have worse preoperative and late outcomes after peripheral vascular intervention.

