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Care of Patients Undergoing Valvular Surgery

Impact of previous cardiac surgery on patients undergoing transcatheter aortic valve implantation: A meta-analysis

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ABSTRACT

The objective of our meta-analysis is to evaluate the impact of previous cardiac surgery in patients undergoing transcatheter aortic valve implantation (TAVI). We did a systemic search of databases, including Pubmed, EMBASE and Cochrane to identify relevant studies. We included studies comparing clinical outcomes in patients undergoing TAVI, with and without previous cardiac surgery. The 30 days as well as 1 year mortality was not significantly different between the two groups: 30 days (RR, 0.95; 95% CI, 0.82–1.09, $I^2 = 0\%$), 1 year (RR, 0.94; 95% CI, 0.86–1.02, $I^2 = 0\%$). The risk of acute myocardial infarction was significantly higher in patients with previous cardiac surgery and the risk of major vascular complications was lower in patients with previous cardiac surgery. Our meta-analysis suggests that the presence of previous cardiac surgery does not impair outcomes after TAVI, making this subset of patients particularly applicable for this evolving approach.

Introduction

Aortic valve stenosis is a debilitating disease that carries significant mortality and morbidity after symptom onset if left untreated.[1] In the PARTNER trial, the mortality from aortic stenosis after symptoms of congestive heart failure manifest was 51% in the medical treatment arm.[2] Surgical aortic valve replacement (SAVR) is a gold standard treatment for patients with severe aortic stenosis if the patient is a good surgical candidate.[3] Unfortunately, many of these patients are not good surgical candidates; either they are inoperable or are at a very high risk for surgery. Transcatheter aortic valve replacement (TAVR) or transcatheter aortic valve implantation (TAVI) has emerged as a new, less-invasive treatment modality, which involves percutaneous deployment of a bioprosthetic valve. Studies reported decreased mortality and improvement in clinical symptoms in patients with TAVI compared with medical therapy in patients with severe AS who are at high risk for surgery.[2,4] TAVI has been shown to be comparable with surgical aortic valve replacement in terms of mortality in patients with severe aortic stenosis.[5,6] The prevalence of coronary artery disease (CAD) is about 52%–68% in patients undergoing TAVI, and many of these patients had coronary artery bypass grafting (CABG) in the past.[7,8] Also, because aortic stenosis is a disease of elderly people, many of these patients had some sort of cardiac surgery in the past. Redo cardiac surgery in patients going for SAVR increases operative risk because of the complexity of the procedure, which poses a risk for injuring bypass grafts crossing the midline, major heart structures, mainly the right ventricle and calcific aortic root.[9,10] In redo cardiac surgery, the advantages of TAVI are due to the nature of minimally invasive approach that requires a small mediastinal dissection in cases of transapical-TAVI and transaortic-TAVI or no dissection at all in case of transfemoral-TAVI and trans-subclavian-TAVI and reduce the risks related to chest reopening such as massive hemorrhage or graft injury. Another advantage is myocardial protection because of the beating heart technique. The clinical outcomes of previous cardiac surgery in patients undergoing TAVI are unresolved. We aimed to evaluate the impact of previous cardiac surgery on procedural outcomes and survival in patients undergoing TAVI by pooling all available evidence.

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Materials and methods

Data sources

We followed meta-analysis of observational studies in epidemiology (MOOSE) guidelines for the conduct of the current systematic review and meta-analysis.[11] A systematic search of Medline, EMBASE and Cochrane Databases, and Google Scholar were performed. The following keywords were used: transcatheter aortic valve implantation, transcatheter aortic valve replacement. Additionally, references from previous trials, reviews, abstracts from annual meetings, and web base were also searched to identify relevant studies. The retrieved studies were carefully examined to exclude potentially duplicate or overlapping data. No language restriction was enforced. Authors of the studies were contacted for missing data. The manuscripts of all retrieved studies cited before October 2015 were reviewed. Literature search results are detailed in Fig. 1. Abstracts were excluded from the analysis because non-peer-reviewed data may introduce bias into the study.

Study eligibility

Studies were considered eligible for the analysis if they fulfilled the following criteria: 1) design: prospective or retrospective cohort study design with well-defined study population; 2) population: patients underwent TAVI for severe aortic stenosis; either they were inoperable or very high risk for surgical aortic valve replacement; 3) studies comparing clinical outcomes in patients with previous cardiac surgery and without previous cardiac surgery; 4) outcomes reported: short-term (in hospital or 30 day) all-cause mortality, 1-year all-cause mortality, stroke or TIA, acute myocardial infarction (MI), major bleeding events, major vascular complications, and need for permanent pacemaker placement.

Data extraction and validity assessment

Two independent reviewers (AB and PR) performed the literature search and identified relevant studies. A third investigator was available for arbitration in the event of discordance of the extracted data. The retrieved studies were carefully examined to exclude potentially duplicate or overlapping data (Fig. 1). Authors were contacted to get relevant data. Relevant data on study design, year of publication, single or multicenter study, patient population, the number of patients in previous cardiac-surgery group and non cardiac-surgery group, inclusion criteria, exclusion criteria, mean age, gender, coronary artery disease (CAD), diabetes mellitus (DM), left ventricle ejection fraction (LVEF), type of prosthetic valve, logistic EuroSCORE, and Society of Thoracic Surgeon score (STS score) and outcomes were extracted. In cases where data in several publications were derived from part or all of the same patient series, only the study presenting the largest patient population or most complete dataset was included.

Study outcomes

Primary outcomes: The primary outcomes of our study were 30 day and 1-year all-cause mortality.

Secondary outcomes: The secondary outcomes of our study were stroke or TIA event rate, major bleeding event rate, major vascular complication rate, myocardial infarction (MI) rate, and permanent pacemaker implantation rate.

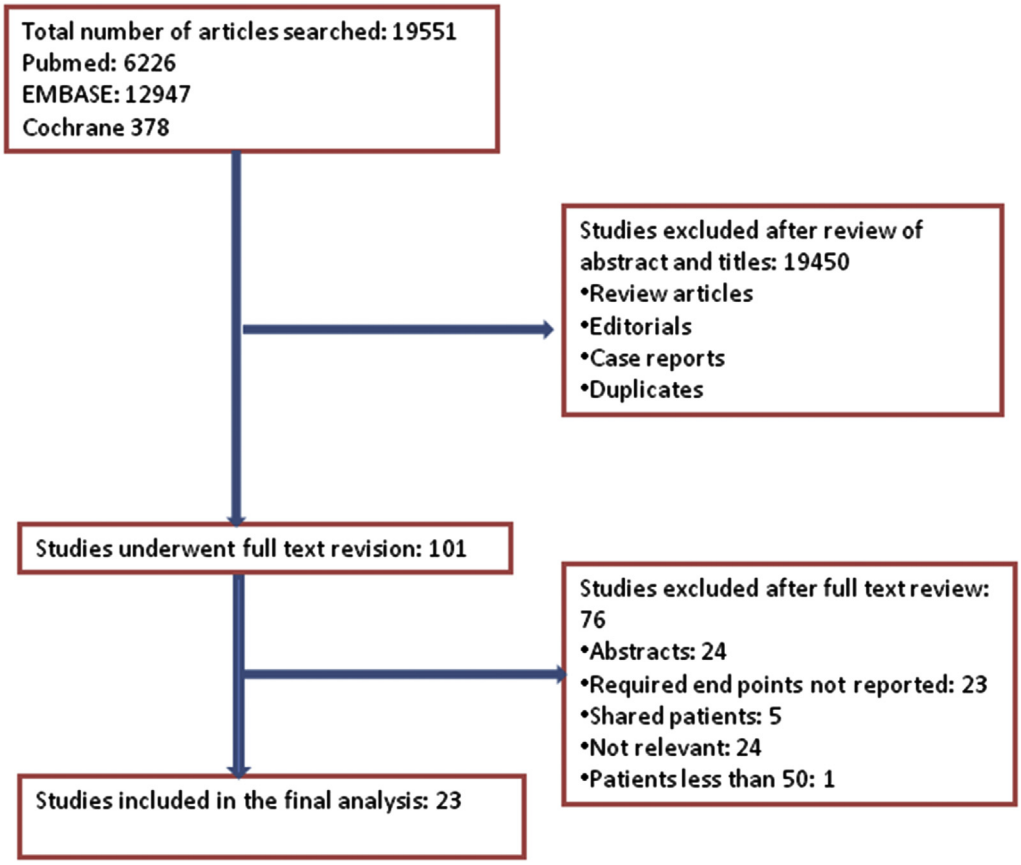

Fig. 1. Flow diagram describing study selection into meta-analysis.