The Effect of Rurality on Aneurysm Presentation and Postoperative Follow-Up after Endovascular Aortic Aneurysm Repair

Sashi Inkollu MD[1], **Paul Rothenberg MD**[1], Santiago Lopez BS[1], Erika T. Beidelman MA[2], Corey A. Kalbaugh PhD MS[2], Pamela Zimmerman MD[1], Samantha D. Minc MD MPH[1]

1. Department of Cardiovascular and Thoracic Surgery, West Virginia University, Heart and Vascular Institute, Morgantown, WV, USA

2. Indiana University, School of Public Health, Bloomington, IN, USA

OBJECTIVE

- Patients lost to follow-up after endovascular abdominal aortic aneurysm repair (EVAR) have worse outcomes
- Rural patients have barriers to care and may present with larger aneurysms and be more likely to be lost to follow-up (LTFU)
- The purpose of this study was to assess the effects of rurality on clinical presentation of abdominal aortic aneurysms and follow-up after EVAR

METHODS

- The National Vascular Quality Initiative (VQI) EVAR module (2003-2021) was used for analyses
- Patients were categorized as residing in urban or rural areas using the Rural-Urban Commuting Area (RUCA) codes
- Large AAA was defined as > 6 cm for men, and > 5.5 cm for women and was analyzed as a categorical variable
- Univariate analyses were performed to describe differences in socioeconomic, intraoperative, and follow-up factors
- Unadjusted and adjusted logistic regression models were fit to assess the association between rurality and aneurysm size, urgent presentation (defined as symptomatic or ruptured), adverse cardiovascular events, death, LTFU, and follow-up type

Odds Ratios Associated with Rural Patients Compared to Urban Patients

	Unadjusted			Adjusted		
Predictors	Odds Ratios	CI	p	Odds Ratios	CI	p
AAA Diameter >6cm (males) or >5.5cm (females)	1.06	1.02 – 1.11	0.005	1.09	1.04 – 1.13	**<0.001**
Urgent AAA	1.14	1.08 – 1.21	<0.001	1.18	1.11 – 1.24	**<0.001**
MACE or Death	1.12	1.00 – 1.25	0.046	1.10	0.97 – 1.24	0.119
Any Imaging	0.87	0.80 – 0.94	<0.001	0.86	0.79 – 0.93	**<0.001**
In-Person Follow-Up	0.92	0.88 – 0.96	<0.001	0.90	0.86 – 0.95	**<0.001**
Lost to Follow-Up	1.09	1.01 – 1.17	0.023	1.08	1.00 – 1.16	0.054

RESULTS

- 62,503 patients were included in the analysis
- 79% of patients were classified as urban (n=49,372)
- 21% of patients were classified as rural (n=13,131)
- Rural patients were more likely to be diagnosed with HTN, CAD, COPD and less likely to be prescribed DAPT or statins
- On multivariable analysis, residing in a rural area was associated with a 9% higher odds of presenting with a large AAA (p<0.001)
- Rural patients had 18% higher odds of having a symptomatic or ruptured aneurysm (p<0.001)
- Rural patients had 14% lower odds of having follow-up imaging (p<0.001)
- Although not statistically significant, residing in a rural area was associated with an 8% increase in odds of being LTFU (95% CI 1.00-1.16, p=0.054)

CONCLUSIONS

- Rural patients had higher odds of presenting with a symptomatic or ruptured AAA and at larger sizes than their urban counterparts
- Disparities in LTFU did not achieve statistical significance
- However, among the patients that did follow-up, rural patients had lower odds of being seen in-person or having imaging
- Additional resources to improve AAA screening, access to repair, and a focus on community-level interventions to optimize follow-up in rural populations is merited