Incidence and prognosis of pacing induced cardiomyopathy: Retrospective cohort study

원주세브란스기독병원 내과[1]

이재호[1], 안민수[1], 박영준[1]

Background/Aims: Implantation of permanent pacemaker (PPM) for symptomatic bradyarrhythmia is a definitive treatment strategy associated with reducing cardiac mortality and improved quality of life. However, long-term right ventricular (RV) pacing cause electrical and mechanical LV desynchrony, which leads to systolic dysfunction and clinical heart failure (HF) defined as pacing induced cardiomyopathy(PiCM). The incidence of PiCM was described by many studies and ranged between 12.3% and 15.8%. Several risk factors of PiCM have been reported, including older age, male gender, pre-existing LV systolic dysfunction, RV apical pacing. Previous researches had relatively small sample sizes because they were performed as single-center studies. A large cohort study can provide further insights into the incidence and risk factors of PiCM. Therefore, this study aimed to evaluate the incidence and risk factors of PiCM using the Korean nationwide cohort database

Methods: picture attached

Results: table attached

Conclusions: During the mean follow-up duration of 4.2±2.3 years, 1446 of 21545 (6.7%) PPM patients occurred PiCM with the incidence rate of 16/1000PY. In multivariate Cox regression analysis, older age, male, hypertension, diabetes, peripheral artery disease, stroke, chronic kidney disease, COPD, and higher CCI (≥3 units) were identified as independent predictors of PiCM. In contrast, AVB (vs. SND), ACEi or ARB, and beta-blocker did not affect on the occurrence of PiCM after pacemaker implantation. PiCM occurs consistently after pacemaker implantation. Careful follow-up evaluations of patient are reasonable in patients with pacemaker.

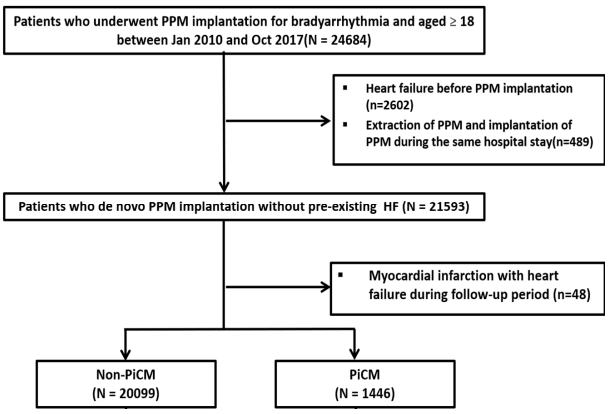

Table 1. Baseline characteristics

Characteristic	Without PiCM (N= 20099)	With PiCM (N=1446)	Total (N=21545)	p value
Age, years, mean±SD	64.00±12.15	67.16±10.87	64.21±12.10	
Male, n(%)	8492(42.3%)	645(44.6%)	9137(42.4%)	0.0801
Hypertension, n(%)	12870(64.0%)	1126(77.9%)	13996(65.0%)	<.0001
Diabetes, n(%)	4337(21.6%)	456(31.5%)	4793(22.3%)	<.0001
Ischemic heart disease, n(%)	6041(30.1%)	577(39.9%)	6618(30.7%)	<.0001
Peripheral artery disease, n(%)	4324(21.5%)	350(24.2%)	4674(21.7%)	0.0165
Stroke, n(%)	3288(16.4%)	297(20.5%)	3585(16.6%)	<.0001
COPD, n(%)	3421(17.0%)	318(22.0%)	3739(17.4%)	<.0001
Atrial fibrillation, n(%)	3871(19.3%)	389(26.9%)	4260(19.8%)	<.0001
Valvular heart disease, n(%)	1571(7.8%)	196(13.6%)	1767(8.2%)	<.0001
Chronic kidney disease, n(%)	1206(6.0%)	129(8.9%)	1335(6.2%)	<.0001
Pacemaker				
Single chamber, n(%)	3158(15.9%)	396(27.7%)	3554(16.7%)	<.0001
Dual chamber, n(%)	16660(84.1%)	1032(72.3%)	17692(83.3%)	
Sinus node disease, n(%)	7629(39.3%)	567(40.8%)	8196(39.4%)	0.2698
AV node disease, n(%)	11772(60.7%)	822(59.2%)	12594(60.6%)	
Medication				
Aspirin, n(%)	8886(44.2%)	754(52.1%)	9640(44.7%)	<.0001
Warfarin, n(%)	2077(10.3%)	264(18.3%)	2341(10.9%)	<.0001
ACEi or ARB, n(%)	10842(53.9%)	1017(70.3%)	11859(55.0%)	<.0001
Beta blocker, n(%)	5959(29.7%)	595(41.1%)	6554(30.4%)	<.0001
Thiazide, n(%)	3666(18.2%)	360(24.9%)	4026(18.7%)	<.0001
Loop diuretics, n(%)	4173(20.8%)	520(36.0%)	4693(21.8%)	<.0001
Spironolactone, n(%)	2041(10.2%)	286(19.8%)	2327(10.8%)	<.0001
Charlson score(≥3), unit	9006(44.8%)	890(61.6%)	9896(45.9%)	<.0001

COPD, chronic obstructive pulmonary disease; AV, atrioventricular; ACEi, Angiotensin-converting enzyme (ACE) inhibitors; ARB, angiotensin II Receptor Blocker.

Table 3. Risk factor of Pacing induced cardiomyopathy

	Univariable		Multivariable	
Variable	HR (95% CI)	P value	HR (95% CI)	P value
Age	1.07 (1.07-1.07)	<0.001	1.07 (1.07-1.07)	<0.001
Male	1.51 (1.41-1.62)	<0.001	1.49 (1.39-1.60)	<0.001
Hypertension	1.36 (1.26-1.47)	<0.001	0.86 (0.78-0.95)	0.004
Diabetes	1.65 (1.53-1.78)	<0.001	1.25 (1.15-1.36)	<0.001
Valvular heart disease	1.08 (0.95-1.22)	0.229		
Atrial fibrillation	1.12 (1.02-1.22)	0.013	0.86 (0.79-0.94)	0.167
Peripheral artery disease	1.09 (1.01-1.19)	0.037	1.07 (0.97-1.17)	0.001
Stroke	1.60 (1.48-1.74)	<0.001	1.19 (1.09-1.30)	<0.001
Chronic kidney disease	3.44 (3.12-3.80)	<0.001	2.72 (2.45-3.03)	<0.001
COPD	1.43 (1.31-1.55)	<0.001	1.10 (1.01-1.20)	0.027
AV block	1.21 (1.13-1.31)	<0.001	0.95 (0.88-1.03)	0.176
ACEi/ARB	1.36 (1.26-1.46)	<0.001	1.04 (0.95-1.14)	0.415
Beta blocker	1.11 (1.03-1.19)	0.008	0.97 (0.89-1.05)	0.454
Spironolactone	1.61 (1.48-1.74)	<0.001	1.43 (1.30-1.58)	<0.001
Charlson score(≥3), unit	1.74 (1.62-1.87)	<0.001	1.16 (1.07-1.27)	<0.001

Table 2. Incidence of Pacing induced cardiomyopathy