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Trends and Outcomes of Transcatheter Valve Implantation in Patients With Prior Mediastinal Radiation

Transcatheter aortic valve implantation (TAVI) is a safe and effective alternative for patients with severe aortic stenosis (AS) irrespective of their surgical risk.[1,2] Aortic stenosis is the most common radiation-induced valvular heart disease. Surgical aortic valve replacement is associated with higher operative mortality and morbidity among patients with prior mediastinal radiation.[3] While a percutaneous approach appears appealing for patients with prior mediastinal radiation, these patients were excluded from pivotal randomized trials. We sought to evaluate outcomes of TAVI among patients with prior mediastinal radiation using a large national database.

We queried the Nationwide Readmissions Database (NRD) between 2013 and 2018, and identified hospitalizations for TAVI among patients with prior mediastinal radiation. We utilized the International Classification of Diseases Ninth or Tenth editions diagnostic codes for prior radiation (V15.3 and Z923) and diagnostic codes for history of breast cancer, lung cancer, Hodgkin's lymphoma, or other mediastinal tumors.[4] We employed propensity score methodology to match hospitalizations for patients with previous mediastinal radiation to those without, at 1:1 ratio with a caliper width of 0.2. The propensity score was calculated using the following matching variables: Age, sex, chronic lung disease, chronic kidney disease (CKD), chronic dialysis, obesity, diabetes mellitus with complications, diabetes mellitus without complications, previous coronary artery bypass grafting, and prior myocardial infarction. A secondary analysis to evaluate in-hospital mortality was conducted using a multivariable regression analysis. The multivariable model included the same matching variables. Analyses were conducted using complex sample analysis that adjusted for hospital type, bed-size, and stratification. The main study outcome was in-hospital mortality. Associations were considered significant if the p-value was <0.05. Data from the NRD are publicly available and deidentified; hence, this study was exempt from institutional review board evaluation.

Our analysis yielded 224,264 hospitalizations for TAVI. Among those, 3,242 (1.5%) had prior mediastinal radiation, with a rising trend over time (141 in 2013 vs 887 in 2018, $P_{trend} = 0.01$). Admissions with prior mediastinal radiation were younger (76.35 ± 10.20 vs 80.22 ± 8.45 years, p <0.001), and likely women (79.4% vs 45.7%, p <0.001). Admissions with prior mediastinal radiation were more likely to have chronic lung disease and prior tobacco abuse, but less likely to have heart failure, CKD, hypertension, diabetes, and prior CABG. After propensity matching, the standardized mean differences for all matching variables were <10%.

In-hospital mortality was lower among those with prior mediastinal radiation versus none in the unmatched cohort (0.8% vs 2.1%; odds ratio [OR] 0.37; 95% confidence interval [CI] 0.20 to 0.68, p = 0.01), propensity-matched cohort (0.8% vs 2.2%; OR 0.35; 95% CI 0.17 to 0.73, p = 0.01), and on multivariable analysis (OR 0.37; 95% CI 0.20 to 0.69, p = 0.01). After propensity-matching, those with prior mediastinal radiation had lower rates of cardiogenic shock (0.9% vs 1.8%, p = 0.03), acute kidney injury (6.4% vs 11.2%, p <0.001), major bleeding (11.0% vs 13.7%, p = 0.03), blood transfusion (7.9% vs 11.2%, p = 0.01), prolonged mechanical ventilation (0.6% vs 1.4%, p = 0.02), and discharge to nursing facility (11.0% vs 15.0%, p = 0.01). There were no significant differences between both groups in the rates of cardiac arrest (1.5% vs 1.7%, p = 0.68), hemodialysis requirement (0.4% vs 0.5%, p = 0.57), acute ischemic stroke (1.2% vs 2.1%, p = 0.05), acute hemorrhagic stroke (0% vs 0.2%, p = 0.05), cardiac tamponade/hemopericardium (0.5% vs 1.1%, p = 0.06), vascular complications (0.3% vs 0.6%, p = 0.22), respiratory complications (1.4% vs 2.0%, p = 0.27), ventricular arrhythmias (2.9% vs 2.8%, p = 0.89), complete heart block (10.8% vs 9.1%, p = 0.09), and pacemaker implantation (8.9% vs 8.8%, p = 0.93). Admissions with prior mediastinal radiation were associated with shorter median (interquartile range) length of hospital stay (3[3] vs 3(4), p <0.001).

The present study is the first to-date to compare outcomes of TAVI among those with previous mediastinal radiation versus none. Our analysis showed that TAVI is increasingly utilized among select patients with prior mediastinal radiation.

We also demonstrated that TAVI among those with previous mediastinal radiation was associated with favorable in-hospital mortality, morbidity and shorter length of hospital stay compared with those without prior mediastinal radiation. With advancement in cancer therapies and improved survival of cancer patients, the prevalence of aortic stenosis among survivors with

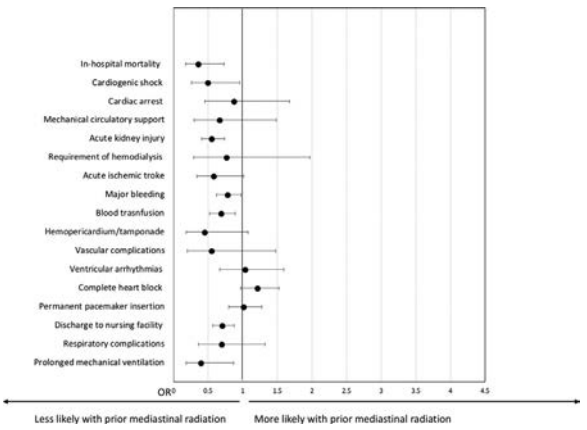

Figure 1. Forrest plot for in-hospital outcomes after matching those with prior mediastinal radiation versus without.

prior mediastinal radiation has increased. Given the higher surgical risk, TAVI is an appealing option among carefully selected patients. Our results suggest that prior mediastinal radiation does not pose an additive procedural risk, and those patients can be risk stratified similar to the general population when evaluated for TAVI. Our study results are limited by the observational nature of our analysis and the lack of procedural details or long-term outcomes.

Disclosures

No conflict of interest exists.

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