SUPPLEMENTAL MATERIAL

Supplementary Table 1. Echocardiographic characteristics of catheter cohort at baseline and follow-up

	Rhythm at Follow-up (SR n =175) (Recurrent AF n = 104)	Baseline	P value (Recurrent AF vs. SR at Baseline)	Follow-up	P value (Baseline vs. Follow-up)	P value (Recurrent AF vs. SR at Follow-up)
LVESD, mm	Sinus	34.6±12.4		34.8±9.2	0.802	
	Recurrent AF	37.4±11.9	0.302	37.9±5.0	0.753	0.620
LVEDD, mm	Sinus	53.9±7.8		52.6±7.7	0.217	
	Recurrent AF	51.8±6.1	0.217	52.7±7.3	0.842	0.129
sPAP, mmHg	Sinus	38.4±6.3		37.3±8.2	0.370	
	Recurrent AF	39.9±5.2	0.292	39.6±6.6	0.524	0.151
LAD, mm	Sinus	53.1±10.6		53.8±9.7	0.510	
	Recurrent AF	52.8±12.1	0.093	54.5±11.2	0.061	0.159
LVEF, %	Sinus	62.1±5.9		60.4±10.1	0.443	
	Recurrent AF	59.8±7.3	0.721	59.4±6.8	0.520	0.999
RAA, mm^2	Sinus	20.1±4.7		18.3±6.9	0.076	
	Recurrent AF	19.8±5.2	0.093	21.3±6.9	0.037	0.040
RVSI	Sinus	2.0±0.6		2.1±0.2	0.014	
	Recurrent AF	1.9±0.1	0.039	1.8±0.5	0.004	<0.001

RVFAC, %	Sinus	44.6±3.9		45.2±8.9	0.048	
			0.091			0.031
	Recurrent AF	42.9±6.3		40.6±7.2	0.042	
Tethering height, mm	Sinus	4.5±1.5		3.1±3.6	0.013	
			0.004			<0.001
	Recurrent AF	7.6±1.9		8.6±1.9	0.069	
Tethering area, cm^2	Sinus	1.8±0.7		1.1±0.4	0.020	
			0.034			<0.001
	Recurrent AF	2.0±0.9		2.6±0.7	0.072	
TAD, cm	Sinus	35.2±3.5		33.0±6.7	0.016	
			0.077			0.008
	Recurrent AF	36.9±3.7		39.2±6.2	0.006	
TR EROA, cm^2	Sinus	0.7±0.6		0.4±0.5	0.028	
			0.096			0.015
	Recurrent AF	0.8±0.7		1.0±0.6	0.021	
TR VC, cm	Sinus	0.9±0.8		0.4±0.3	0.012	
			0.087			0.008
	Recurrent AF	1.0±0.3		1.1±0.5	0.057	
TR Grade	Sinus	3.2±0.3		2.4±0.8	0.013	
			0.051			<0.001
	Recurrent AF	3.6±0.4		3.9±0.2	0.048	

AF = atrial fibrillation; EROA = effective regurgitant orifice area; LAD = left atrial diameter; LVEF = left ventricle ejection fraction; LVEDD = left ventricle end-diastolic dimension LVESD = left ventricle end-systolic dimension; RAA = right atrial

area; RVFAC = right ventricle fractional area change; RVSI = right ventricle sphericity index; sPAP = pulmonary artery systolic pressure; TAD = tricuspid annulus diameter; TR = tricuspid regurgitation; VC = vena contracta.

Supplementary Table 2. Echocardiographic characteristics of surgical cohort at baseline and follow-up

	Rhythm at Follow-up (SR n =66) (Recurrent AF n = 48)	Baseline	P value (Recurrent AF vs. SR at Baseline)	Follow-up	P value (Baseline vs. Follow-up)	P value (Recurrent AF vs. SR at Follow-up)
LVESD, mm	Sinus	38.1±10.7		36.8±10.4	0.819	
			0.459			0.115
	Recurrent AF	37.0±13.1		37.9±.6	0.371	
LVEDD, mm	Sinus	54.2±4.9		53.8±10.1	0.812	
			0.348			0.258
	Recurrent AF	52.9±8.1		53.1±6.9	0.568	
sPAP, mmHg	Sinus	40.5±5.9		39.8±9.3	0.744	
			0.326			0.721
	Recurrent AF	41.0±7.1		40.6±7.2	0.405	
LAD, mm	Sinus	54.1±9.6		53.8±10.5	0.184	
			0.096			0.629
	Recurrent AF	53.9±4.3		54.6±9.5	0.333	
LVEF, %	Sinus	57.9±6.4		59.7±9.6	0.118	
			0.953			0.154
	Recurrent AF	59.2±5.8		60.4±10.0	0.635	
RAA, mm^2	Sinus	21.6±2.7		20.5±7.4	0.064	
			0.093			0.046
	Recurrent AF	20.1±3.6		22.7±8.1	0.043	
RVSI	Sinus	2.0±0.7		2.1±0.9	0.012	
			0.020			<0.001
	Recurrent AF	1.9±0.2		1.8±0.7	0.045	
RVFAC, %	Sinus	41.3±8.3	0.087	43.9±7.3	0.028	0.013

	Recurrent AF	42.9±6.8		40.7±9.0	0.024	
Tethering height, mm	Sinus	8.2±3.6		4.9±3.7	<0.001	
			0.007			<0.001
	Recurrent AF	14.3±4.8		13.9±4.1	0.920	
Tethering area, cm^2	Sinus	3.9±0.3		1.4±0.9	0.006	
			0.041			<0.001
	Recurrent AF	4.3±0.3		4.6±1.0	0.485	
TAD, cm	Sinus	38.8±6.7		34.7±5.9	0.001	
			0.059			<0.001
	Recurrent AF	40.1±4.0		43.8±5.7	0.008	
TR EROA, cm^2	Sinus	0.9±0.2		0.5±0.7	0.003	
			0.098			0.023
	Recurrent AF	1.0±0.6		1.1±0.4	0.089	
TR VC, cm	Sinus	0.9±0.4		0.5±0.6	0.009	
			0.084			0.002
	Recurrent AF	1.0±0.3		1.1±0.9	0.819	
TR Grade	Sinus	3.4±0.7		2.7±0.6	0.012	
			0.089			<0.001
	Recurrent AF	3.6±0.6		3.8±0.7	0.812	

AF = atrial fibrillation; EROA = effective regurgitant orifice area; LAD = left atrial diameter; LVEF = left ventricle ejection fraction; LVEDD = left ventricle end-diastolic dimension LVESD = left ventricle end-systolic dimension; RAA = right atrial area; RVFAC = right ventricle fractional area change; RVSI = right ventricle sphericity index; sPAP = pulmonary artery systolic pressure; TAD = tricuspid annulus diameter; TR = tricuspid regurgitation; VC = vena contracta.

S Figure 1. Propensity-score matching for the total cohort. A, Dot plot of patients in either matched or unmatched groups. B, Histograms with overlaid kernel density estimates of standardized differences before and after matching. C, Distribution of propensity scores of surgical ("treated") and catheter cohort ("control") before and after matching with overlaid kernel density estimate. D, Line plot of standardized differences before and after matching. E, Dot plot of standardized mean differences (Cohen's d) for all covariates before and after matching.

ACEI indicates angiotensin-converting enzyme inhibitor; ACT, aortic clamp time; ARB, angiotensin receptor blocker; BMI, body mass index; CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; EROA, effective regurgitant orifice area; LAD, left atrial diameter; LVEDD, left ventricle end- diastolic dimension; LVEF, left ventricle ejection fraction; LVESD, left ventricle end-systolic dimension; NYHA, New York Heart Association; RA, right atrial; RVFAC, right ventricle fractional area change; RVSI, right ventricle sphericity index; sPAP, pulmonary artery systolic pressure; TAD, tricuspid annulus diameter; TR, tricuspid regurgitation; VC, vena contracta.

S Figure 2. Example of a patient in surgical cohort with a preoperational tethering height of 1.22cm (A), had a significant moderate-severe TR at 18 months follow-up with recurrent AF (B).
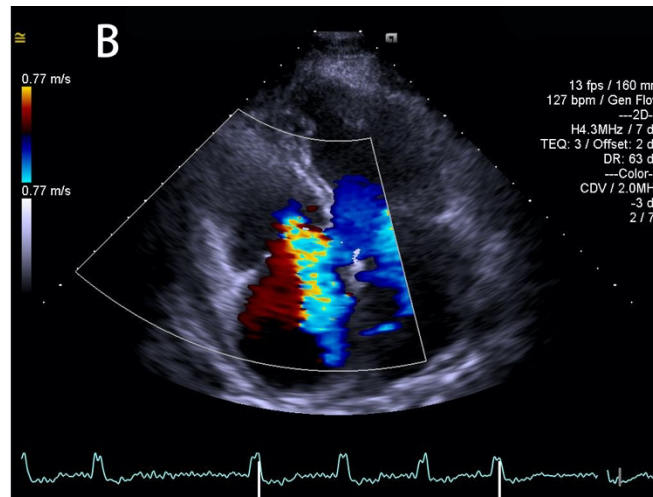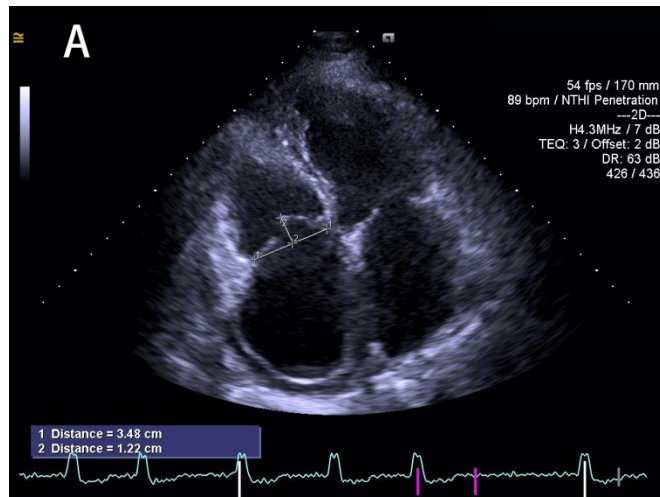
S Figure 3. Example of a patient with a preoperational moderate-severe TR and tethering height of 0.4 cm in catheter cohort (A), had no TR at 24 months follow-up with sinus rhythm (B).

S Figure 4. Example of using an autologous pericardial patch (white arrow) to enlarge the anterior tricuspid leaflet in patients with tethering height more than 8mm.
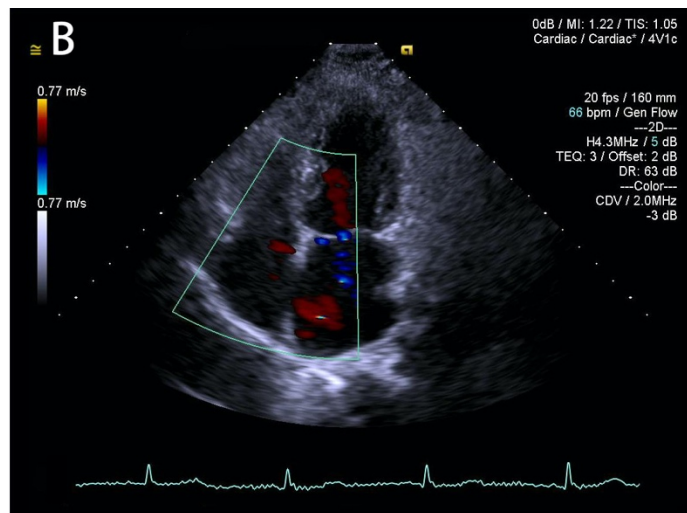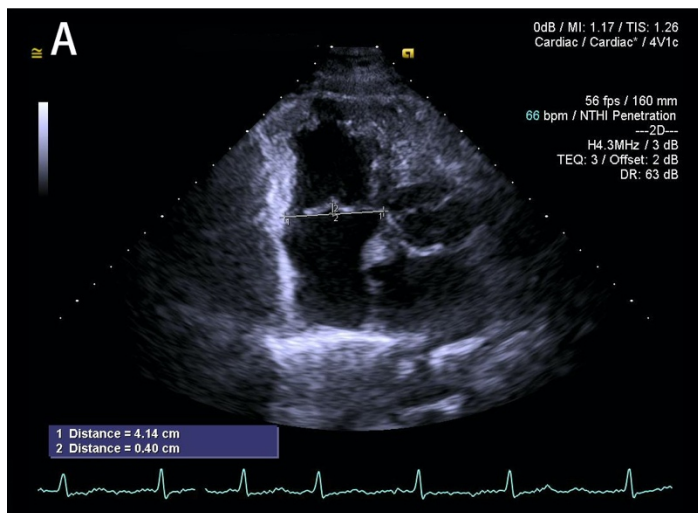
S Figure 1.
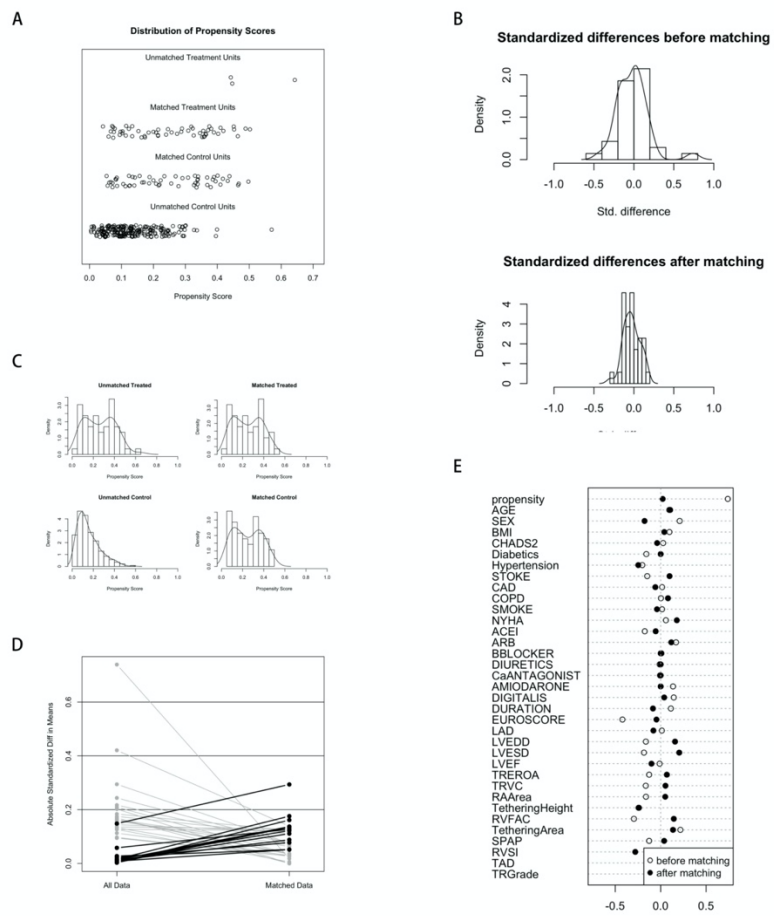
S figure 2.

S Figure 3.

S Figure 4.