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Higher BNP levels after transcatheter aortic valve implantation are associated with increased mortality and hospitalizations

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Funding Acknowledgement: The PARTNER 2 Trial was funded by Edwards Lifesciences

Background: Among patients with aortic stenosis (AS), the adverse association between increased B-type natriuretic peptide (BNP) levels and worse clinical outcomes, including mortality and hospitalization after valve replacement, has been demonstrated. However, little attention has been paid to the clinical consequences of BNP levels after valve replacement, which may have implications for medical therapy prescribed after the procedure.

Purpose: Evaluate the association between BNP levels after transcatheter aortic valve implantation (TAVI) and subsequent mortality and hospitalizations.

Methods: Among intermediate, high, and extreme risk patients with severe symptomatic AS who received TAVI for native valve AS in the PARTNER II and S3 clinical trials or registries, we included 3260 patients who had BNP measured at baseline. Patients from sites which measured NT-proBNP were excluded. To account for factors that influence BNP levels, we developed a regression equation–including age, sex, BMI, creatinine, study site, and the upper limit of normal of the BNP assay used for a given measurement–to determine expected BNP. BNP ratio was determined pre-TAVR and at discharge, 30 days, and 1 year and calculated as the actual BNP/expected BNP. Using a landmark approach, the relationships between (1) BNP ratio at 30 days or (2) delta BNP ratio between discharge and 30 days and subsequent outcomes between 30 days and 1 year were assessed. The primary outcome was a composite of cardiovascular (CV) mortality or hospitalization. Adjustment was made for 20 baseline and post-procedural factors known to influence outcomes.

Results: Higher BNP ratio at 30 days was associated with higher CV mortality or hospitalization between 30 days and 1 year (adjusted hazard ratio [aHR] 1.07 per increase of 1 in the BNP ratio, 95% CI 1.04–1.10, $p<0.001$), whereas baseline BNP ratio was not ($p=0.38$). A similar relationship was shown for the components of this composite: CV mortality (aHR 1.08, 95% CI 1.04–1.12, $p<0.001$) and hospitalizations (aHR 1.04, 95% CI 1.01–1.08, $p=0.01$). Adjusted for discharge BNP ratio and other factors, a greater decrease in BNP ratio between discharge and 30 days was also associated with lower CV mortality or hospitalization between 30 days and 1 year (aHR 0.95 per decrease of 1 in the BNP ratio, 95% CI 0.92–0.99, $p=0.006$). Similar relationships were observed for all-cause mortality and when examining the relationship between 1 year BNP ratio and outcomes between 1 and 2 years.

Conclusion: Higher BNP ratio after TAVI is associated with higher subsequent all-cause and CV mortality and hospitalizations, whereas baseline BNP ratio was not. Greater decrease in BNP ratio between discharge and 30 days is associated with better outcomes. Further investigation is warranted to understand these findings and determine whether intensification of medical therapy to decrease BNP after TAVR may improve patient outcomes.