Impact of catheter ablation on functional tricuspid regurgitation in patients with atrial fibrillation

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Funding Acknowledgement: Type of funding sources: None.

Background: Since atrial functional tricuspid regurgitation (AF-TR) is associated with increased heart failure and mortality, the management of AF-TR is clinically important. Atrial fibrillation (AF) plays the main role in AF-TR. However, the effectiveness of catheter ablation (CA) and mechanism of improvement of AF-TR haven't been fully evaluated.

Purpose: We sought to investigate the impact of CA for AF on AF-TR in patients with moderate or more TR.

Methods: We retrospectively investigated consecutive 2685 patients with AF who received CA from February 2004 to December 2019 in Japan. The current study population consisted of 102 patients with moderate or greater TR who underwent CA for AF. The echocardiographic parameters were compared between pre-ablation and post-ablation transthoracic echocardiography (TTE), and the recurrence rate of AF/ atrial tachycardia (AT) was measured.

Results: The mean age was 73.2 years, 53% were women. TR severity and TR jet area significantly improved after CA for AF (TR jet area: 5.8 [3.9–7.6] cm^2 to 2.0 [1.1–3.0] cm^2, $p<0.001$). In addition, mitral regurgitation (MR) jet area, left atrial (LA) area, mitral valve diameter, right ventricular (RV) end-diastolic area, right atrial (RA) area, tricuspid valve (TV) diameter decreased after CA ($p<0.001$, <0.001, <0.001, $= 0.02$, <0.001, and <0.001, respectively). There was no significant difference between one-year recurrence of AF/AT and TR severity at pre-ablation TTE (moderate 28.6%, moderate to severe 37.2%, and severe 31.6%, p=0.72).

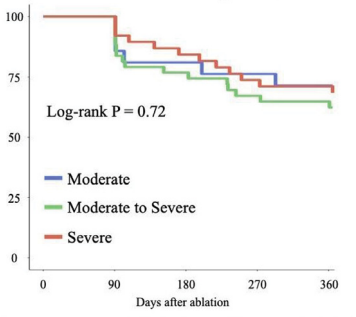
Conclusions: TR severity and jet area improved after CA in patients with AF and moderate or more TR. RV size, RA size, TV diameter also decreased after CA, which may be associated with TR improvement. There was no significant difference between one-year recurrence of AF/AT and TR severity at pre-ablation TTE.

Table. Echocardiographic parameters

	Pre-ablation	Post-ablation	P value
AF/AT rhythm	72 (71%)	18 (18%)	
Left ventricular end-diastolic diameter (mm)	44.1 [40.6-47.6]	49.4 [42.4-49.4]	0.004
Left ventricular ejection fraction (%)	63.9 [57.2-71.6]	66.5 [61.2-70.5]	0.06
Left atrial area (cm^2)	23.5 [19.6-28.0]	18.9 [16.0-21.7]	<0.001
Mitral regurgitation jet area (cm^2)	2.7 [1.7-4.3]	1.5 [0.8-2.8]	<0.001
Mitral regurgitation severity			
None or trivial	13 (13%)	27 (26%)	
Mild	66 (65%)	64 63%)	
Moderate	16 (16%)	10 (10%)	
Moderate to severe	5 (5%)	1 (1%)	
Severe	2 (2%)	0 (0%)	
Diastolic early trans-mitral flow velocity/ mitral annular velocity: E/e'	10.7 [8.5-14.0]	11.3 [8.6-16.0]	0.21
Right ventricular end-diastolic area (cm^2)	15.9 [12.6-18.7]	14.4 [12.2-17.6]	0.02
Right ventricular fractional area change (%)	38.7 [31.5-45.4]	39.6 [31.7-46.6]	0.33
Right atrial area (cm^2)	19.9 [16.6-22.8]	15.3 [12.9-18.4]	<0.001
Tricuspid valve diameter (mm)	35.6 [31.8-38.9]	30.1 [27.6-33.4]	<0.001
Tricuspid valve tenting height (mm)	2.8 [2.2-3.5]	2.6 [1.9-2.9]	0.004
Tricuspid regurgitation jet area (cm^2)	5.8 [3.9-7.6]	2.0 [1.1-3.0]	<0.001
Tricuspid regurgitation area/ right atrial area	0.28 [0.20-0.40]	0.12 [0.08-0.19]	<0.001
Tricuspid regurgitation severity			
None or trivial	0 (0%)	12 (12%)	
Mild	0 (0%)	28 (27%)	
Moderate	21 (21%)	40 (39%)	
Moderate to severe	43 (42%)	13 (13%)	
Severe	38 (19%)	9 (9%)	
Tricuspid regurgitation pressure gradient (mmHg)	28.0 [24.0-33.2]	27.3 [23.0-31.1]	0.08

AF, atrial fibrillation; AT, atrial tachycardia. Categorical variables are presented as numbers and percentages, and continuous variables are presented as the median and interquartile range. Continuous variables were compared using Wilcoxon signed-rank test.

Figure. The Kaplan–Meier curves for one-year recurrence rates of AF/AT among TR severities.



	0-day	91-day	180-day	270-day	365-day
Moderate					
N of patients with event		3	4	5	6
N of patients at risk	21	21	18	17	14
Cumulative incidence		14.3	19	23.8	28.6
Moderate to Severe					
N of patients with event		5	10	14	16
N of patients at risk	43	43	33	29	26
Cumulative incidence		11.6	23.3	32.6	37.2
Severe					
N of patients with event		3	6	10	12
N of patients at risk	38	38	34	29	26
Cumulative incidence		7.9	15.8	26.3	31.6