

MitraClip versus Pascal in transcatheter mitral valve repair (TMVR) and the most valuable outcomes following surgery: A systematic review meta-analysis of 1398 patients

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Background:

Mitral regurgitation (MR) is a cardiac medical condition characterized by leakage of blood from the left ventricle to the left atrium during systole due to the incomplete closure of the mitral valve. MitraClip and PASCAL are innovative transcatheter edge-to-edge repair (TEER) devices used to treat MR. Whether MitraClip or PASCAL is better for achieving the best MR repair is still controversial. In the present meta-analysis, we aim to comprehensively compare both TEER device systems in severe MR patients and reveal which system is better depending on both efficacy and safety outcomes.

Methods:

Five databases (PubMed, Scopus, Web of Science, Cochrane, and Ovid) were searched until 18 Mars 2023 in addition to manual searching of Google Scholar and grey literature. Original studies were only included and critically appraised using an adapted version of the Newcastle-Ottawa scale (NOS) for observational cohort studies and the Cochrane risk of bias (ROB) tool for randomised controlled trials (RCTs). The risk ratio (RR) and mean difference (MD) with their corresponding 95% confidence interval (95% CI) were calculated depending on the type of each outcome, either dichotomous or continuous, to investigate the comparison between both devices for TMVR (P value < 0.05 considered significant). The analysis was performed via R software version 4.2.2 (2022-10-31) and R Studio version 2022.07.2 (2009-2022) RStudio, Inc.).

Results:

The database search identified 197 studies, and seven studies were finally included with 1398 patients who underwent TMVR either through MitraClip or PASCAL. The ROB was low in five studies, moderate in one study, and high in one study. The statistical analysis results favored PASCAL over MitraClip, achieving lower transmittal mean pressure gradient at discharge than MitraClip (MD = 0.24 mmHg; 95% CI: [0.03, 0.45]; P = 0.02). Regarding vena contract width, PASCAL significantly lowered this width distance than MitraClip (MD = 1.64 mm; 95% CI: [1, 2.28], P < 0.01). Also, PASCAL was significantly superior to the MitraClip in reducing Effective regurgitant orifice area (EROA) than MitraClip (MD = 0.16; 95% CI: [0.12, 0.21]; P < 0.01) using the proximal isovelocity surface area (PISA) method. The MR grade reduction was significantly better in PASCAL rather than MitraClip.

Regarding the secondary outcomes, including the procedure time, procedural success, reinterventions, and all-cause mortality, the results showed no significant differences between both devices.

Conclusions: According to the meta-analysis, severe MR patients showed better short-and midterm outcomes with the PASCAL clip rather than the conventional MitraClip TEER device. Both devices were found equally safe during the procedure with similar ease to use.

Keywords: MitraClip, PASCAL; Mitra Regurgitation; Transcatheter mitral valve repair; Transcatheter edge-to-edge repair; Review; and Meta-analysis.