INPLASY

A Meta-Analysis of the Impact of Pulmonary Hypertension on Prognostic Outcomes for Mitral Regurgitation Treated with the Transcatheter Mitral Valve Edge-to-Edge Repair Technique

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ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 August 2024 and was last updated on 14 August 2024.

INTRODUCTION

Review question / Objective An in-depth systematic review of the impact of pulmonary hypertension on the prognosis (outcome) of mitral regurgitation treated with transcatheter mitral valve edge-to-edge repair technique.

Condition being studied Pulmonary hypertension (pHTN) is often caused by long-term left-sided valvular heart disease and is present in 15% to 32% of patients undergoing mitral valve surgery for mitral regurgitation. The presence of pulmonary hypertension is critical in determining the advisability of proceeding with mitral valve surgery and is a known risk factor for both short-term and long-term mortality following such procedures. Transcatheter mitral valve repair (TMVr) using the commercially marketed MitraClip system (Abbot Vascular, Inc.) has emerged as an effective treatment for patients with primary mitral regurgitation who are considered high-risk for mitral valve surgery. Recent studies further demonstrate its effectiveness in select instances of secondary mitral regurgitation, especially in those also considered high-risk for such surgeries. Although TMVr is known to improve pulmonary artery pressure (PAP) and right ventricular function, detailed data correlating preoperative pHTN with clinical outcomes post-TMVr treatment for mitral regurgitation remains limited.

METHODS

Participant or population The study involved patients who were diagnosed with or without pulmonary hypertension (PH) through echocardiography or right heart catheterization, and who subsequently underwent catheter-based edge-to-edge mitral valve repair.

Intervention Patients diagnosed with pulmonary hypertension (PH), a type of high blood pressure affecting the arteries in the lungs and heart, via echocardiography or right-heart catheterization.

Comparator Patients found to be free of pulmonary hypertension (PH) through echocardiography or right heart catheterization constituted the control group.

Study designs to be included This study is classified as a cohort study.

Eligibility criteria The literature screening and data extraction were completed by two researchers. Inclusion criteria: (1) Studies must be cohort studies; (2) Include patients diagnosed with or without pulmonary hypertension (PH) via echocardiography or right heart catheterization (a diagnostic procedure), who were then treated with catheter-based mitral valve edge-to-edge repair; (3) Intervention measures include categorizing patients into PH and non-PH groups based on diagnoses from echocardiography or right heart catheterization; (4) Primary outcome measures assessed include 30-day all-cause mortality, which refers to death from any cause, 2-year all-cause mortality, cardiac-related death, rehospitalization due to heart failure, and duration of hospital stay. Exclusion criteria include duplicate publications, studies lacking relevant outcome measures, studies where the original text cannot be obtained, reviews or letters, and non-clinical studies.

Information sources We searched PubMed, Cochrane Library, Web of Science, and Embase up to August 2024 using the following search terms: transcatheter edge to edge mitral valve repair, mitral valve transcatheter edge-to-edge repair, Mitral Valve Insufficiency, mitral valve regurgitation, pulmonary hypertension, Hypertension, Pulmonary, and TEER.

Main outcome(s) 30-day all-cause mortality rate, 2-year all-cause mortality rate, cardiac-related mortality, heart failure readmission rate, and average length of hospital stay.

Quality assessment / Risk of bias analysis In this instance, 10 studies were included, all cohort studies with NOS (Newcastle-Ottawa Scale) scores of 7 or higher. Therefore, the studies incorporated into this article are classified as being of moderate to high quality.

Strategy of data synthesis This study utilized Stata 17.0 software for meta-analysis, employing the odds ratio (OR) as the effect measure for count data and mean difference (MD) for continuous data. Each effect size was accompanied by a 95% confidence interval (CI). The analysis of heterogeneity among the included studies was conducted using the $\chi 2$ test (Chi-squared test) in conjunction with I2 quantification (a measure of inconsistency among studies), where the threshold for the $\chi 2$ test was set at $\alpha=0.1$, indicating the level of significance. Heterogeneity was considered significant when P-values were below 0.1 or I2 exceeded 50%. In such cases, a random-effects model was necessary for the meta-analysis. Conversely, if significant heterogeneity was not present, a fixed-effects model was employed. Subgroup and sensitivity analyses, integral components of the meta-analysis, were undertaken to investigate the sources of heterogeneity. Publication bias was evaluated qualitatively with funnel plots and quantitatively via Egger's test, which evaluates the statistical significance of the bias.

Subgroup analysis If there is high heterogeneity among the included studies, analytical methods such as subgroup analysis, sensitivity analysis, and Meta-Regression are used to address it.

Sensitivity analysis To evaluate the robustness of the statistical analysis outcomes, a methodical sensitivity analysis was performed by sequentially excluding each included study to ascertain the reliability of the statistical findings.

Country(ies) involved China.

Keywords The Transcatheter Edge-to-Edge Repair (TEER) procedure addresses conditions such as mitral valve prolapse, mitral regurgitation, and pulmonary hypertension.

Contributions of each author

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