AATS ANNUAL MEETING 93RD 2013

AMERICAN ASSOCIATION FOR THORACIC SURGERY
We Model Excellence

Does Limited Right Ventriculotomy Prevent Right Ventricular Dilation and Dysfunction in Patients Who Undergo Transannular Repair of Tetralogy of Fallot?

Matched Comparison of MRI Parameters With Conventional Right Ventriculotomy Long-Term After Repair

Cheul Lee[1], Chang-Ha Lee[1], Jae Gun Kwak[1], Seong-Ho Kim[2], Woo-Sup Shim[2], Sang Yun Lee[2], Jae Suk Baek[2], So-Ick Jang[2], and Yang Min Kim[3]

[1]Department of Thoracic and Cardiovascular Surgery, [2]Pediatric Cardiology, and [3]Radiology, Sejong General Hospital, Bucheon, Republic of Korea

Disclosure

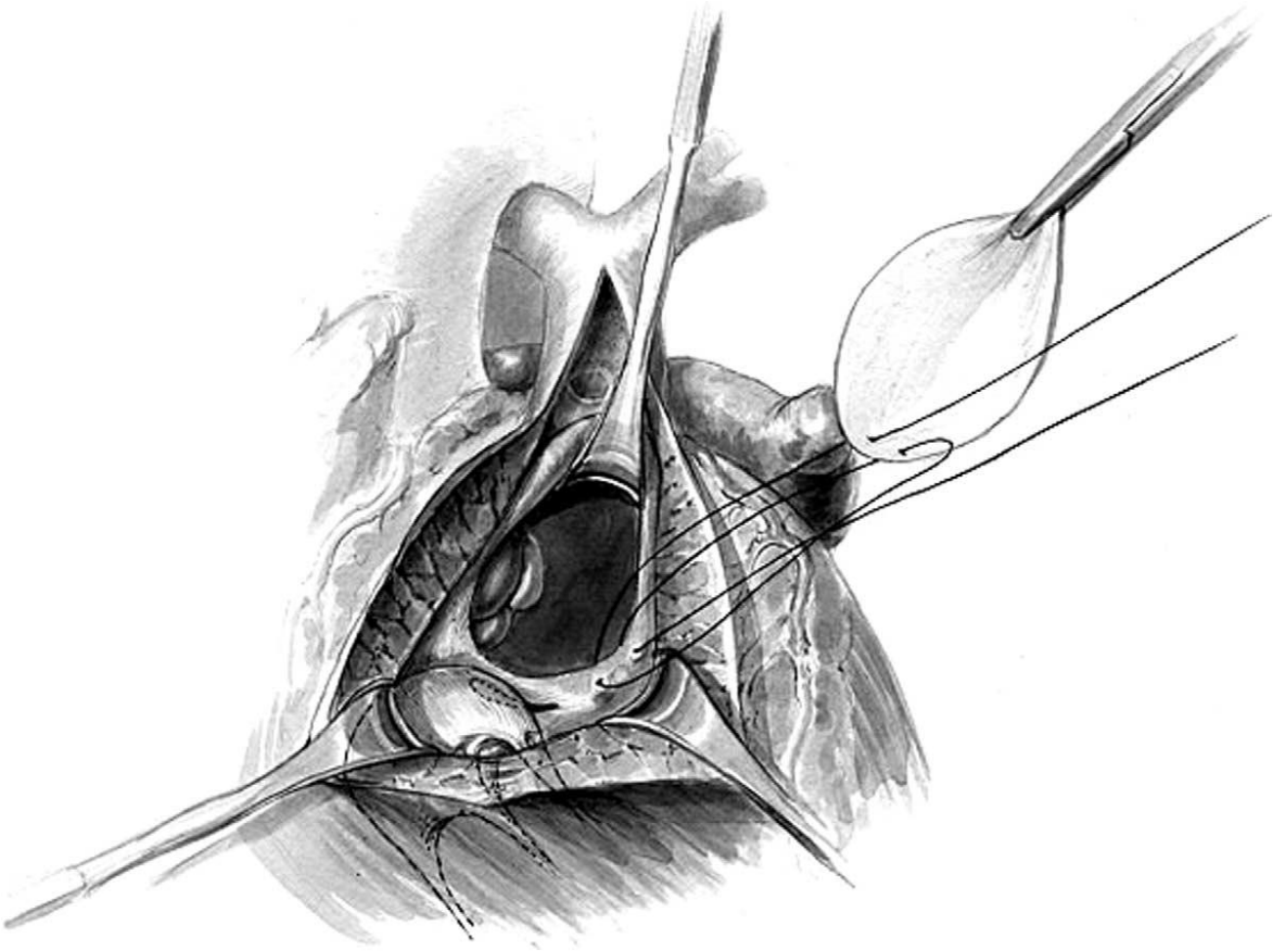
None

Background

- **In the hope of decreasing long-term complications of conventional transannular repair with a large right ventriculotomy in patients with TOF, transatrial and transpulmonary approach with limited (< 1 cm) transannular right ventriculotomy has been adopted by many centers.**

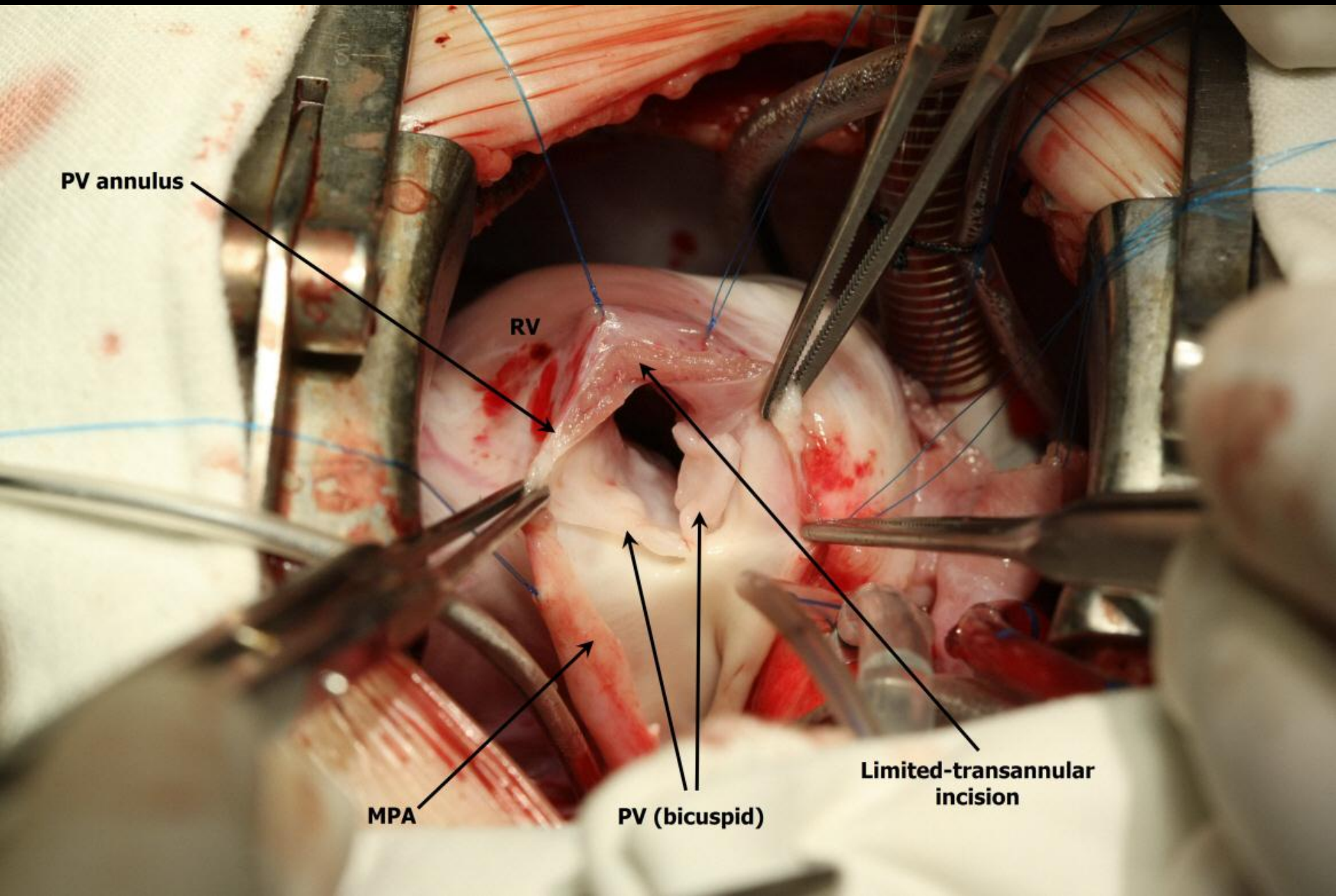
- **However, long-term benefits of this technique have not been demonstrated.**

Conventional Transannular RV-tomy



Oper Tech Thorac Cardiovasc Surg 2005;10:45-53

Limited Transannular RV-tomy



Tetralogy of Fallot: Favorable Outcome of Nonneonatal Transatrial, Transpulmonary Repair

Tom R. Karl, MD, Shunji Sano, MD, PhD, Samphant Pornviliwan, MD, and Roger B. B. Mee, FRACS

Royal Children's Hospital, Melbourne, Australia

This report describes our experience with 366 patients who had a transatrial, transpulmonary repair of tetralogy of Fallot between December 1980 and December 1991. Included in this group are patients with tetralogy of Fallot plus atrioventricular septal defect as well as patients displaying all degrees of aortic override (in the presence of subaortic ventricular septal defect and right ventricular outflow tract obstruction). Median age was 15.3 months and median weight, 12.3 kg. Of the 366 patients, 72% required a pericardial patch to reconstruct the main pulmonary artery or right ventricular outflow tract. Serious coronary anomalies were seen in 11 patients, without influencing surgical approach. There were two hospital deaths (0.5%; 70% confidence limits, 0.2% to 1.2%). Actuarial survival was 97.5% at 42 months (95% confidence limits, 95% to 99%) reflecting four late deaths over 1,129 patient-years of follow-up. Postoperative cardiac catheterization studies were performed in 61 patients at a mean follow-up interval of 23 months. Mean right ventricular/left ventricular systolic pressure ratio after repair was 0.46 (standard deviation, 0.28), and mean gradient across the right ventricular outflow tract was 15 mm Hg (standard deviation, 24 mm Hg). Actuarial freedom from reoperation for any reason has been 95% (95% confidence limits, 92% to 97%) at 5-year and 10-year follow-up. These early and medium-term results encourage us to continue with transatrial, transpulmonary repair of tetralogy of Fallot. We believe that this approach has an operative risk similar to or lower than transventricular repair, and that it will result in better preservation of right ventricular function in the long term.

(Ann Thorac Surg 1992;54:903–7)

Tetralogy of Fallot: Favorable Outcome of Nonneonatal Transatrial, Transpulmonary Repair

Tom R. Karl, MD, Shunji Sano, MD, PhD, Samphant Pornviliwan, MD, and Roger B. B. Mee, FRACS

Royal Children's Hospital, Melbourne, Australia

"Even patients with a limited transannular patch should not develop severe pulmonary insufficiency, and in most cases we would predict a good probability of preserved RV function in the long term."

Ann Thorac Surg 1992;54:903-7

Objective of Our Study

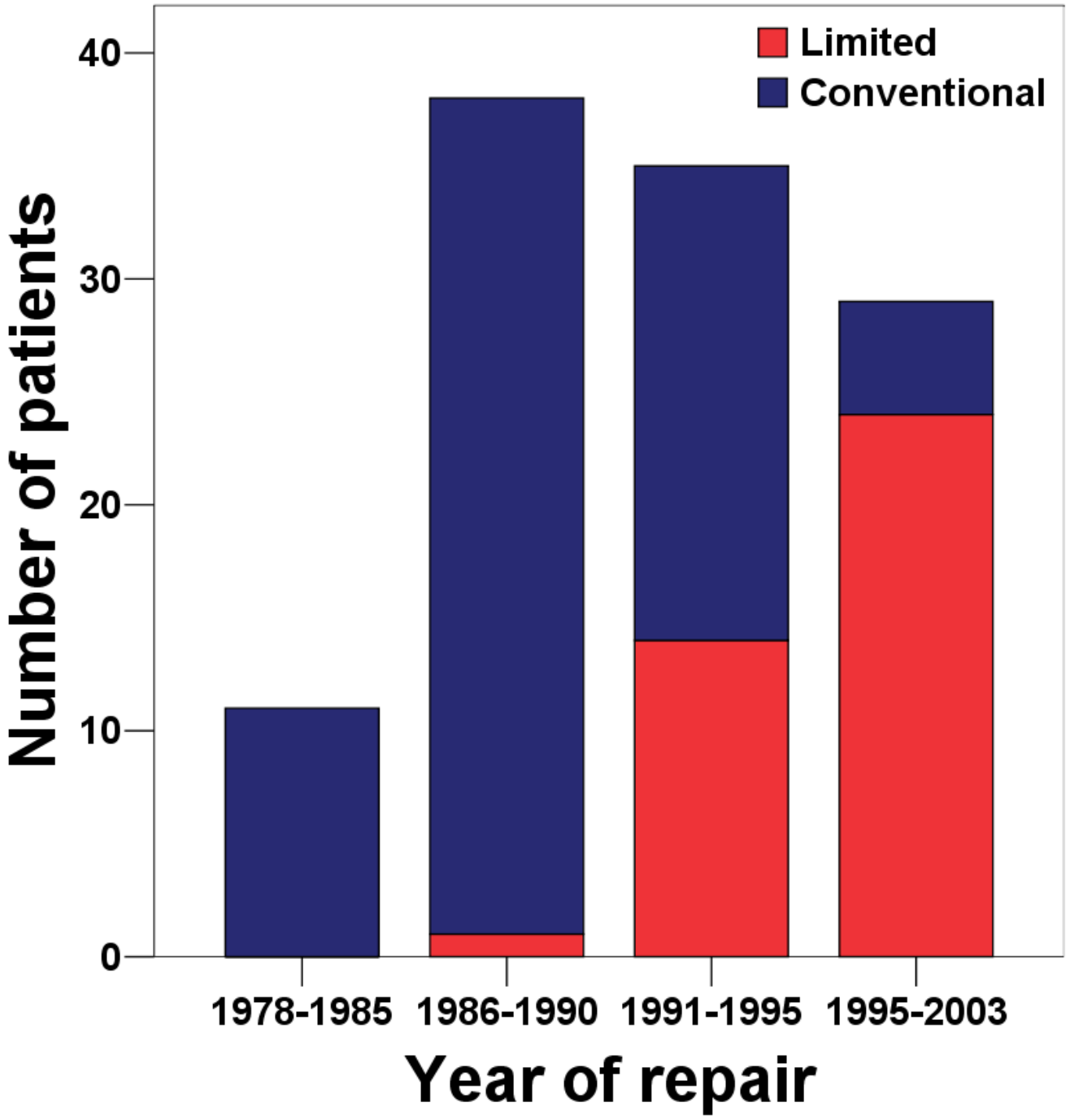
- **To test the hypothesis that limited right ventriculotomy in the setting of transannular TOF repair might result in less RV dilation and dysfunction compared with conventional right ventriculotomy.**

Patients

- **N = 113**
- **Inclusion**
  - **Transannular repair of TOF**
  - **MRI between June 2002 and April 2012**
- **Exclusion**
  - **Other significant confouding CHD**
  - **Significant regurgitation of other valves**
  - **No information about the extent of RV-tomy**

Operative Data at TOF Repair

Variable	Value
Sex (M/F)	64/49
Age (y)	2.8 ± 3.4
Shunt before repair	8/113 (7%)
Limited RV-tomy	39/113 (35%)
Route of VSD closure	
Limited RV-tomy (n = 39)	RA(34), RV(4), RA/RV(1)
Conventional RV-tomy (n = 74)	RV(74)
Post-repair pRV/LV (n = 72)	0.57 ± 0.16


Limited
Conventional
Number of patients
40
30
20
10
0
1978-1985
1986-1990
1991-1995
1995-2003
Year of repair

Patient Characteristics at MRI Examination

Variable	Value
Age (y)	18.5 ± 6.6
Interval between repair and MRI (y)	15.7 ± 4.9
NYHA functional class	I(63), II(46), III(1), NA(3)
QRS duration (ms, n = 76)	141 ± 29
Peak VO_2 (mL/kg/min, n = 47)	30 ± 6
% Predicted peak VO_2 (%, n = 47)	73 ± 17

Overall MRI Data

Parameter	Value
PR fraction (%)*	45 ± 9
RV EDVI (mL/m^2)	151 ± 38
RV ESVI (mL/m^2)	75 ± 34
RV EF (%)	52 ± 9
LV EDVI (mL/m^2)	74 ± 12
LV ESVI (mL/m^2)	29 ± 9
LV EF (%)	61 ± 7

*Data not available for one patient.

Overall Comparison

	Limited (n = 39)	Conventional (n = 74)	*P* value
Sex (M/F)	21/18	43/31	0.664
Age at repair (y)	1.8 ± 2.0	3.3 ± 3.9	0.007
Shunt before repair	3/39 (8%)	5/74 (7%)	1.000
Age at MRI (y)	14.5 ± 4.8	20.6 ± 6.5	<0.001
Interval between repair and MRI (y)	12.7 ± 3.8	17.2 ± 4.7	<0.001
PR fraction (%)	43 ± 10	45 ± 9*	0.270
RV EDVI (mL/m^2)	149 ± 31	152 ± 42	0.704
RV ESVI (mL/m^2)	70 ± 24	77 ± 38	0.313
RV EF (%)	54 ± 9	51 ± 9	0.160
LV EDVI (mL/m^2)	72 ± 11	75 ± 13	0.212
LV ESVI (mL/m^2)	26 ± 7	31 ± 10	0.009
LV EF (%)	64 ± 6	60 ± 7	0.002

*Data not available for one patient.

Propensity Score Matched Comparison

	Limited (n = 39)	Conventional (n = 39)	
Covariates used for matching			**SD**
Sex (M/F)	21/18	21/18	0.000
Age at repair (y)	1.8 ± 2.0	1.9 ± 2.3	0.030
Shunt before repair	3/39 (8%)	3/39 (8%)	0.000
MRI data			***P* value**
Age at MRI (y)	14.5 ± 4.8	18.3 ± 4.6	<0.001
Interval between repair and MRI (y)	12.7 ± 3.8	16.4 ± 3.8	<0.001
PR fraction (%)*	42 ± 10	46 ± 9	0.205
RV EDVI (mL/m^2)	149 ± 31	152 ± 48	0.757
RV ESVI (mL/m^2)	70 ± 24	77 ± 46	0.430
RV EF (%)	54 ± 9	52 ± 10	0.372
LV EDVI (mL/m^2)	72 ± 11	75 ± 15	0.365
LV ESVI (mL/m^2)	26 ± 7	30 ± 12	0.076
LV EF (%)	64 ± 6	61 ± 8	0.037

*Data not available for one pair.

Clinical Outcomes

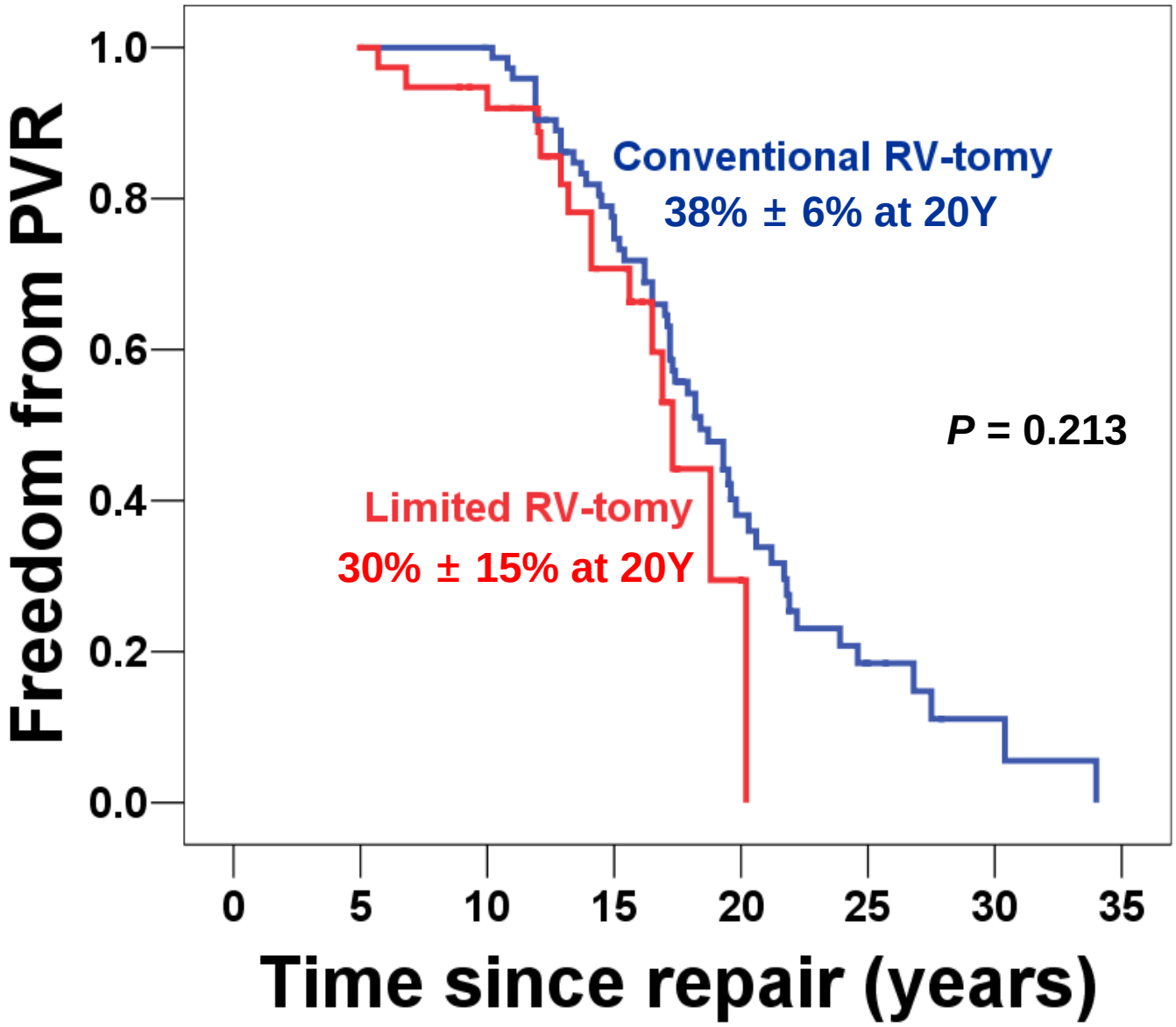
	Limited (n = 39)	Conventional (n = 74)	*P* value
Follow-up (y)*	14.5 ± 3.5	21.1 ± 4.2	<0.001
Subsequent PVR	15	54	0.213
Late mortality	1†	0	0.163
Arrhythmia	0	2‡	0.371

*Follow-up completeness was 93%.

†Mortality at the time of PVR.

‡Atrial flutter in one patient and atrial flutter/fibrillation in the other patient.

Pulmonary Valve Replacement



Conclusions

- **We could not demonstrate long-term benefits of limited RV-tomy compared with conventional RV-tomy in patients who underwent transannular TOF repair, at least in terms of RV volumes and function.**

- **Further studies are necessary to define the role of limited RV-tomy in patients who undergo transannular TOF repair.**