

EFFICACY AND SAFETY OF DIFFERENT PROSTHESIS AORTIC VALVE REPLACEMENT IN PATIENTS WITH AORTIC STENOSIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background

A surgical replacement of the stenotic aortic valve has been a big challenge which facing cardiac surgeons while different types of prosthesis valves showed many clinical events that improving the hemodynamic performance in these patients. Selection for the best prosthesis is still under debate while evidence remains controversial. The aim of this systematic review and Meta-analysis was to assess the efficacy and safety while comparing variable protheses after aortic valve replacement.

Methods and Materials

We searched PubMed, MEDLINE in Process, Scopus and Web of Science (previously ISI) for relevant studies, published up to January 2018. We included randomized controlled trials (RCTs) that compared different types of prostheses valves. Data were pooled as odds ratios (OR) or mean differences (MD) with their 95% confidence intervals (CI) between compared groups in a random metaanalysis model. Subgroup and sensitivity analysis were conducted. We assessed heterogeneity by a Chi square test and I2 statistic. Regarding efficacy outcomes, transvalvular mean gradient at 1 year was significantly lower in Cryolife O'Brien than Toronto (MD= -4.50 mmhg, 95% CI [-6.64, -2.36]), lower in Edwards Perimount Magna (EPM) than Medtronic Mosaic (MM) (MD= -6.42 mmhg, 95% CI [-8.11, -4.72]), and lower in ROSS than MIRA (MD= -6.70 mmhg, 95% CI [-8.38, -5.02]). Regarding safety outcomes, CarboMedics was associated with significantly higher cardiac valve not related deaths (OR= 2.04, 95% CI [1.04, 3.97]), higher early mortality (OR= 2.72, 95% CI [1.18, 6.32]), and lower hemorrhage (OR= 0.41, 95% CI [0.17, 0.98]) compared to St. Jude Medical.

Results

Figure 1. Forest plot of Transvalvular mean gradient at 1 year.	Figure 2. Forest plot of Cardiac Valve Non related Deaths	Figure 3. Forest plot early mortality.	Figure 4. Forest plot of Hemorrhage
Study Mean Difference MD 95%-Cl	Study Odds Ratio OR 95%-CI	Study Odds Ratio OR 95%-CI	Study Odds Ratio OR 95%-CI
SJ. standard prosthesis Vis Medfronic—[4:8] 1.00 [-12.75; 14.75] Flore et al 1997 1.00 [-12.75; 14.75] Random effects model 1.00 [-12.75; 14.75] Heterogenetic /* FMAS, p. = HA 1.00 [-12.75; 14.75]	St. Jude vs Medical Hall Antunes 1990 1.33 [0.26; 6.94]	CE vs SPV Cohen et al 2002 Random effects model 0.86 [0.12; 6.38] 0.86 [0.12; 6.38]	S.I.vs.Medtronic-Hall
Cryolife O'Brien Vs Toronto Chambers et al 2007 Random effects model Helenometric ℓ ² = 1666, = 2.36] Helenometric ℓ ² = 1666, = 2.36]	Random effects model 1.33 [0.26; 6.94] Heterogeneity: I ² = NA%, p = NA	Heterogeneity: $I^2 = NA\%$, $p = NA$	Fiore et al 1997 4.09 [0.14; 120.69]
$ \begin{array}{c} {\rm EPM} \ V_n \ {\rm MM} \\ {\rm Darbaus} \ {\rm eff} \ {\rm add} \ {\rm 2011} & {\rm eff} \\ {\rm Darbaus} \ {\rm eff} \ {\rm add} \ {\rm add} \ {\rm add} \\ {\rm Darbaus} \ {\rm eff} \ {\rm add} \ {\rm add} \ {\rm add} \\ {\rm Barbaud} \ {\rm add} \\ {\rm add} \ {\rm add$	SJ vs. Meditronic=Hall E 0.75 [0.08; 6.71] Random effects model 0.75 [0.08; 6.71] 0.75 [0.08; 6.71]	Lim et al 2002 2007, Bryan et al Random effects model Heterogeneitr, if = 0%, p = 0.94	Random effects model 4.09 [0.14; 120.69] Heterogeneity: I ² = NA%, p = NA 4.09 [0.14; 120.69]
Mosale Va Parimount 4.00 [2.00; 6.00] Chambers et al 2006 ➡ Random effects model ♣.00 [2.00; 6.00] Heterogenety; I ² = NA%, p = NA	ATS vs CM Autschbach et al 2000 3.00 [0.15; 59.89]	Top Hat vs OnX Chambers at al 2005 100 1004: 24 551	CM vs SJM
CELVa SPV Cohen el 2010 Random effects model Mathematical a 2010 Random effects model ↓ 1.47 [0.17; 2.77] ↓ 1.47 [0.17; 2.77]	Random effects model 3.00 [0.15; 59.89] Heterogeneity: I ² = NA%, p = NA	Random effects model 1.00 [0.04; 24.55] Heterogeneity: I ² = NA%, p = NA	Lim et al 2002 0.41 [0.16; 1.04]
IBOBE V5 MIRA Does et a 2011 Flandsom effects model -6.70 [-8.38; -6.02] Handsom effects model -6.70 [-8.38; -6.02]	ATS vs 5JMHP Autschach et al 2000 3.00 [0.15; 59.89] Random effects model Heteroseneir / ² = NS5, p = NA	Toronto Va Perimount 2006, Chambers et al 1.36 [0.43; 4.23] Random effects model 1.36 [0.43; 4.23]	Bryan et al 2007 0.31 [0.01; 7.82] Random effects model 0.41 [0.17; 0.98]
PRIMA PLUE VS MIRA Doss et al 2011 Random effects model Insteroperativ (* – 8.5%; 2.79) -1.90 [-6.59; 2.79] -1.90 [-6.59] -1.90 [-6.5	CM vs SJMHP	Heterogeneity: I' = NA%, p = NA C-E Perimount stented vs Prima Plus stentless	Heterogeneity: $r = 0.66$
PRIMA PLUS Va Parlmount Doss of al 2011	Autschbach et al 2000 1.00 [0.04; 24.55] Random effects model 1.00 [0.04; 24.55] Heterogeneity: I ² = NA%, p = NA 1.00 [0.04; 24.55]	2007, Ali et al 1.48 [0.24; 9.11] Random effects model 1.48 [0.24; 9.11] Heterogeneity: <i>P</i> = NA%, <i>p</i> = NA 1.48 [0.24; 9.11]	Top Hat vs OnX
Trifecta Vs Freestyle Ospedation:2015 Random effects model Interrogenetic; 1 ² = NAS ₂ , ρ = NA	CM vs SJM Bryan et al 2007 E 2.27 [0.91; 5.63] Lim et al 2002 E 1.79 [0.67; 4.80]	Epic vs Magna 2012, Suri et al 0.56 [0.16; 1.97]	Random effects model 1.00 [0.04; 24:55]
ATS Va CM Lehnano 2006 model Haurogenety, P = NAS, p = NA 1000 (-13.11; 23.11)	Random effects model 2.04 [1.04; 3.97] Heterogeneily: I ² = 0%, p = 0.73	Random effects model 0.56 [0.16; 1.97] Heterogeneity: $l^2 = NA\%$, $p = NA$	Heterogeneity: $I^2 = NA\%$, $p = NA$
ATS Va 5.24840P Lehmann 2009 Random offsel5 model Helerorgenetic / ² = NASs., a = NA	Starr Edwards vs St. Jude 1.47 [0.58; 3.70] Murday et al 2003 1.47 [0.58; 3.70] Random effects model 1.47 [0.58; 3.70]	Epic vs Mitroflow 2012, Swi et al Random effects model 4.44 4.44 4.44 4.44 4.44 4.44 4.44 4.	C-E Perimount stented vs Prima Plus stentless
CM Vs BJMHP Lehnano 2008 200 [-13.68; 17.68] Random effects model 200 [-13.68; 17.68] Heterogenety, r ² = RA%, p = RA	Heterogeneity: / = NA%, p = NA MP vs BP	Magna vs Mitroflow	Random effects model 0.78 [0.20; 3.02]
Bitentlese Ve Conventional Xenogram Lehmann 2007	Stassano et al 2009 0.63 [0.26; 1.56] Random effects model 0.63 [0.26; 1.56] Heterogeneity: I ² = NA%, p = NA 0.63 [0.26; 1.56]	ZV12, sum et al 1.19 [0.39; 3.68] Random effects model 1.19 [0.39; 3.68] Heterogeneity: I ² = NA%, p = NA 1.19 [0.39; 3.68]	Heterogeneity: I ^z = NA%, p = NA
-20 -10 0 10 20	0.1 0.51 2 10	0.1 0.5 1 2 10	0.01 0.1 1 10 100

Conclusion

Our findings showed that Cryolife O'Brien had lower transvalvular mean gradient at 1 year than Toronto. CM had higher early mortality, cardiac valve not related deaths, and lower haemorrhage than SJM.