

## Severe Symptomatic Aortic Stenosis? Check Troponin, Too

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**D**egenerative aortic stenosis is the most common valvular disease in the Western world in patients aged >65 years with transcatheter aortic valve implantation (TAVI) emerging as a promising treatment option for high, intermediate, and potentially low-risk patient cohorts. Although patients with TAVI are evaluated by a multidisciplinary heart team for risk stratification, the value of biomarkers to predict outcomes has been lacking.

In this issue of the *Journal of the American Heart Association (JAHA)*, Akodad and colleagues propose a role for high-sensitivity troponin T as an independent prognostic factor in TAVI, identifying both pre- and post-procedural high-sensitivity troponin T levels as significant predictors of outcomes.<sup>1</sup> In this prospective registry the authors evaluated 1390 patients with severe symptomatic aortic stenosis undergoing TAVI via transfemoral, transaortic, transapical, subclavian, or carotid approach with second and third generation devices. The authors concluded that the pre-procedural troponin levels were associated with 30-day mortality and were an independent predictor of 1-year mortality. Interestingly, the troponin rise post-procedure was also independently predictive of 1-year mortality and its effect was more pronounced in patients with normal or near normal pre-procedural troponin.

It is not the first time that the troponin levels have been studied in the setting of TAVI. Different smaller series<sup>2,3</sup> have suggested pre-procedural high-sensitivity troponin T as a

prognostic factor of mortality but the significance of post-TAVI troponin rise still remained controversial.<sup>4-6</sup> In the recently published PROMISE (Prospective Multicenter Imaging Study for Evaluation of Chest Pain) trial in patients with known coronary artery disease, higher baseline levels of troponin were associated with a significantly greater risk of a composite of death, acute myocardial infarction, or hospitalization for unstable angina as well as an elevated risk of cardiovascular death or acute myocardial infarction at 1 year.<sup>6</sup> Overall, elevated baseline troponin levels may indicate myocardial damage, left ventricular hypertrophy, and advanced stages of cardiomyopathy and it is not a surprise to detect elevated high-sensitivity troponin levels in elderly patients in need for aortic valve replacement. Nevertheless, it is hard to attribute the baseline troponin elevation to a specific factor as the increased sensitivity of this test comes at a cost of decreased specificity. In the present study by Akodad and colleagues, 4 independent predictors of pre-procedural troponin values were identified: male sex, atrial arrhythmia, low glomerular filtration rate, and pre-procedural N-terminal pro b-type natriuretic peptide. Patients who had normal or near-normal troponin before the procedure were younger, with less atrial fibrillation or vascular disease, better left ventricular ejection fraction, better renal function, and lower N-terminal pro b-type natriuretic peptide levels. In everyday practice we see patients with atrial fibrillation and rapid ventricular response to frequently “leak” troponins, especially if there is underlying coronary artery disease. Similarly, patients with congestive heart failure have elevated troponins in the setting of fluid overload, especially if there is underlying renal dysfunction and slower troponin clearance. Once the heart rate is well controlled or the patients’ volume status is optimized, the troponin levels usually downtrend and go back to normal. The typical patients undergoing TAVI are elderly and they usually have different comorbidities including atrial fibrillation, low ejection fraction, and renal dysfunction. It would be difficult to address all these issues before the procedure; however, all these risk factors are modifiable and can be controlled with medical management. An elevated pre-procedural troponin level may indicate some fluid overload in 1 patient or some baseline tachycardia in another but based on the findings of

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this trial both groups of patients incur adverse long-term outcomes compared with medically optimized patients.

Another interesting finding of this study is that nearly 50% of the patients undergoing transfemoral TAVI had some troponin elevation detected after the procedure. Different mechanisms can be responsible for this myocardial injury such as the actual balloon valvuloplasty, possible resultant acute aortic regurgitation, microembolism in the coronary arteries, or temporary hypotension during rapid ventricular pacing. Several prior series have reported troponin elevation after TAVI and its prognostic significance.<sup>5,7</sup> The only variable in this present study that was associated with myocardial injury, was a history of previous percutaneous coronary intervention (PCI). Although the *P* value did not reach statistical significance, the trend is likely attributed to significant underlying coronary atherosclerosis leading to an increased risk of myocardial injury during the procedure. These data are consistent with the increased risk of myocardial injury after TAVI in patients with coronary artery disease as reported by Koskinas et al.<sup>5</sup> However, to our knowledge, the article by Akodad et al is the first to show that myocardial injury was independently predictive of 1-year mortality with more pronounced effects in patients with normal or near normal pre-procedural troponin. It is unclear why the troponin elevation of the lower-risk patients would lead to worst outcomes as compared with the higher-risk patients but regardless of etiology, it appears that any significant troponin elevation exerts its effect on mortality upon occurrence, before or after the procedure.

How important are these findings for our everyday practice? Will 1 troponin level eventually dictate the exact timing of the procedure? Probably not, but troponin levels can be an added tool in our armory. It is a relatively inexpensive and readily available test that has the potential to guide our management. Additional studies are required to determine if targeting and correcting risk factors as guided by troponin

levels will ultimately influence long-term mortality. Until then, for patients with severe symptomatic aortic stenosis, it might be worthwhile to check troponin levels too.

## Disclosures

None.

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