

A systematic review of patient baseline characteristics, procedural details and outcomes of combined transcatheter valvular interventions.

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Protocol

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Abstract

Background Valvular heart pathologies remain amongst the most encountered conditions surgeons and interventionists face today. Multi-valve procedures exhibit higher operative mortality than do single valve procedures, with a mortality rate that is double its counterpart. Up until recently, surgical repair was the gold standard for most diseased valves. With the advent of new percutaneous and transcatheter technologies for valve replacement, many patients deemed inoperable due to prohibitively high surgical risk have been able to benefit from these new lesser invasive techniques. Currently, one systematic review article exists by Ando et al which included 37 studies and 60 patients and demonstrated reasonable clinical outcomes in patients undergoing combined transcatheter aortic and mitral valve intervention (CTAMVI). Since that original article, many new papers and studies have been published. We purpose an updated systematic review of all cases of combined percutaneous/transcatheter multi-valvular repairs.

Methods An electronic search will be performed in PubMed, EMBASE, and Cochrane through September 2020 to identify eligible observation studies and RCTs. A complete electronic search will be conducted from January 1st 2000 to September 1st 2020 with Pubmed, EMBASE and Cochrane. All search results will be uploaded to COVIDENCE and screened by title or abstract and included for full manuscript review when it's deemed relevant to the systematic review. All data will be abstracted into a dedicated excel spreadsheet and used for further data analysis. Demographic information such as patient's age, sex and location will be extracted. Further information such as performed procedure, surgical risk, whether procedures were done simultaneously or staged, deployed device and clinical outcomes will be extracted as well.

Discussion Within the medical literature, there is limited data available regarding combined transcatheter aortic, mitral, and tricuspid valve intervention. This is an attractive alternative in high-surgical risk patients with combined valvular disease. However, its procedural details and clinical outcomes have not been well described in any current medical guidelines. Through our systematic review we will be able to better elucidate and establish strategies for undergoing transcatheter interventions in high risk patients who require multi-valvular repair.

Background And Clinical Relevance

Valvular heart pathologies remain amongst the most encountered conditions surgeons and interventionists face today. Existing data in medical literature show the enormous proportion of patients presenting with multivalvular disease. The European Society of Cardiology's (ESC) EORP-VHD II registry demonstrated that 24.9% of patients with valvular disease had multiple left-sided lesions.² Multi-valve procedures exhibit higher operative mortality than do single valve procedures, with a mortality rate that is double its counterpart.³ The evaluation of multivalvular disease is difficult due to the misleading hemodynamic interactions of sequential valves on each other. Most of the echocardiographic parameters have been established for isolated valvular lesions and the presence of concomitant valvular lesions can affect the assessment by Doppler echocardiography and CMR.⁴ Up until recently, surgical repair was the

gold standard for most diseased valves. With the advent of new percutaneous and transcatheter technologies for valve replacement, many patients deemed inoperable due to prohibitively high surgical risk have been able to benefit from these new lesser invasive techniques. This is especially true within the domain of the aortic and mitral valves where patients suffering from aortic stenosis, mitral stenosis, and mitral regurgitation have had their valvular lesions ameliorated with transcatheter aortic valve replacement (TAVR) and transcatheter mitral valve replacement (TMVR) respectively. Within the medical literature, there is limited data available regarding combined transcatheter aortic, mitral, and tricuspid valve intervention. This is an attractive alternative in high-surgical risk patients with combined valvular disease. However, its procedural details and clinical outcomes have not been well described in any current medical guidelines. Currently, one systematic review article exists by Ando et al which included 37 studies and 60 patients and demonstrated reasonable clinical outcomes in patients undergoing combined transcatheter aortic and mitral valve intervention (CTAMVI).¹ We propose an updated systematic review with increased power and a greater amount of patients. Furthermore, Ando et al included only patients undergoing combined transcatheter aortic and mitral valve interventions. Since that article, a plethora of new reports has been published. Our study will include more patients and patients undergoing transcatheter tricuspid valve interventions as well. Thus increasing the thoroughness of our review paper. The purpose of our study is to summarize the baseline characteristics, procedural details and post procedural outcomes (such as improvement in NYHA class, mortality rate, and rate of hospitalizations) in all patients who underwent combined transcatheter interventions.

Aim:

The aim of our study is to summarize the baseline characteristics, procedural details and post procedural outcomes (such as improvement in NYHA class, mortality rate, and rate of hospitalizations) in all patients who underwent combined transcatheter interventions.

Objective:

The objective of our study is to update Ando et al's previous systematic review on combined transcatheter interventions.¹

P- Patients with severe valvular disease. (aortic stenosis, aortic regurgitation, mitral stenosis, mitral regurgitation, and tricuspid insufficiency)

I- Transcatheter aortic valve intervention, transcatheter mitral valve intervention, and transcatheter tricuspid valve intervention.

C- Surgical treatment

O- Early and late mortality. Increased hospitalizations from all cardiac causes.

Methods

Study protocol registration:

This protocol has been registered on PROSPERO (CRD42020211462), and has been reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocol (PRISMA-P) statement.

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Eligibility Criteria:

Inclusion Criteria: All Adults (≥ 18 years of age) aortic valve treated with transcatheter aortic valve repair (native or valve-in-ring or valve in valve) and/or 2: mitral valve treated with transcatheter mitral valve repair or percutaneous mitral valve repair (native, valve-in-ring or valve-in-valve) 3: tricuspid valve treated with either transcatheter or percutaneous valvular repair (native, valve-in-ring, or valve-in-valve)

Exclusion Criteria: Studies where open-heart surgery was performed to treat either aortic, mitral, and tricuspid valve and studies where procedure and patient characteristics can't be determined.

Information sources and search strategy:

An electronic search will be performed in PubMed, EMBASE, and Cochrane through September 2020 to identify eligible observation studies. This will be done in consultation with an experienced medical librarian and expert in literature searching.

A complete electronic search will be conducted from January 1st 2000 to September 1st 2020 with Pubmed, EMBASE and Cochrane. The search terms will include:

1: Transcatheter Aortic Valve Replacement, transcatheter aortic valve implantation, transcatheter aortic valve, TAVR, TAVI, percutaneous aortic valve, TAVIV, trans-femoral, transapical, trans-carotid, trans-aortic, aortic valve-in-valve, aortic-valve in ring

2: mitral valve or percutaneous mitral valve or transcatheter mitral valve, MitraClip, clip, mitral, double or dual 'double valve' OR 'valve-in-valve' OR 'valve-in-ring' OR TMVI OR TMVR OR TMVIV OR mitral valve in valve OR TMVIR OR mitral valve in ring OR

PMVR

3: tricuspid valve or percutaneous tricuspid valve or transcatheter tricuspid valve, TriClip, clip, tricuspid, double or dual 'double valve' OR 'valve-in-valve' OR 'valve-in-ring' OR TTVI OR TTVR OR TTVIV OR tricuspid valve in valve OR TTVIR OR tricuspid valve-in-ring.

Study Selection:

All search results will be first uploaded into citation management (Zotero), in order to merge and eliminate all duplicates. After eliminating all duplicates, all the search results will be uploaded onto

COVIDENCE and screened by title or abstract and included for full manuscript review when it's deemed relevant to the systematic review. Literature search will be limited to articles published in English.

Outcomes Measurements:

Primary outcomes include:

1. In hospital major adverse cardiac events such as myocardial infarction, stroke, and death.
2. All cause mortality at 30 days.

Secondary outcomes include:

1. All cause mortality at 1 year
2. Improvement of at least 1 NYHA class
3. Presence of paravalvular leak post procedure
4. Left ventricular outflow tract obstruction

Data extraction and management

Two independent authors will perform the literature search independently and in the event of any disagreement, a third independent author will serve as a tiebreaker. All data will be abstracted into a dedicated excel spreadsheet and used for further data analysis. Demographic information such as patient's age, sex and location will be extracted. Further information such as performed procedure, surgical risk, whether procedures were done simultaneously or staged, deployed device and clinical outcomes. Outcomes included improvement in NYHA class, mortality rates and rates of re-hospitalizations will be included as well. Continuous data will be presented as means, standard deviations, standard errors, and 95% confidence intervals (CIs), while dichotomous data will be exerted as frequencies and percentages (%) and 95% CIs.

Risk of bias assessment

Two authors will independently evaluate and cross check the risk of bias of publications using the Joanna Briggs Institute critical appraisal checklist for case reports.⁶ Each domain will be graded as yes, no, or unclear for high risk of bias. Any discrepancy between two authors will be resolved through discussion with a third author.

Strength of evidence

We will judge the strength of evidence for each paper using Grading of Recommendations Assessment, Development and Evaluation tool (GRADE).⁷ Two authors will independently assess the strength of evidence for each outcome and disagreement will be solved by a third author through discussion. A summary of all outcomes will be summarized in a table following the principle of GRADE.

Data synthesis and statistical analysis

A systematic narrative synthesis will be provided with information presented in the text and tables to summarise and explain the characteristics and findings of the included studies. Continuous data will be pooled using mean difference (MD) or standardized MD (SMD) with its respective 95% CIs. Dichotomous data will be pooled using risk ratios with its respective 95% CIs.

Declarations

Amer Muhyieddeen: Creator and lead author

Miro Asaodurian: Contributing author

Ashwini Sadhal: Contributing author

Mehdia Amini: Contributing author

Sheeda Saba: Contributing author

Sujana Balla: Contributing author

Min-lin Fang: search strategy and cross reference

Ankit Rathod: Guarantor of review

Support:

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Sponsor: Jain Ratnali, MBBS

Role of funder: Funder had no role or contribution to protocol

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Supplementary Files

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- [PRISMAPchecklist2.docx](#)