

Patients With Moderate-to-Severe Baseline MR Before TAVR Showed Greater Pronounced Improvements in Specific Echocardiographic Parameters Related to LV Function and Geometry After TAVR: A Systematic Review and Meta-Analysis

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Back ground

- Mitral regurgitation (MR), frequently coexists with aortic stenosis (AS)
- MR is recognized as a potential risk factor affecting the outcomes of patients undergoing aortic valve replacement (AVR) procedures
- In recent years, transcatheter AVR (TAVR) has significantly progressed to a clinical standard for patients with AS
- The prognostic role of baseline MR severity in patients undergoing TAVR has been the subject of extensive research linking moderate-to-severe MR to worse clinical outcomes
- In addition, few studies have compared echocardiographic parameters between groups with different MR grades, yielding inconsistent results
- In theory, replacing the aortic valve reduces the left ventricular (LV) pressure and trans mitral pressure gradient, which can lead to a reduction in MR severity

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Goal of this study:

- This meta-analysis aimed to evaluate the mean changes in key echocardiographic parameters before and after TAVR
- Compare these changes between patients with:
 - Moderate-to-severe MR ($MR \geq 2$)
 - None-to-mild MR ($MR < 2$).

For Changes in EF, Mean gradient, and LV indices

Methods:

- A comprehensive literature search was conducted using six electronic databases.
- We included studies that evaluated patients undergoing TAVR, and classified them based on baseline MR:
 - Grade ≥ 2 (moderate/severe MR) or MR grade < 2 (none/mild MR),
 - And reported the mean difference (MD) in echo parameters before and after TAVR

The primary outcomes included changes in ejection fraction (EF), LV end-diastolic volume (LVEDV) index, LV end-systolic volume (LVESV) index, LV end-diastolic diameter (LVEDD), LV end-systolic diameter (LVESD), aortic valve area (AVA), and the mean aortic gradient. Pooled MDs were analyzed using a random-effects model.

Identification

Identification of studies via databases and registries

Number of records identified from
Medline = 688, Embase = 1183, Web of
science = 678, Scopus = 2632, CENTRAL =
287, Clinicaltrials.gov = 76
(n = 5544)

Records after duplicates removed
(n = 3360)

Records screened
(n = 3360)

Records excluded (n = 3176):
Exclude by title: 1236, Exclude by
abstract: 756, Exclude by language:
23, Exclude by publication type: 1161

Full-text articles assessed for eligibility
(n = 184)

Full-text articles excluded (n = 173)

Included

Identification of studies via other methods

Records identified from other
sources: Google/Google scholar
= 746, Citation searching = 64,
Review references = 74

Reports sought for retrieval
(n = 12)

Records not retrieved
(n = 0)

Records assessed for eligibility
(n = 884)

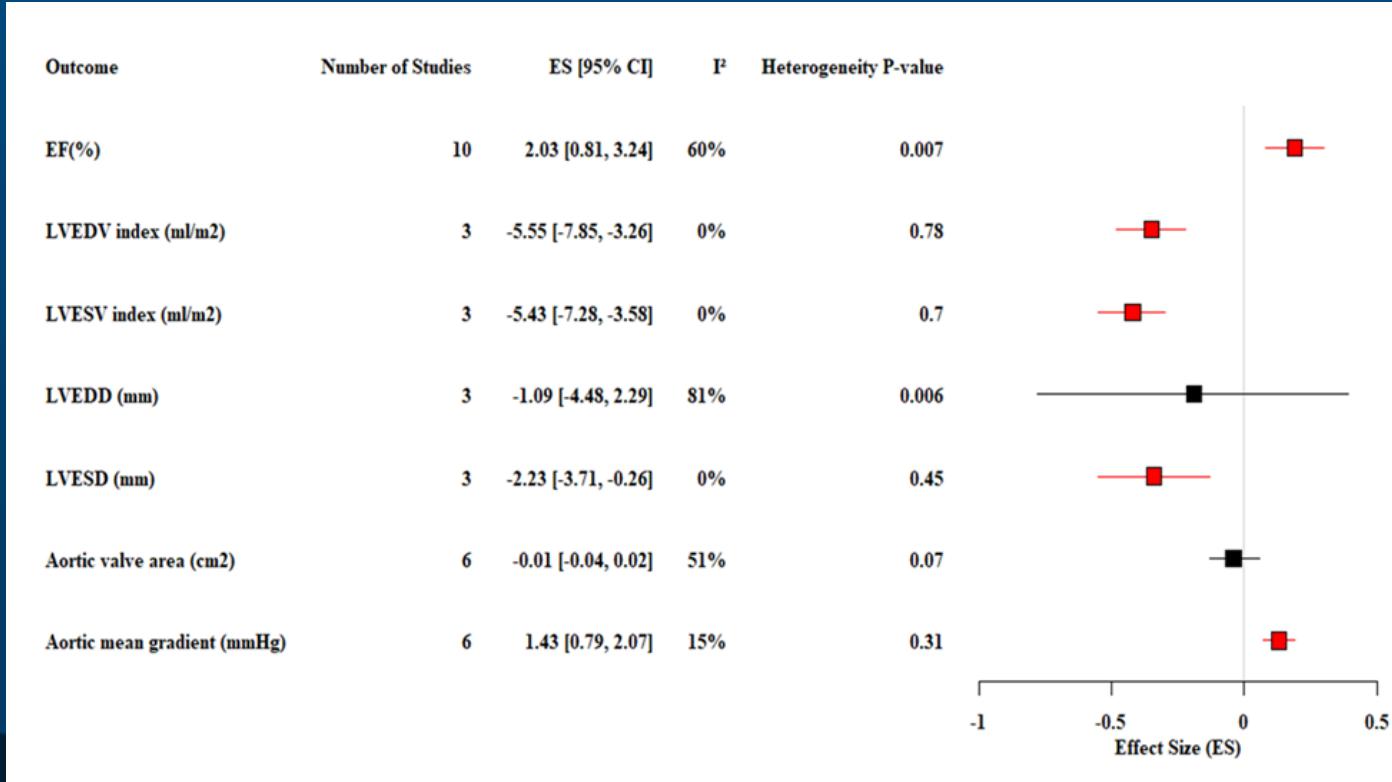
Records excluded
(n = 882)

Studies included in quantitative synthesis
(network meta-analysis) = 13

Results:

- 13 studies with 7,163 patients were included, of which 2,376 had an MR ≥ 2 .
- The MR <2 and MR ≥ 2 groups experienced sig improvements in AVA and reductions in mean aortic gradient, LVEDV index, LVESV index, LVEDD, and LVESD.
- Compared to MR <2 patients, those with MR ≥ 2 exhibited significantly greater improvements in:
 - EF (MD = 2.03; 95% CI: 0.81, 3.24)
 - LVEDV index (MD = -5.55; 95% CI: -7.85, -3.26),
 - LVESV index (MD = -5.43; 95% CI: -7.28, -3.58),
 - LVESD (MD = -2.23; 95% CI: -3.71, -0.26)
 - Mean aortic gradient (MD = 1.43; 95% CI: 0.79, 2.07).

Results of the pooled mean difference of the change-from-baseline analysis between patients with pre-TAVR MR ≥ 2 and patients with pre-TAVR MR < 2 .



Conclusion:

- This meta-analysis highlights significant improvements in echocardiographic and hemodynamic parameters in patients with moderate-to-severe MR compared to non-to-mild MR patients
- These patients exhibited greater reductions in the LVEDV index, LVESV index, and LVESD, as well as enhanced EF, suggesting better reverse remodeling.
- However, the changes in LVEDD and AVA were similar across the groups.
- Future studies should focus on stratifying outcomes according to

Questions