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Impact of Prophylactic Donor Heart Tricuspid Valve Annuloplasty in Long-term Clinical Outcomes of Heart Transplantation

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Background

- Incidence of Tricuspid Regurgitation (TR) after heart transplantation has been reported from 20% to 40%.[1-4]
- It has been well documented that TR after transplantation is associated with adverse clinical outcomes including right side heart failure, renal function impairment and even long-term mortality.[1,2]
- To address TR after transplantation, prophylactic tricuspid annuloplasty has been performed in some institutions. However, it is not clearly understood if prophylactic tricuspid valve annuloplasty (TVA) affects late outcomes or not.

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Methods

- Between January 2010 and August 2019, 308 patients underwent heart transplantation at University of Chicago Medicine.
- In the 308 patients, 292 patients who underwent concomitant prophylactic TVA with a DeVega procedure were included in this study.
- We divided the cohort into two groups: significant TR group (patients developed moderate or greater TR:N=22) and non-significant TR group (patients who had less than mild TR:N=270)
- We compared perioperative data and late outcomes. We also evaluated impact of significant TR on long-term survival using multivariable analyses

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Results -patients background-

	All (n=292)	Non-significant TR (n=270)	Significant TR (n=22)	p
Mean age (years)	53.6 ± 13.1	53.8 ± 13.1	50.8 ± 12.7	0.30
Male	226 (77.4%)	208 (77.4%)	18 (81.8%)	0.60
Height (cm)	174.6±9.8	174.6±10.0	175.0±8.3	0.88
Weight (kg)	86.4 ± 19.0	85.8 ± 19.0	93.6 ± 18.5	0.08
Hypertension	165 (57.7%)	146 (55.3%)	19 (86.4%)	<0.01
Dyslipidemia	107 (37.5%)	99 (37.6%)	8 (36.4%)	0.91
Diabetes mellitus	89 (31.1%)	84 (31.8%)	5 (22.7%)	0.36
IABP	136 (46.6%)	128 (47.4%)	8 (36.4%)	0.31
LVAD	75 (25.7%)	67 (24.8%)	8 (36.4%)	0.92
Nonischemic cardiomyopathy	193 (66.1%)	181 (67.0%)	12 (54.6%)	0.46
Previous cardiac surgery	151 (51.7%)	135 (50.0%)	16 (72.7%)	0.037
Creatinin (mg/dl)	1.41±0.9	1.41±0.9	1.32±0.5	0.68

Results -patients background-

	All (n=292)	Non-significant TR (n=270)	Significant TR (n=22)	p
LVDd (mm)	66.8±13.3	66.6±13.3	69.5±13.1	0.41
Ejection fraction (%)	23.9±10.5	23.9±10.7	24.2±7.3	0.91
CVP (mmHg)	9.6±6.0	9.6±6.1	9.0±5.1	0.62
Mean PAP (mmHg)	28.8±10.1	28.6±10.2	30.2±9.0	0.48
PAWP (mmHg)	18.9±8.5	18.8±8.6	19.5±7.6	0.74
PAPi	3.29±3.4	3.18±3.2	4.54±4.8	0.16
CVP/PAWP	0.53±0.3	0.54±0.3	0.45±0.2	0.18
CI (L/min/m^2)	2.39±0.6	2.41±0.7	2.18±0.6	0.12

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Results -operative data-

Variables	All (n=292)	Non-significant TR (n=270)	Significant TR (n=22)	p
Operative procedures				
Bicaval anastomosis	204 (70.0 %)	187 (69.3 %)	17 (77.3 %)	0.45
Ischemic time (min)	229.1±60.1	227.9±59.8	243.0±63.1	0.27
Cardiopulmonary bypass time (min)	195.1±57.5	195.1±57.8	194.2±55.5	0.94
Cross clamp time (min)	147.2±37.7	147.2±37.8	146.9±37.8	0.96
Implant time (min)	87.5±20.1	87.7±19.7	86.1±24.9	0.74
Reperfusion time (min)	31.7±17.1	31.6±16.6	33.2±23.0	0.68

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Results -Early clinical outcomes-

Variables	All (n=292)	Non-significant TR (n=270)	Significant TR (n=22)	P
In hospital mortality	9 (3.1%)	9 (3.3%)	0 (0%)	0.23
ECMO	19 (6.5%)	17 (6.3%)	2 (9.1%)	0.63
Hemodialysis	17 (5.8%)	14 (5.2%)	3 (13.6%)	0.16
Re-exploration for bleeding	31 (10.6%)	28 (10.4%)	3 (13.6%)	0.65
Stroke	9 (3.1%)	8 (3.0%)	1 (4.6%)	0.70
CVP (mmHg)	7.9±4.3	7.8±4.2	10.0±4.7	0.02
Mean PAP (mmHg)	24.1±6.9	23.9±6.9	26.9±5.8	0.03
PCWP (mmHg)	15.2±5.7	14.9±5.6	18.4±5.5	<0.01
PAPi	3.23±2.8	3.32±2.8	2.18±0.9	0.04
CVP/PAWP	0.52±0.2	0.51±0.2	0.57±0.2	0.20
CI (L/min/m^2)	3.0±0.3	3.0±0.6	2.8±0.5	0.19

Results -Late clinical outcomes-

Variables	All (n=283)	Non-significant TR (n=261)	Significant TR (n=22)	p
Hemodialysis	25 (8.8%)	16 (6.1%)	9 (40.9%)	<0.01
No. of biopsies in the first year	12.5±4.3	12.8±4.3	13.0±4.0	0.80
Rejection ≧ grade2	106 (36.3%)	92 (35.3%)	14 (63.6%)	<0.01
CVP (mmHg)	6.8±5.7	6.29±4.1	13.0±13.5	<0.01
Mean PAP (mmHg)	22.1±6.8	21.6±6.5	27.1±8.1	<0.01
PAWP (mmHg)	13.0±5.4	12.7±5.0	17.3±8.0	<0.01
PAPi	3.78±3.5	3.88±3.6	2.53±2.5	0.03
CVP/PAWP	0.54±0.7	0.52±0.7	0.67±0.5	0.03
CI (L/min/m^2)	3.06±0.6	3.10±0.6	2.57±0.7	<0.01

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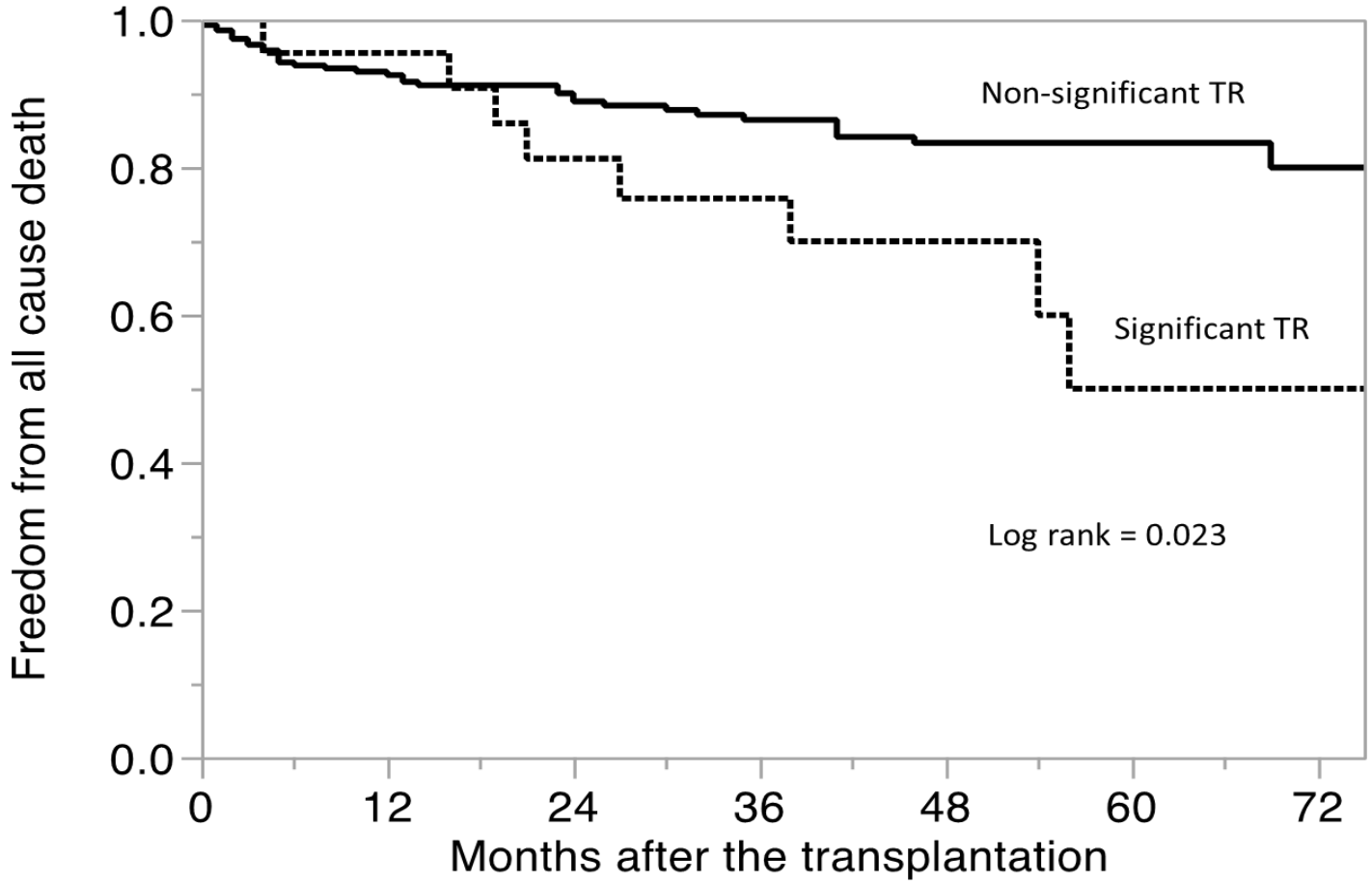
Results -Long term survival-



Non significant TR	270	203	164	124	94	66	44
Significant TR	22	21	17	14	12	4	4

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Results -Cox multivariable analysis for late death-

Risk factors	Hazard ratio	95% confidence interval	p
Significant TR	2.46	1.04 – 5.19	0.04
Age	1.01	0.98 – 1.04	0.58
Rejection ≧ grade2	0.56	0.28 – 1.06	0.08
Diabetes mellitus	1.28	0.67 – 2.38	0.44
Previous cardiac surgery	2.69	1.38 – 5.67	<0.01

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Conclusion

- Prophylactic donor heart tricuspid valve annuloplasty seemed to contribute to reducing the incidence of TR (7.5%).
- Postoperative significant TR negatively impacted the long-term survival compared to those who did not develop significant TR
- Significant TR was an independent predictor of long-term mortality.

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