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Clinical implications of physical function and resilience in patients undergoing transcatheter aortic valve implantation

B.R. Lindman¹, K. Goel¹, J.M. O'leary¹, C.M. Barker², V. Rajagopal³, R.R. Makkar⁴, T. Bajwa⁵, N. Kleiman², A. Linke⁶, D.J. Kereiakes⁷, R. Waksman⁸, D.J. Allocco⁹, D.G. Rizik¹⁰, M.J. Reardon²

¹Vanderbilt University, Structural Heart and Valve Center, Nashville, United States of America; ²The Methodist Hospital, Houston Methodist DeBakey Heart and Vascular Center, Houston, United States of America; ³Piedmont Heart Institute, Atlanta, United States of America; ⁴Cedars-Sinai Medical Center, Los Angeles, United States of America; ⁵Aurora St. Luke's Medical Center, Milwaukee, United States of America; ⁶University Hospital Dresden, Dresden, Germany; ⁷The Christ Hospital Heart and Vascular Center/The Lindner Research Center, Cincinnati, United States of America; ⁸Washington Hospital Center, Washington, United States of America; ⁹Boston Scientific, Marlborough, United States of America; ¹⁰HonorHealth and the Scottsdale-Lincoln Health Network, Scottsdale, United States of America

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Background: Gait speed, as a measure of physical function and marker of frailty, is now routinely screened when evaluating patients with aortic stenosis (AS) for transcatheter aortic valve implantation (TAVI). Assessment of physical function is important to identify patients for whom TAVI may be futile and to assign patients to a procedural risk category. After TAVI, patients may exhibit physical resilience (improvement in physical function) or vulnerability (worsening). Characterizing the trajectory and clinical consequences of physical function after TAVI represent knowledge gaps in the field.

Purpose: Evaluate associations between physical resilience (improved gait speed) vs vulnerability (decline) after TAVI and subsequent death/hospitalization.

Methods: The REPRISÉ III trial compared a mechanically-expanded vs a self-expanding valve in 912 high/extreme risk patients with symptomatic AS. Patients (n=587) who underwent valve implantation and who had a gait speed recorded both pre- and 1-year post-TAVI were analyzed. Gait speed is based on the 5m walk test (slow: 5m in >6s, <0.83m/s; normal: ≥0.83m/s). Trajectory of physical function after TAVI was characterized in

2 ways. Model 1 examined 4 groups based on slow or normal gait speeds at baseline and 1-year post-TAVI. Model 2 examined gait speed change pre-TAVI to 1 year (adjusted for baseline gait speed). Using a landmark approach, the relationships between baseline and 1-year gait speed were evaluated in multivariable Cox PH models of outcomes between 1 and 2 years post-TAVI.

Results: A clinically-meaningful improvement (≥0.1m/s), no change (±0.1m/s), or decline (≤0.1m/s) in gait speed 1 year after TAVI was observed in 39%, 36%, and 26% of patients, respectively. Among the 4 groups defined by pre- and 1-year post-TAVI gait speeds, 1 to 2 year mortality or hospitalization rates were: 6.6% (normal/normal), 20.9% (normal/slow), 8.0% (slow/normal), and 21.5% (slow/slow). Adjusted hazard ratios of the 2 models are shown (Table).

Conclusion: These data reveal there is marked heterogeneity in the trajectory of physical function after TAVI and that this trajectory—more so than baseline physical function—is clinically consequential. Identifying and optimizing factors associated with physical resilience after TAVI may improve outcomes.

Table. Outcome by Change in Gait Speed

	Death/Hospitalization Adjusted HR [95% CI]	P-value	Death Adjusted HR [95% CI]	P-value	Hospitalization Adjusted HR [95% CI]	P-value
Model 1: Baseline/1 year Gait Speed (Normal/Normal (n=150) [referent])						
Normal/Slow (n=59)	3.82 [1.61, 9.08]	<0.01	2.75 [0.96, 7.86]	0.06	7.31 [1.94, 27.58]	<0.01
Slow/Normal (n=114)	1.39 [0.53, 3.59]	0.50	1.44 [0.50, 4.12]	0.50	1.69 [0.38, 7.60]	0.49
Slow/Slow (n=253)	3.88 [1.91, 7.91]	<0.01	2.36 [1.02, 5.46]	0.045	3.89 [1.14, 13.27]	0.03
Model 2: Gait speed change						
Baseline to 1 year per 0.1m/s increase	0.83 [0.74, 0.92]	<0.01	0.92 [0.80, 1.04]	0.19	0.75 [0.64, 0.88]	<0.01