SUPPLEMENTAL MATERIAL

Data S1.

Supplemental Methods

Search strategy.

<u>PubMed</u> (n=393 on 29/12/2020)

("Pulmonary Valve"[Mesh] OR "Pulmonary valve*" OR "Valves, Pulmonary" OR "Valve, Pulmonary") AND ("Replacement*" OR "Replantation*" OR "Surgical Replantation*" OR "Replantation, Surgical" OR "Reimplantation*") AND ("Tricuspid Valve"[Mesh] OR "Tricuspid valve*" OR "Valve, Tricuspid" OR "Valves, Tricuspid" OR "Tricuspid")

Embase (n=709 on 29/12/2020)

(('pulmonary valve'/exp AND ('replacement' OR 'replantation' OR 'reimplantation')) OR 'pulmonary valve replacement'/exp OR 'pulmonary valve replacement') AND ('tricuspid valve'/exp OR 'tricuspid valve' OR 'tricuspid')

<u>Scopus</u> (n=929 on 29/12/2020)

(TITLE-ABS-KEY ("Pulmonary valve*" OR "Valves, Pulmonary" OR "Valve, Pulmonary"
) AND TITLE-ABS-KEY ("Replacement*" OR "Replantation*" OR "Surgical Replantation*" OR "Replantation, Surgical" OR "Reimplantation*") AND TITLE-ABS-KEY ("Tricuspid valve*" OR "Valve, Tricuspid" OR "Valves, Tricuspid" OR "Tricuspid"



Figure S1. Bias assessment of observational studies (ROBINS-1 tool).

Figure S2. Forest plots for TR grade (0-3). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; SD, standard deviation; TR, tricuspid regurgitation; TVI, tricuspid valve intervention.

A. Difference in pre-op TR grade (0-3) between TVI+PVR and PVR

		TVI+P	/R		PVR				Weight	Weight
Study	Total	Mean	SD Total	Mean	SD	Mean Difference	MD	95%-CI	(fixed)	(random)
Taejung Kim 2019	38	2.79 0.	95 29	1.45	0.56	i —=	1.34	[0.98; 1.70]	19.1%	25.1%
Lueck 2018	10	2.00 0.	77 18	1.94	0.62		0.06	[-0.50; 0.62]	8.2%	20.3%
Cramer 2015	18	2.70 0.	50 18	2.20	0.40		0.50	[0.20; 0.80]	29.0%	26.7%
Kogon 2015	16	2.63 0.	43 19	2.08	0.26	-	0.55	[0.31; 0.79]	43.7%	27.9%
Fixed effect model Random effects model	82		84			*	0.65	[0.49; 0.81]	100.0%	100.0%
Heterogeneity: $l^2 = 85\%$, p Test for overall effect (fixed Test for overall effect (rand	< 0.001 d effect): dom effe	z = 7.95 cts): t ₃ =	(p < 0.00 2.47 (p =	l) 0.090)		i -1 -0.5 0 0.5 1 1.5	0.04	[-0.10, 1.40]		100.070

B. Difference in post-op TR grade (0-3) between TVI+PVR and PVR

		TVI	PVR			PVR				Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD	Mean Difference	MD	95%-CI	(fixed)	(random)
Taejung Kim 2019	38	1.42	0.63	29	1.28	0.45	-+i= c	0.14	[-0.12; 0.40]	49.4%	49.4%
Lueck 2018	10	1.60	0.49	18	1.72	0.56		0.12	[-0.52; 0.28]	20.8%	20.8%
Cramer 2015	18	0.94	0.90	18	0.71	0.70	(0.23	[-0.30; 0.76]	11.9%	11.9%
Kogon 2015	16	1.31	0.75	19	1.29	0.50	C	0.02	[-0.41; 0.45]	17.8%	17.8%
Fixed effect model	82			84			÷ (0.08	[-0.11; 0.26]	100.0%	
Random effects mode	1							0.08	[-0.14; 0.29]		100.0%
Heterogeneity: $I^2 = 0\%$, p	= 0.670								5		
Test for overall effect (fixe	d effect)	z = 0.	81 (p	= 0.417	5		-0.6 -0.4 -0.2 0 0.2 0.4 0.6				
Test for overall effect (ran	dom effe	ects): ta	= 1.1	3 (p = 1	0.342)						

C. Change from pre-op to post-op TR grade (0-3) in TVI+PVR

Study	TE	seTE	Mean Difference	MD	95%-CI	(fixed)	(random)
Deshaies 2020 (mild TR)	-0.40	0.0910	i i 🖬	-0.40	[-0.58; -0.22]	60.2%	16.2%
Deshaies 2020 (moderate TR	-1.45	0.1590	-)-	-1.45	[-1.76; -1.14]	19.7%	15.8%
Deshaies 2020 (severe TR)	-2.35	0.2910		-2.35	[-2.92; -1.78]	5.9%	14.7%
Taejung Kim 2019	-1.68	0.2690		-1.68	[-2.21: -1.15]	6.9%	14.9%
Lueck 2018	-0.56	0.4590		-0.56	[-1.46; 0.34]	2.4%	12.7%
Cramer 2015	-2.36	0.4450	<u> </u>	-2.36	[-3.23; -1.49]	2.5%	12.9%
Kogon 2015	-2.10	0.4520		-2.10	[-2.99; -1.21]	2.4%	12.8%
Fixed effect model			\$	-0.90	[-1.04; -0.77]	100.0%	-
Random effects model				-1.53	[-2.28; -0.79]		100.0%
Heterogeneity: $I^2 = 94\%$, $p < 0.0$	01			7			
Test for overall effect (fixed effect	t): z = -	12.81 (p	<30.00.12 -1 0 1 2	3			
Test for overall effect (random e	fects): t	a = -5.02	(p = 0.002)				

D. Change from pre-op to post-op TR grade (0-3) in PVR

Study	TE	seTE	Mean Difference	MD	95%-CI	Weight (fixed)	Weight (random)
Deshaies 2020 (mild TR)	-0.40	0.0260	.	-0.40	[-0.45; -0.35]	91.3%	21.7%
Deshaies 2020 (moderate TR)	-0.93	0.0970	*	-0.93	[-1.12; -0.74]	6.6%	20.9%
Deshaies 2020 (severe TR)	-2.89	1.4430		-2.89	[-5.72; -0.06]	0.0%	2.2%
Taejung Kim 2019	-0.33	0.2650	i-++	-0.33	[-0.85; 0.19]	0.9%	16.6%
Lueck 2018	-0.36	0.3360	÷++	-0.36	[-1.02; 0.30]	0.5%	14.6%
Cramer 2015	-2.56	0.4610		-2.56	[-3.46; -1.66]	0.3%	11.3%
Kogon 2015	-1.94	0.4010		-1.94	[-2.73; -1.15]	0.4%	12.8%
Fixed effect model			÷	-0.45	[-0.50; -0.40]	100.0%	-
Random effects model Heterogeneity: $l^2 = 91\%$, $n < 0.00$	1			-0.99	[-1.81; -0.16]		100.0%
Test for overall effect (fixed effect	t): z = -	17.99 (p	< 0.0.041) -2 0 2 4				
Test for overall effect (random eff	fects):	$t_{e} = -2.94$	(p = 0.026)				

E. Difference in change in TR grade (0-3) between TVI+PVR and PVR

		TVI	PVR			PVR				Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD	Mean Difference	MD	95%-CI	(fixed)	(random)
Deshaies 2020 (mild TR)	19	-0.32	0.80	235	-0.25	0.61	<u></u>	-0.07	[-0.44; 0.30]	10.4%	14.6%
Deshaies 2020 (moderate TR)	83	-1.07	0.74	92	-0.71	0.76		-0.36	[-0.58; -0.14]	28.3%	17.9%
Deshaies 2020 (severe TR)	65	-1.49	0.64	4	-1.25	0.43		-0.24	[-0.69; 0.21]	6.9%	12.7%
Taejung Kim 2019	38	-1.37	0.95	29	-0.17	0.68	— —	-1.20	[-1.59; -0.81]	9.2%	14.1%
Lueck 2018	10	-0.40	0.29	18	-0.22	0.20		-0.18	[-0.38; 0.02]	34.8%	18.3%
Cramer 2015	18	-1.76	0.96	18	-1.49	0.74		-0.27	[-0.83; 0.29]	4.4%	10.5%
Kogon 2015	16	-1.32	0.87	19	-0.79	0.52		-0.53	[-1.02; -0.04]	5.9%	12.0%
Fixed effect model	249			415				-0.34	[-0.46; -0.22]	100.0%	
Random effects model							-	-0.40	[-0.75; -0.05]		100.0%
Heterogeneity: $I^2 = 75\%$, $p < 0.00$	01										
Test for overall effect (fixed effect): z = -	5.66 (p	< 0.00	1)			1.5 -1 -0.5 0 0.5 1	1.5			
Test for overall effect (random eff	ects): I	e = -2.7	'9 (p =	0.031)							

Figure S3. Forest plots for PR grade (0-3). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PR, pulmonary regurgitation; PVR, pulmonary valve replacement; SD, standard deviation; TVI, tricuspid valve intervention.

A. Difference in pre-op PR grade (0-3) between TVI+PVR and PVR

		TVI	PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence		MD	95%-CI	(fixed)	(random)
Cramer 2015	18	2.90	0.31	18	3.00	0.10		*		-0		-0.10	[-0.25; 0.05]	16.3%	26.3%
Krogon 2015	16	3.00	0.10	19	3.00	0.10		-		_		0.00	[-0.07; 0.07]	83.7%	73.7%
Fixed effect model	34			37				-	#			-0.02	[-0.08; 0.04]	100.0%	-
Random effects model Heterogeneity: $I^2 = 30\%$, p	= 0.23	4					-	_	T	T	-	-0.03	[-0.59; 0.53]	-	100.0%
Test for overall effect (fixed Test for overall effect (rand	d effect)	z = -0 ects): t_1	.53 (p = -0.6	= 0.59 50 (p =	9) 0.657)		-0.2	-0.1	0	0.1	0.2				

B. Difference in post-op PR grade (0-3) between TVI+PVR and PVR

		TVI	PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence		MD	95%-CI	(fixed)	(random)
Cramer 2015	18	0.50	0.50	18	0.50	0.50	-		-		-	0.00	[-0.33; 0.33]	65.9%	65.9%
Kogon 2015	16	0.37	0.47	19	0.41	0.87			-		-	-0.04	[-0.49; 0.41]	34.1%	34.1%
Fixed effect model	34			37					4			-0.01	[-0.28; 0.25]	100.0%	
Random effects model									-	-		-0.01	[-0.25; 0.23]		100.0%
Heterogeneity: $I^2 = 0\%$, $p =$	0.889							1	1	1	1		A		
Test for overall effect (fixed	effect)	: z = -0	10 (p	= 0.92	0)		-0.4	-0.2	0	0.2	0.4				
Test for overall effect (rand	om effe	ects): t1	= -0.7	72 (p =	0.603)										

C. Change from pre-op to post-op PR grade (0-3) in TVI+PVR

		Po	stop		F	reop	6							Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD	1	Mean	Diffe	rence		MD	95%-CI	(fixed)	(random)
Cramer 2015	18	0.50	0.50	18	2.90	0.31	 11		T			-2.40	[-2.67; -2.13]	42.9%	45.5%
Kogon 2015	16	0.37	0.47	16	3.00	0.10	- -					-2.63	[-2.87; -2.39]	57.1%	54.5%
Fixed effect model	34			34			\$					-2.53	[-2.71; -2.35]	100.0%	
Random effects model												-2.53	[-3.98; -1.07]		100.0%
Heterogeneity: $I^2 = 36\%$, p	= 0.21	0					Г	1	1	1			5 C D		
Test for overall effect (fixed	effect)	z = -2	7.88 (0.0 > 0	01)		-2	-1	0	1	2				
Test for overall effect (rand	lom effe	ects): t1	= -22	.05 (p :	= 0.029)									

D. Change from pre-op to post-op PR grade (0-3) in PVR

		Po	stop		F	reop									Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence	e	MD	98	5%-CI	(fixed)	(random)
Cramer 2015	18	0.50	0.50	18	3.00	0.10	÷		T			-2.50	[-2.74;	-2.26]	73.6%	73.6%
Kogon 2015	19	0.41	0.87	19	3.00	0.10	+					-2.59	[-2.98;	-2.20]	26.4%	26.4%
Fixed effect model	37			37			\$					-2.52	[-2.73;	-2.32]	100.0%	
Random effects mode	el						\diamond				_	-2.52	[-3.03;	-2.02]		100.0%
Heterogeneity: $I^2 = 0\%$, p	= 0.701							1		1				-		
Test for overall effect (fixe	ed effect	: z = -24	4.47 ()	p < 0.0	01)		-2	-1	0	1	2					
Test for overall effect (ran	ndom eff	ects): t1	= -63	.65 (p	= 0.010)										

E. Difference in change in PR grade (0-3) between TVI+PVR and PVR

		TVI+	PVR		3	PVR				Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD	Mean Difference	MD	95%-CI	(fixed)	(random)
Cramer 2015	18	-2.40	0.14	18	-2.50	0.12		0.10	[0.02: 0.18]	61.8%	52.9%
Krogon 2015	16	-2.63	0.12	19	-2.59	0.20		-0.04	[-0.15; 0.07]	38.2%	47.1%
Fixed effect model	34			37				0.05	[-0.02; 0.11]	100.0%	-
Random effects mode Heterogeneity: $I^2 = 75\%$, I	0 = 0.04	5	_	_				0.03	[-0.85; 0.92]		100.0%
Test for overall effect (fixe	d effect)	z = 1.3	37 (p	= 0.172)		-0.15 -0.05 0 0.05 0.1 0.15				
Test for overall effect (ran	dom effe	ects): t1	= 0.4	9 (p = 1	0.711)						

Figure S4. Forest plots for TV annulus (mm). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; SD, standard deviation; TV, tricuspid valve; TVI, tricuspid valve intervention.

A. Difference in pre-op TV annulus (mm) between TVI+PVR and PVR

Study	TVI+PV Total Mean S	R PVR D Total Mean SD	Mean Difference	Weight Weig MD 95%-Cl (fixed) (rando	ght m)
Taejung Kim 2019 Cramer 2015	38 21.30 4.8 18 31.10 2.0	0 29 21.10 6.30 0 18 29.50 4.00		0.20 [-2.55; 2.95] 36.0% 36. - 1.60 [-0.47; 3.67] 64.0% 64.	0% 0%
Fixed effect model Random effects model	56	47		1.10 [-0.56; 2.75] 100.0% - 1.10 [-7.44; 9.63] - 100.0)%
Test for overall effect (fixed Test for overall effect (rand	d effect): $z = 1.30$ (dom effects): $t_1 = 1$	o = 0.194) 63 (p = 0.350)	-3 -2 -1 0 1 2 3		

B. Difference in post-op TV annulus (mm) between TVI+PVR and PVR

	TVI+PV	R PVF				Weight Weight
Study	Total Mean S	D Total Mean SE	Mean Difference	MD	95%-CI	(fixed) (random)
Taejung Kim 2019	38 14.40 3.5	0 29 17.50 4.60		-3.10	[-5.11; -1.09]	40.7% 48.3%
Cramer 2015	18 24.90 2.0	0 18 24.90 3.00		0.00	[-1.67; 1.67]	59.3% 51.7%
Fixed effect model	56	47		-1.26	[-2.54; 0.02]	100.0%
Random effects mode				-1.60	[-21.18; 18.19]	100.0%
Heterogeneity: $I^2 = 82\%$, μ	p = 0.020			1		
Test for overall effect (fixe	d effect): z = -1.93 (p = 0.054)	-4 -2 0 2	4		
Test for overall effect (ran	dom effects): $t_1 = -0$.97 (p = 0.511)				

C. Change from pre-op to post-op TV annulus (mm) in TVI+PVR

	Postop	Preop		Weight Weight
Study	Total Mean SD T	fotal Mean SD	Mean Difference	MD 95%-CI (fixed) (random)
Taejung Kim 2019 Cramer 2015	38 14.40 3.50 18 24.90 2.00	38 21.30 4.80 18 31.10 2.00	*	-6.90[-8.79; -5.01]32.4%32.4%-6.20[-7.51; -4.89]67.6%67.6%
Fixed effect model Random effects model Heterogeneity: $I^2 = 0\%$, $p =$ Test for overall effect (fixed Test for overall effect (rand	56 = 0.550 d effect): <i>z</i> = -11.72 (<i>p</i> + lom effects): <i>t</i> ₁ = -19.62	56 < 0.001) 2 (p = 0.032)	-5 0 5	-6.43 [-7.50; -5.35] 100.0% -6.43 [-10.59; -2.27] 100.0%

D. Change from pre-op to post-op TV annulus (mm) in PVR

	Postop	Preop			Weight Weight
Study	Total Mean SD	Total Mean SD	Mean Difference	MD 95%	CI (fixed) (random)
Taejung Kim 2019 Cramer 2015	29 17.50 4.60 18 24.90 3.00	29 21.10 6.30 18 29.50 4.00		-3.60 [-6.44; -0. -4.60 [-6.91; -2.	76] 39.8% 39.8% 29] 60.2% 60.2%
Fixed effect model Random effects mode Heterogeneity: $l^2 = 0\%$, p Test for overall effect (fixe Test for overall effect (ran	47 = 0.592 = 0.60 (p dom effects): $z = -4.60$ (p	47 < 0.001) 8 (p = 0.074)	-6 -4 -2 0 2 4 6	-4.20 [-5.99; -2. -4.20 [-10.42; 2.	11] 100.0% 12] 100.0%

E. Difference in change in TV annulus (mm) between TVI+PVR and PVR

Study	TVI+PVR Total Mean SD	PVR Total Mean SD	Mean Difference	Weight Weight MD 95%-Cl (fixed) (random)
Taejung Kim 2019 Cramer 2015 Fixed effect model	38 -6.90 0.96 18 -6.20 0.67 56	29 -3.60 1.45 - 18 -4.60 1.18 47	*	-3.30 [-3.91; -2.69] 51.3% 50.1% -1.60 [-2.23; -0.97] 48.7% 49.9% -2.47 [-2.91; -2.03] 100.0%
Random effects model Heterogeneity: $l^2 = 93\%$, p Test for overall effect (fixed Test for overall effect (rand	< 0.001 d effect): $z = -11.09$ (p_{1} dom effects): $t_{1} = -2.8$	o < 0.001) 8 (p = 0.212)	-2 0 2	

Figure S5. Forest plots for RV dilatation (0-3). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; RV, right ventricular; SD, standard deviation; TVI, tricuspid valve intervention.

A. Difference in pre-op RV dilatation (0-3) between TVI+PVR and PVR

		TVI+	PVR			PVR						Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD	Mean	n Differ	rence	MD	95%-CI	(fixed)	(random)
Lueck 2018	10	1.70	1.00	18	1.50	0.96		-11+	e	- 0.20	[-0.56; 0.96]	29.3%	29.3%
Kogon 2015	16	2.27	0.86	19	2.24	0.56				0.03	[-0.46; 0.52]	70.7%	70.7%
Fixed effect model	26			37			-	4		0.08	[-0.33; 0.49]	100.0%	
Random effects mode	1					-		<u> </u>	_	- 0.08	[-0.90; 1.06]		100.0%
Heterogeneity: $I^2 = 0\%$, p	= 0.713							1					
Test for overall effect (fixe	d effect)	: z = 0.:	38 (p	= 0.705)		-0.5	0	0.5				
Test for overall effect (ran	dom effe	ects): t1	= 1.0	3 (p = 1	0.490)								

B. Difference in post-op RV dilatation (0-3) between TVI+PVR and PVR

		TVI	PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	n Diffe	rence		MD	95%-CI	(fixed)	(random)
Lueck 2018	10	2.11	0.99	18	1.78	0.92		_	-1-	100	0	.33	[-0.42; 1.08]	33.3%	33.3%
Kogon 2015	16	1.70	0.77	19	1.53	0.82		-	- 18	-	0	17	[-0.36; 0.70]	66.7%	66.7%
Fixed effect model	26			37					-	-	0.	.22	[-0.21; 0.65]	100.0%	
Random effects mode	el								-		-0.	22	[-0.73; 1.18]		100.0%
Heterogeneity: $I^2 = 0\%$, p	= 0.732							1	1	I.					
Test for overall effect (fixe	ed effect)): z = 1.	02 (p	= 0.310))		-1	-0.5	0	0.5	1				
Test for overall effect (rar	ndom effe	ects): t.	= 2.9	6(p = 1)	0.207)										

C. Change from pre-op to post-op RV dilatation (0-3) in TVI+PVR

		Po	stop		P	reop								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence		MD	95%-CI	(fixed)	(random)
Lueck 2018	10	2.11	0.99	10	1.70	1.00		\rightarrow	-	10		- 0.41	[-0.46; 1.28]	29.6%	44.0%
Kogon 2015	16	1.70	0.77	16	2.27	0.86	-					-0.57	[-1.14; 0.00]	70.4%	56.0%
Fixed effect model	26			26					4	-		-0.28	[-0.75; 0.19]	100.0%	
Random effects mod	ti		_		_		_					-0.14	[-6.32; 6.04]		100.0%
Heterogeneity: 12 = 71%,	p = 0.06	5							1				ecours income		
Test for overall effect (fix	ed effect)	z = -1	.16 (p	= 0.24	8)		-1	-0.5	0	0.5	1				
Test for overall effect (ra	ndom effe	ects): t	= -0.2	28 (p =	0.823)										

D. Change from pre-op to post-op RV dilatation (0-3) in PVR

		Po	stop		P	reop								Weight	Weigh
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	erence		MD	95%-CI	(fixed)	(random
Lueck 2018	18	1.78	0.92	18	1.50	0.96		14	-		_	0.28	[-0.33: 0.89]	34.6%	47.6%
Kogon 2015	19	1.53	0.82	19	2.24	0.56						-0.71	[-1.16; -0.26]	65.4%	52.4%
Fixed effect model	37			37					-			-0.37	[-0.73; -0.01]	100.0%	
Heterogeneity: $I^2 = 85\%$,	p = 0.01	1	_				-		Ť	Т		-0.24	[-6.52; 6.04]		100.0%
Test for overall effect (fixe	ed effect)	: z = -2	.00 (p	= 0.04	6)		-1	-0.5	0	0.5	1				
Test for overall effect (rar	ndom effe	ects): t1	= -0.4	18 (p =	0.714)										

E. Difference in change in RV dilatation (0-3) between TVI+PVR and PVR



Figure S6. Forest plots for RV dysfunction (0-3). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; RV, right ventricular; SD, standard deviation; TVI, tricuspid valve intervention.

A. Difference in pre-op RV dysfunction (0-3) between TVI+PVR and PVR

		TVI+	PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence		MD	95%-CI	(fixed)	(random)
Lueck 2018	10	1.80	0.87	18	1.56	0.96		_	-1-	- 1		0.24	[-0.46; 0.94]	45.0%	45.0%
Kogon 2015	16	1.93	1.04	19	1.42	0.83			+	1		- 0.51	[-0.12; 1.14]	55.0%	55.0%
Fixed effect model	26			37					+	4	-	0.39	[-0.08; 0.86]	100.0%	
Random effects mode	el					-	_				_	0.39	[-1.32, 2.10]		100.0%
Heterogeneity: $I^2 = 0\%$, p	= 0.574								1	1					
Test for overall effect (fixe	ed effect)	z = 1.	63 (p	= 0.104	()		-1	-0.5	0	0.5	1				
Test for overall effect (rar	ndom effe	ects): t1	= 2.8	9 (p =)	0.212)										

B. Difference in post-op RV dysfunction (0-3) between TVI+PVR and PVR

		TVI	PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence	•	MD	95%-CI	(fixed)	(random)
Lueck 2018	10	2.44	1.07	18	2.06	1.03		-	+	- 18		0.38	[-0.44; 1.20]	32.6%	32.6%
Kogon 2015	16	1.90	0.83	19	1.03	0.88				-		- 0.87	[0.30; 1.44]	67.4%	67.4%
Fixed effect model	26			37						-	-	0.71	[0.24; 1.18]	100.0%	-
Random effects mode	el				_	-	_	_	-		_	0.71	[-2.21; 3.63]		100.0%
Heterogeneity: $I^2 = 0\%$, p	= 0.334							1	1	1			Contract Sectors (Sectors)		
Test for overall effect (fixe	ed effect)	z = 2.	99 (p	= 0.003	3)		-1	-0.5	0	0.5	1				
Test for overall effect (ran	ndom effe	ects): t.	= 3.0	9(p = 1)	0.199)										

C. Change from pre-op to post-op RV dysfunction (0-3) in TVI+PVR

		Po	stop		P	reop								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	erence	•	MD	95%-CI	(fixed)	(random)
Lueck 2018	10	2.44	1.07	10	1.80	0.87			+	<u>} </u>		- 0.64	[-0.21; 1.49]	36.8%	41.1%
Kogon 2015	16	1.90	0.83	16	1.93	1.04			1			-0.03	[-0.68; 0.62]	63.2%	58.9%
Fixed effect model	26			26				0	-	-		0.22	[-0.30; 0.73]	100.0%	-
Random effects model			-			_					-	0.25	[-3.94; 4.43]		100.0%
Heterogeneity: $I^2 = 33\%$, p	= 0.22	2						1	1	1					
Test for overall effect (fixed	effect)	: z = 0.	82 (p	= 0.413	()		-1	-0.5	0	0.5	1				
Test for overall effect (rand	lom effe	ects): t	= 0.7	5 (p = (0.592)										

D. Change from pre-op to post-op RV dysfunction (0-3) in PVR

Study	Total	Po Mean	SD	Total	P Mean	sD		Mean	Diffe	ence		MD	95%-CI	Weight (fixed)	Weight (random)
Lueck 2018 Kogon 2015	18 19	2.06 1.03	1.03 0.88	18 19	1.56 1.42	0.96 0.83	_			- 10	-	0.50	[-0.15; 1.15] [-0.93; 0.15]	41.2% 58.8%	47.9% 52.1%
Fixed effect model Random effects mode	37			37			_	_	÷	-	_	-0.02	[-0.44; 0.39] [-5.61; 5.69]	100.0%	 100.0%
Heterogeneity: $I^2 = 76\%$, Test for overall effect (fixe Test for overall effect (ran	p = 0.040 ed effect)	0 c z = -0 ects): t	.11 (p = 0.0	= 0.91 B (p = (1) 0.948)		-1	-0.5	0	0.5	1				

E. Difference in change in RV dysfunction (0-3) between TVI+PVR and PVR

		TVI+	PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	erence	•	MD	95%-CI	(fixed)	(random)
Lueck 2018	10	0.64	0.44	18	0.50	0.33		-	+		<u> </u>	0.14	[-0.17; 0.45]	30.4%	35.4%
Kogon 2015	16	-0.03	0.33	19	-0.39	0.28				-		- 0.36	[0.15; 0.57]	69.6%	64.6%
Fixed effect model	26			37						V	-	0.29	[0.12; 0.46]	100.0%	
Random effects model					_		_	_	-	_	_	0.28	[-1.05; 1.62]		- 100.0%
Heterogeneity: $I^2 = 25\%$, p	= 0.24	7								1					
Test for overall effect (fixed	effect)	z = 3.	35 (p ·	< 0.001)		-0.4	-0.2	0	0.2	0.4				
Test for overall effect (rand	lom effe	ects): t	= 2.6	8 (p = (0.227)										

Figure S7. Forest plots for RVEDV (mL). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; RVEDV, right ventricular end-diastolic volume; SD, standard deviation; TVI, tricuspid valve intervention.

A. Difference in pre-op RVEDV (mL) between TVI+PVR and PVR

		TV	I+PVR			PVR				Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD	Mean Difference	MD	95%-CI	(fixed)	(random)
Roubertie 2017 (moderate TR group)	8	166.40	33.00	16	160.20	19.00	<u> </u>	6.20	[-18.49; 30.89]	42.6%	42.6%
Roubertie 2017 (severe TR group)	8	168.00	15.00	9	179.00	35.00		-11.00	[-36.12; 14.12]	41.1%	41.1%
Cramer 2015	18	175.40	62.00	18	157.30	60.00		- 18.10	[-21.76; 57.96]	16.3%	16.3%
Fixed effect model	34			43			-	1.07	[-15.04; 17.18]	100.0%	-
Random effects model								1.07	[-32.04; 34.18]		100.0%
Heterogeneity: $I^2 = 0\%$, $p = 0.416$											
Test for overall effect (fixed effect): z = 0	.13 (p	= 0.896)					-40 -20 0 20 40				
Test for overall effect (random effects):	2 = 0.1	4(p = 0.	902)								

B. Difference in post-op RVEDV (mL) between TVI+PVR and PVR

		TV	+PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence		MD	95%-C	I (fixed)	(random)
Roubertie 2017 (moderate TR group)	8	98.00	45.00	16	86.00	32.00		-	-11-			12.00	[-22.90; 46.90] 10.9%	10.9%
Roubertie 2017 (severe TR group)	8	80.00	9.00	9	86.80	18.00		-	- 10			-6.80	[-20.11; 6.51	74.6%	74.6%
Cramer 2015	18	106.90	42.00	18	100.70	50.00		<u>.</u>				6.20	[-23.97; 36.37	14.5%	14.5%
Fixed effect model	34			43					#			-2.87	[-14.37; 8.63	100.0%	100.0%
Heterogeneity: $l^2 = 0\%$, $n = 0.502$								1	-	1		2.01	1-20.00, 10.00		100.070
Test for overall effect (fixed effect): $z = -$	0.49 (p	= 0.625					-40	-20	0	20	40				
Test for overall effect (random effects):	2 = -0.5	59 (p = 0	615)				6.50								

C. Change from pre-op to post-op RVEDV (mL) in TVI+PVR

Study	Po Total Mean	SD Total	Preop Mean SD	Mean Difference	MD	95%-CI	Weight (fixed)	Weight (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 98.00 4 8 80.00 18 106.90 4	15.00 8 9.00 8 12.00 18	166.40 33.00 168.00 15.00 175.40 62.00	*	-68.40 -88.00 -68.50	[-107.07; -29.73] [-100.12; -75.88] [-103.10; -33.90]	8.0% 81.9% 10.1%	8.0% 81.9% 10.1%
Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $p = 0.405$ Test for overall effect (fixed effect): $z = -$ Test for overall effect (random effects): t	34 15.09 (p < 0.001) t ₂ = -15.87 (p = 0.	34 004)		.100 -50 0 50 1	-84.46 -84.46 00	[-95.43; -73.49] [-107.36; -61.57]	100.0%	100.0%

D. Change from pre-op to post-op RVEDV (mL) in PVR

Study	Pos Total Mean	D Total Mean	Preop SD Mean Difference	MD	95%-CI	Weight Weight (fixed) (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	16 86.00 32 9 86.80 18 18 100.70 50	00 16 160.20 00 9 179.00 00 18 157.30	0 19.00	-74.20 -92.20 [- -56.60	[-92.44; -55.96] -117.91; -66.49] [-92.68; -20.52]	56.9%50.3%28.6%31.5%14.5%18.2%
Fixed effect model Random effects model Heterogeneity: $I^2 = 25\%$, $p = 0.264$ Test for overall effect (fixed effect): $z = -$ Test for overall effect (random effects): 1	43 10.94 (p < 0.001) t ₂ = -8.78 (p = 0.01)	43	-100 -50 0 50	-76.79 [-76.66 [- 100	[-90.54; <mark>-63.04]</mark> 114.22; -39.11]	100.0% 100.0%

E. Difference in change in RVEDV (mL) between TVI+PVR and PVR

		TV	+PVR			PVR								Weight	Weight
Study	Total	Mean	SD	Total	Mean	SD		Mean	Diffe	rence		MD	95%-CI	(fixed)	(random)
Roubertie 2017 (moderate TR group)	8	-68.40	19.73	16	-74.20	9.30		-				5.80	[-8.61; 20.21]	21.0%	28.1%
Roubertie 2017 (severe TR group)	8	-88.00	6.18	9	-92.20	13.10						4.20	[-5.37; 13.77]	47.6%	38.4%
Cramer 2015	18	-68.50	17.65	18	-56.60	18.40 -			-			-11.90	[-23.68; -0.12]	31.4%	33.4%
Fixed effect model	34			43				-	4	-		-0.52	[-7.12; 6.08]	100.0%	
Random effects model						_			-	_	-	-0.74	[-24.90; 23.43]		100.0%
Heterogeneity: $I^2 = 62\%$, $p = 0.072$							_	1	1	1	1				
Test for overall effect (fixed effect): z = -	0.16 (p	= 0.877)				-20	-10	0	10	20				
Test for overall effect (random effects):	2 = -0.	13(p = 0)	0.908)												

Figure S8. Forest plots for RVESV (mL). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; RVESV, right ventricular end-systolic volume; SD, standard deviation; TVI, tricuspid valve intervention.

A. Difference in pre-op RVESV (mL) between TVI+PVR and PVR

Study	TVI+PVR Total Mean SD 1	PVR Total Mean SD	Mean Difference	MD 9	Weight Weight 5%-CI (fixed) (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 80.50 28.00 8 75.40 20.00 18 79.20 27.00	16 71.30 17.00 9 86.40 26.00 - 18 73.20 45.00		9.20 [-11.92; -11.00 [-32.92; 6.00 [-18.24;	30.32] 37.2% 37.2% 10.92] 34.5% 34.5% 30.24] 28.2% 28.2%
Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $p = 0.388$ Test for overall effect (fixed effect): $z = 1$ Test for overall effect (random effects):	34 0.20 (p = 0.841) t ₂ = 0.21 (p = 0.855)	43	30 -20 -10 0 10 20 30	1.32 [-11.56; 1.32 [-26.18;	14.20] 100.0% 28.82] 100.0%

B. Difference in post-op RVESV (mL) between TVI+PVR and PVR

	TVI+PVR	PVR				Weight	Weight
Study	Total Mean SD	Total Mean SD	Mean Difference	MD	95%-CI	(fixed) (ra	ndom)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 58.00 29.00 8 47.70 14.00 18 47.90 24.00	16 49.00 22.00 9 53.80 17.00 18 45.80 29.00		- 9.00 -6.10 2.10	[-13.80; 31.80] [-20.85; 8.65] [-15.29; 19.49]	19.6% 46.8% 33.6%	19.6% 46.8% 33.6%
Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $p = 0.520$ Test for overall effect (fixed effect): $z = -C$	34 0.08 ($p = 0.940$)	43 ∽ -30	-20 -10 0 10 20	-0.39 -0.39 30	[-10.47; 9.70] [-18.28; 17.51]	100.0% 	 100.0%

C. Change from pre-op to post-op RVESV (mL) in TVI+PVR

Study	Postop Total Mean SD 1	Preop Total Mean SD	Mean Difference	MD 95%-C	Weight Weight I (fixed) (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 58.00 29.00 8 47.70 14.00 18 47.90 24.00	8 80.50 28.00 8 75.40 20.00 18 79.20 27.00		-22.50 [-50.43; 5.43 -27.70 [-44.62; -10.78 -31.30 [-47.99; -14.61] 15.3% 15.3%] 41.8% 41.8%] 42.9% 42.9%
Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $p = 0.863$ Test for overall effect (fixed effect): $z = -1$ Test for overall effect (random effects): l	34 5.10 (p < 0.001) t ₂ = -13.30 (p = 0.006)	34	-40 -20 0 20 40	-28.45 [-39.38; -17.52 -28.45 [-37.65; -19.25	100.0% 100.0%

D. Change from pre-op to post-op RVESV (mL) in PVR

Study	Postop Total Mean SD	Preop Total Mean SD	Mean Difference	MD 95%-CI	Weight Weight (fixed) (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	16 49.00 22.00 9 53.80 17.00 18 45.80 29.00	16 71.30 17.00 9 86.40 26.00 18 73.20 45.00		-22.30 [-35.92; -8.68] -32.60 [-52.90; -12.30] -27.40 [-52.13; -2.67]	57.0% 57.0% 25.7% 25.7% 17.3% 17.3%
Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $p = 0.704$ Test for overall effect (fixed effect): $z = -$ Test for overall effect (random effects):	43 4.92 (p < 0.001) t ₂ = -8.31 (p = 0.014)	43	-40 -20 0 20 40	-25.83 [-36.11; -15.54] 1 -25.83 [-39.20; -12.46]	100.0% 100.0%

E. Difference in change in RVESV (mL) between TVI+PVR and PVR

Study	TVI+PVR Total Mean SD	PVR Total Mean SD	Mean Difference	MD 95%	Weight Weight -CI (fixed) (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 -22.50 14.25 8 -27.70 8.63 18 -31.30 8.51	16 -22.30 6.95 9 -32.60 10.35 18 -27.40 12.62		-0.20 [-10.65; 10 - 4.90 [-4.13; 13 -3.90 [-10.93; 3	25] 22.0% 23.3% 93] 29.5% 30.3% 13] 48.5% 46.4%
Fixed effect model Random effects model Heterogeneity: $i^2 = 12\%$, $p = 0.320$ Test for overall effect (fixed effect): $z = -$ Test for overall effect (random effects):	34 $0.20 \ (p = 0.843)$ $t_2 = -0.14 \ (p = 0.901)$	43	-10 -5 0 5 10	-0.49 [-5.39; 4. -0.37 [-11.84; 11.	41] 100.0% 09] 100.0%

Figure S9. Forest plots for RVEF (%). Pooled mean difference and conclusions plot for all comparisons. CI, confidence interval; MD, mean difference; PVR, pulmonary valve replacement; RVEF, right ventricular ejection fraction; SD, standard deviation; TVI, tricuspid valve intervention.

A. Difference in pre-op RVEF (%) between TVI+PVR and PVR

Study	TVI+PV Total Mean S	R D Total Mean	PVR SD	Mean Difference	MD	95%-CI	Weight (fixed) (Weight (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 38.10 8. 8 42.50 5. 18 561.00 13.	10 16 41.50 10 9 38.30 10 18 523.00	7.00 5.00 11.00		-3.40 4.20 	[-9.92; 3.12] [-0.56; 8.96] [30.13; 45.87]	28.1% 52.6% 19.3%	33.3% 33.8% 32.9%
Fixed effect model Random effects model Heterogeneity: $l^2 = 97\%$, $p < 0.001$ Test for overall effect (fixed effect): $z = 4$ Test for overall effect (random effects):	34 4.87 (p < 0.001) t ₂ = 1.01 (p = 0.420)	43		-40 -20 0 20	8.58 12.77 40	[5.13; 12.04] -[-41.75; 67.30]	100.0% 	 100.0%

B. Difference in post-op RVEF (%) between TVI+PVR and PVR

0 h h.	T-total Marca	VI+PVR		PVR	New Difference		05% 01	Weight	Weight
Study	Total Mea	n 50 10	tai mean	50	Mean Difference	MD	95%-CI	(fixed)	(random)
Roubertie 2017 (moderate TR group)	8 43.4	0 11.00	16 44.30	7.00		-0.90	[-9.26; 7.46]	9.6%	30.7%
Roubertie 2017 (severe TR group)	8 46.1	0 2.00	9 43.30	4.00	Hand I have a second se	2.80	[-0.16; 5.76]	76.3%	36.6%
Cramer 2015	18 578.0	0 10.00	18 559.00	11.00		- 19.00	[12.13; 25.87]	14.2%	32.7%
Fixed effect model	34		43		4	4.74	[2.16; 7.32]	100.0%	
Random effects model						6.9 6	[-18.98; 32.89]		100.0%
Heterogeneity: $I^2 = 90\%$, $p < 0.001$									
Test for overall effect (fixed effect): z = 3	.60 (p < 0.001)			-20 -10 0 10 20				
Test for overall effect (random effects): I	2 = 1.15 (p = 0	0.368)							

C. Change from pre-op to post-op RVEF (%) in TVI+PVR

Study	Total	Po Mean	ostop SD	Total	Mean	Preop SD		Mean	Differe	ence	MD	95%-CI	Weight (fixed) (Weight random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	8 8 18 5	43.40 46.10 578.00	11.00 2.00 10.00	8 8 18	38.10 42.50 561.00	8.00 5.00 13.00		-			5.30 3.60 17.00	[-4.13; 14.73] [-0.13; 7.33] [9.42; 24.58]	11.2% 71.5% 17.3%	28.2% 39.6% 32.1%
Fixed effect model Random effects model Heterogeneity. / ² = 79%, p = 0.008 Test for overall effect (fixed effect): z = 3 Test for overall effect (random effects): 1	34 .80 (p < 2 = 1.99	0.001) (p = 0.1	185)	34			-20	-10	0	10 20	6.11 8.38	[2.96; 9.27] [-9.77; 26.54]	100.0% 	 100.0%

D. Change from pre-op to post-op RVEF (%) in PVR

Study	Total M	Postop Mean SD	Total	Mean	Preop SD	Mean	n Difference	MD	95%-CI	Weight (fixed)	Weight (random)
Roubertie 2017 (moderate TR group) Roubertie 2017 (severe TR group) Cramer 2015	16 4 9 4 18 55	44.30 7.00 43.30 4.00 59.00 11.00	16 9 18	41.50 38.30 523.00	7.00 5.00 11.00		*	2.80 5.00 	[-2.05; 7.65] [0.82; 9.18] [28.81; 43.19]	35.7% 48.0% 16.3%	33.6% 33.8% 32.6%
Fixed effect model Random effects model Heterogeneity: $l^2 = 97\%$, $p < 0.001$ Test for overall effect (fixed effect): $z = E$ Test for overall effect (random effects):	43 6.26 (p < 0 1 ₂ = 1.35 (j	0.001) (p = 0.310)	43		г -4(0 -20	0 20	9.26 14:35 40	[6.36; 12.16] [-31.49; 60.19]	100.0% 	 100.0%

E. Difference in change in RVEF (%) between TVI+PVR and PVR



Figure S10. Forest plot for 30-day mortality. Pooled odds ratio and conclusions plot. CI,

confidence interval; OR, odds ratio; PVR, pulmonary valve replacement; TVI, tricuspid valve intervention.

Study	TVI Events	+PVR Total	Events	PVR Total	Odds Ratio	OR	95%-CI	Weight (fixed)	Weight (random)
Roubertie 2017	0	16	2	25		0.28	[0.01; 6.33]	33.2%	11.3%
Cramer 2015	0	18	0	18				0.0%	0.0%
Kogon 2015	0	16	0	19				0.0%	0.0%
Deshaies 2020	6	180	5	362	+	2.46	[0.74; 8.18]	55.6%	75.6%
Lueck 2018	1	10	1	18		1.89	[0.11; 33.89]	11.1%	13.1%
Fixed effect model		240		442		1.67	[0.62; 4.52]	100.0%	
Random effects model						1.86	[0.24; 14.61]		100.0%
Heterogeneity: $I^2 = 0\%$, p =	= 0.437								
Test for overall effect (fixed	d effect): z	= 1.02	(p = 0.30)9)	0.1 0.51 2 10				
Test for overall effect (rand	lom effect	s): t ₂ =	1.30 (p =	0.324)					