Long-Term Outcomes of the Ross Procedure Versus Bioprosthetic Versus Mechanical Aortic Valve Replacement: A Network Meta-Analysis



# **Background / Study Objective**

- The choice of the aortic valve substitute for young and middle-aged adults is still debated.
- This study aims to simultaneously compare the direct and indirect evidence of the clinical outcomes following Ross procedure, bioprosthetic aortic valve replacement (bAVR), and mechanical aortic valve replacement (mAVR).



## **Methods**

- After a systematic literature search, randomized clinical trials and propensity score matched studies comparing any combination of Ross procedure, bAVR, and mAVR were included.
- Twenty-five studies with a pooled sample size of 110,023 patients (Ross procedure, n=1,691; mAVR, n=54,811; bAVR, n=53,521) met the eligibility criteria.
- A frequentist network meta-analysis and a randomeffects pairwise meta-analysis were performed.
- Primary end points were in-hospital mortality and allcause mortality at last follow-up. Secondary end points were stroke or transient ischemic attack, bleeding, endocarditis, and reoperation.

## Results 1

- Compared to conventional bioprostheses, the Perceval valve was associated with a significantly lower risk of atrial fibrillation (OR 0.51; 95% CI 0.32–0.82; P <0.01), whereas no evidence of difference was found when compared to the Intuity valve (OR 0.88; 95% CI 0.66–1.19; P =0.41).
- Regarding in-hospital mortality, stoke or transient ischemic attack, reexploration for bleeding, and acute kidney injury no evidence of difference was found between the three approaches.

# Results 2

All-cause mortality at last follow-up							
Comparison	Number of Studies	Direct Evidence	12	Random effects model	OR	95%-CI	
mAVR:bAVR Direct estimate Indirect estimate Network estimate	12	0.97	0.66	*	0.48 [0	0.60; 0.92] 0.14; 1.62] 0.60; 0.91]	
Ross:bAVR Direct estimate Indirect estimate Network estimate	2	0.58	0.30	-#- -#-	0.44 [0	0.24; 0.79] 0.22; 0.87] 0.28; 0.69]	
mAVR:Ross Direct estimate Indirect estimate Network estimate	4	0.75	0.00	0.2 0.5 1 2 5	1.81 [0	0.99; 2.70] 0.75; 4.37] 1.08; 2.59]	

### Reoperation

Comparison	Number of Studies	Direct Evidence	12	Random effects model	OR	95%-CI
mAVR:bAVR Direct estimate Indirect estimate Network estimate	14	0.93	0.54	*	0.44	0.25; 0.47] 0.13; 1.49] 0.25; 0.48]
Ross:bAVR Direct estimate Indirect estimate Network estimate	2	0.53	0.69	*	0.36	0.18; 0.75] 0.17; 0.75] 0.22; 0.61]
mAVR:Ross Direct estimate Indirect estimate Network estimate	6	0.77	0.71	0,2 0,5 1 2 5	1.49	0.48; 1.44] 0.55; 4.07] 0.59; 1.54]

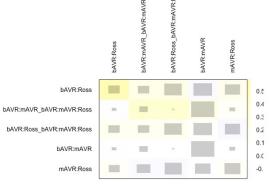
#### Stroke or transient ischemic attack

Comparison	Number of Studies	Direct Evidence	12	Random effects model	OR	95%-CI
mAVR:bAVR Direct estimate Indirect estimate Network estimate	11	0.99	0.00	-	1.06	[0.82; 1.21] [0.21; 5.25] [0.82; 1.21]
Ross:bAVR Direct estimate Indirect estimate Network estimate	2	0.60	0.57	*	0.19	[0.22; 0.89] [0.08; 0.45] [0.18; 0.55]
mAVR:Ross Direct estimate Indirect estimate Network estimate	4	0.77	0.36	-#-	2.89	[1.76; 6.00] [0.93; 9.02] [1.84; 5.43]

Bleeding						
Comparison	Number of Studies	Direct Evidence	12	Random effects model	OR	95%-CI
Ross:bAVR Direct estimate Indirect estimate Network estimate	1	0.63		*	0.28	[0.14; 2.22] [0.05; 1.71] [0.15; 1.30]
mAVR:Ross Direct estimate Indirect estimate Network estimate	3	0.87	0.46	0.1 0.51 2 10	- 4.53	[1.45; 14.39] [0.24; 85.96] [1.57; 13.29]

#### **Endocarditis**

Comparison	Number of Studies	Direct Evidence	12	Random effects model	OR	95%-CI
mAVR:bAVR Direct estimate	5	0.93	0.00			[0.31; 0.73]
Indirect estimate Network estimate						[0.19; 4.60] [0.33; 0.75]
Ross:bAVR Direct estimate	2	0.80	0.54		0.22	[0.17; 0.61]
Indirect estimate		0.00	0.54	-	0.30	[0.08; 1.07]
Network estimate					0.32	[0.18; 0.56]
mAVR:Ross Direct estimate	2	0.81	0.00			[0.88; 3.24]
Indirect estimate Network estimate			_	-		[0.28; 4.21] [0.87; 2.80]
			0.1	0.5 1 2	10	
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	P-score(fixed) P-score (random)				
A !!	Ross	0.9997	0.9948		
All-cause mortality at last	mAVR	0.5003	0.5042		
follow-up	bAVR.	0.0000	0.0010		
	P-sco	ore(fixed) P-s	core (random)		
	Ross	0.8113	0.8113		
30-day mortality	bAVR.	0.6176	0.6176		
	mAVR	0.0711	0.0711		
			P-score (rando	m)	
	mAVR	0.98	0.7911		
Reoperation	Ross	0.52	0.7089		
Reoperation	bAVR.	0.00	0.0000		
	P-score (fixed) P-score (random)				
	Ross	1.0000	1.0000		
Stroke or transient	mAVR	0.2557	0.2557		
ischemic attack	bAVR.	0.2443	0.2443		
	P-score(fixed)P-score (random)				
	Ross	0.9987	0.9643		
nii	bAVR.	0.0120	0.5341		
Bleeding	mAVR	0.4893	0.0017		
	P-s		score (random	ı)	
	Ross	0.9652	0.9652		
Endocarditis	mAVR	0.5345	0.5345		
Elidocardida	bAVR	0.0003	0.0003		
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### Conclusion

Our study shows that Ross procedure has a significantly lesser likelihood of long-term negative outcomes such as all-cause mortality at last follow-up, stroke or transient ischemic attack, bleeding, and reoperation compared to conventional aortic valve replacement.

