Editorial

Gait Speed Assessment in Transcatheter Aortic Valve Replacement

A Step in the Right Direction

Jonathan Afilalo, MD, MSc; Daniel E. Forman, MD

In this issue, a study by Kano et al[1] report on the use of gait speed as a marker of frailty in an older population undergoing transcatheter aortic valve replacement (TAVR) and demonstrated its use to predict outcomes. Specifically, they used a multicenter Japanese registry to analyze the association between gait speed and mortality in 1256 older adults who underwent TAVR. The end points evaluated were all-cause mortality at 30 days and 1 year, with patients followed for a median of 326 days. The assessment of 5-m gait speed was evaluated at a comfortable pace and categorized according to specific cutpoints: normal gait speed was >0.83 m/s, slow gait speed was 0.50 to 0.83 m/s, slowest gait speed was <0.50 m/s, as well as a group of those unable to walk. The latter represented 5% of the population or 9% counting patients who were excluded because of severe limiting dyspnea. Prior work has similarly found that 5% to 10% of patients are physically unable to complete a gait speed test. As summarized in the Table, Yamomoto's analysis showed that being unable to walk or being in the slowest category conferred a 3- and 2-fold increase in adjusted risk of 1-year mortality, respectively.

See Article by Kano et al

This is one of many recent studies that have all showed use of a frailty metric to predict outcomes in relation to TAVR or other management applications.[2–4] Associated editorials have also proliferated,[5–7] all generally extolling the use of frailty as an important measure of vulnerability that can used to improve risk stratification for complex elderly patients. Even a relatively simple assessment like gait speed increases opportunities for management and decision processes that are better aligned to each patient's aggregate circumstances and can thereby improve the value of care. Kano et al's[1] study affirms the prognostic use of a convenient measure like gait speed for TAVR patients and builds on conclusions derived in the study by Alfredsson et al[2] with significantly longer follow-up. Furthermore, Kano et al[1] broaden the generalizability of gait speed by applying it to a TAVR population in Japan, with distinctive features in body habitus (average height, 4 ft 11 inch, average weight 110 pounds).

There are details pertinent to the Kano et al[1] analysis that merit additional discussion and comment. The gait speed cutpoints used to stratify risk in this analysis were originally derived from cohorts of older adults undergoing cardiac surgery and TAVR. For healthy community-dwelling older adults, the empirical range for normal gait speed has been shown to be 0.9 to 1.7 m/s and for younger adults 1.1 to 1.7 m/s.[8] Notably, the time allotted for urban pedestrian crosswalks in North America is usually based on a gait speed of 1.2 m/s.[9] Thus, we strongly agree with the authors' statement that differential thresholds in gait speed be adapted to the population being investigated, or better yet, that gait speed be assessed as a continuous variable (just as done for respiratory rate and many other clinical indices).

A variety of factors can influence gait speed at the individual level, including[8] advanced age, female sex, short stature, weak lower extremity muscle strength, and large waist circumference. Given that these factors account for only 20% of the observed variability in gait speed, other contributors include cognitive impairment and depressed mood, as well as certain diseases of the musculoskeletal and neurological systems. Diseases of the cardiac and pulmonary systems are not strongly associated with gait speed because the short 5-m distance does not significantly draw on cardiopulmonary reserves. Of note, considering the effect of height on gait speed and the 15-cm height difference between the OCEAN-TAVI (Optimized Catheter Valvular Intervention-TAVI) population and a typical North American TAVR population, one may expect the population in Kano et al's[1] study to walk 0.03 m/s more slowly (roughly an additional 0.5 seconds to walk 5 m) by virtue of height alone.

The added value of gait speed, beyond traditional risk scores, also merits scrutiny and commentary. Although gait speed is indeed a powerful prognostic marker, it is not a panacea. Previous studies have demonstrated that a 1-dimensional assessment of frailty with gait speed alone yields only modest improvements in discrimination for future predictions,[2,10] and OCEAN-TAVI similarly showed a modest improvement in C-statistic of 0.02 (P=0.06; unpublished data from Dr Masanori Yamamoto, 2017). In comparison, multidomain frailty scales better capture the complexities of older patients with multiple chronic conditions. One such scale is the Essential Frailty Toolset that was recently reported to yield

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Table. Key Findings From Kano et al's[1] OCEAN-TAVI Gait Speed Study

Gait Speed Category	Time to Walk 5 m	Prevalence, %	30-d Mortality, %	1-y Mortality, %
>0.83 m/s	<6 s	45	1.8	7.6
0.50–0.83 m/s	6–10 s	34	1.8	6.6
<0.50 m/s	>10 s	16	1.4	18.2*
Unable to walk	…	5	4.2	40.7*

*Statistically significant difference.

substantial added value in predicting death and disability after TAVR.[7] Another useful scale is the clinical frailty scale, which the OCEAN-TAVI group has recently reported.[11] In this article, gait speed was interrelated with other frailty markers (specifically, handgrip strength and Rockwood's clinical frailty scale), but these were not included in the multivariable model, such that their inclusion may have attenuated the predictive effect of gait speed. Given these considerations surrounding gait speed, its role may be described as a convenient screening test for frailty that can be used to flag vulnerable patients in need of further evaluation.[12]

Beyond the details of this study's strengths and limitations, it is notable that amid the mounting flood of frailty studies, broader application of frailty assessment and management has lagged as a standard of care. This contrasts strongly with the relatively more rapid integration of other diagnostic and prognostic metrics soon after they were recognized (eg, calcium score). Several overriding factors seem relevant. A persistent debate exists between those who characterize frailty as a physical phenotype (eg, weakness, fatigability, weight loss) with biological underpinnings (eg, inflammation and shifts in gene expression) versus those who characterize it as an accumulation of clinical deficits (eg, renal impairment, falls, and cognitive impairment).[13] Such festering disagreement on basic concepts of frailty may leave a predominant perception that frailty is too nebulous to endorse as a standard of care. Gait speed also has particular critics who argue it can be too easily confounded by patient-specific covariates (as noted above) that often seem to erode its value. The totality of the evidence, however, still suggests that gait speed is worth measuring but that it should be interpreted thoughtfully.

For the time being, clinical care is primarily directed by guidelines that are oriented to diseases and typically make many assumptions about the capacity of patients to respond to disease-based principles of care. Kano et al's[1] study advances the concept that more fundamental orientation to the patient is essential. By efficiently integrating metrics, such as gait speed in routine clinical practice, estimates of therapeutic risk and anticipated benefit can be refined such that disease-based standards can be tailored (rather than applied uniformly) to each individual patient.

Disclosures

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