Bloodstream Infection in Patients with Trans-catheter Aortic Valve Replacement: A Population-Based Study with a Focus on Complicating Infective Endocarditis

Khawaja M. Talha, MBBS; Jack W. McHugh, MB BCh BAO; Daniel C. DeSimone, MD; Karen M. Fischer, MPH; Mackram F. Eleid, MD; Jennifer St. Sauver, PhD; M. Rizwan Sohail, MD; Larry M. Baddour, MD.
Mayo Clinic, Rochester, Minnesota, United States of America.

BACKGROUND

Trans-catheter aortic valve replacement (TAVR) was initially approved as an alternative to surgery for patients at high surgical risk. However, it is now being considered for patients with intermediate and low surgical risk. This will result in the expansion of patient pool for TAVR; hence it is of interest to ascertain risk of blood stream infection (BSI) and infective endocarditis (IE) following TAVR.

OBJECTIVES

We aim to conduct a population-based study addressing the incidence, epidemiology and risk factors associated with BSI and the prevalence of IE in patients who underwent TAVR and subsequently developed BSI.

METHODS

A population-based study was conducted for 7 counties in southeastern Minnesota using the expanded Rochester Epidemiology Project (E-REP) for all patient ≥18 years that underwent TAVR from January 1st, 2010 to December 31st, 2018. Medical records were screened for development of BSI for each patient from the date of TAVR until May 15th, 2020. Patients were classified as having BSI only, IE with BSI, or IE after BSI. A 1:4 nested case control analysis was performed with controls matched with age, year of presentation and county of residence of the cases.

RESULTS

A total of 247 patients underwent TAVR during the study period. There were 25 patients with BSI; 10 (40%) of them developed IE (Figure 1). The 8 year incidence of BSI was 103 per 1000 persons who underwent TAVR. Median age for patients who developed BSI was 85.5 years. Male gender was affected predominantly (72%). Six developed IE at outset of BSI, while four developed IE subsequent to BSI. The median time to development of IE was 791 days following TAVR. There was an equal number of early (< 12 months) and late IE cases (n=5). The most common pathogen causing IE was viridians group streptococci (VGS) (n=4) followed by enterococci and coagulase-negative staphylococci with 2 patients each. A significant correlation between CCI and sex with incidence of BSI was not identified by a nested case-control analysis (Table 2).

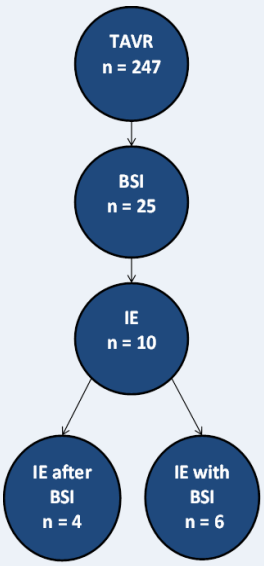

Figure 1: Summary of patients who developed BSI and IE

Median age (IQR)	85.5 (12.1)
Male gender (%)	18 (72.0)
Most common organism – BSI (%)	VGS (20)
Most common organism – IE (%)	VGS (40)
Most common source of BSI (%)	SSTI (28)
Mean CCI	7.0

Table 1: Characteristics of patients with bloodstream infections *SSTI: Skin/soft tissue infection

	Hazard Ratio (95% CI)	p-value
CCI	0.87 (0.66, 1.14)	0.312
Sex	2.19 (0.73, 6.59)	0.163

Table 2: Nested case-control analysis: cox model for post-TAVR BSI with matches included as strata

CONCLUSION

The incidence of BSI and subsequent IE in patients with TAVR were low in the E-REP population. CCI scores and sex were not significantly associated with development of BSI in the TAVR population. Subsequent investigations will include an evaluation of a larger cohort from an institutional experience to further define risk factors associated with post-TAVR BSI.

ACKNOWLEDGEMENTS

The authors are extremely grateful for the philanthropic support provided by a gift from Eva and Gene Lane (L.M.B.), which was paramount in our work to advance the science of cardiovascular infections at Mayo Clinic, an area of focus for more than 60 years.