

심폐재활

게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:00-10:45 Room G(3F)

P 1-77

Is Cardiorespiratory Fitness Level maintained after Cardiac Rehabilitation?

Jin Hyuk Jang^{1*}, Chul Kim^{2†}

Inje University Sanggye Paik Hospital, Department of Rehabilitation Medicine¹, Inje University Sanggye Paik Hospital, Department of Rehabilitation Medicine²

Introduction

The impact of cardiac rehabilitation (CR) to reduce mortality and morbidity has been evidenced through several meta-analyses and improving patients' cardiorespiratory fitness (CRF) is an important therapeutic effect of CR. However, CR program does not mean only attending exercise sessions for a while after discharge, but also maintaining regular physical activity in the community during the rest of life. Thus, it is important to keep track of the patients' CRF level properly after discharge, but research in this area has been limited. The purpose of this research is to examine whether patients who participated in CR program after being hospitalized for acute coronary syndrome (ACS) are properly maintaining optimal level of CRF.

Subjects and Methods

The subjects of this study were patients who received percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) surgery at OO Hospital cardiovascular (CV) Center for ACS and participated in CR program and five years of follow-up evaluation. The patients were divided into hospital-based CR (HBCR) group which participated in ECG monitored exercise training in hospital setting, and community-based CR (CBCR) group which received only education about physical exercise and underwent self-exercise in the community. The subjects' medical records and CPX (cardiopulmonary exercise) test results on the first CR visit were set as the baseline and the follow-up CPX test results during the following five years were observed by retrospective review of electronic medical records.

Results

In the HBCR group (n=37), 29 (74%) patients participated in ECG monitored exercise in hospital for more than six weeks, and 3 (7.6%) patients dropped out early in two or less sessions. On average, HBCR group and CBCR group received 9.1 (1.8) and 10.0 (2.5) follow-up of CPX tests, respectively, and there was no significant difference between the two groups (Table 1). In both groups, the VO₂max and VO₂AT increased during the first 6 weeks of follow up, were maintained at a steady-state for the first year but decreased after a year of follow up; however the extent of decrease was larger in the CBCR group

(Figure 1, Table 2). The rate pressure product and the rate of perceived exertion at stage 3 decreased only in HBCR group during the first 6 weeks of follow up and maintained at a steady-state for the first year but returned to almost baseline level afterward (Table 2).

Conclusion

It is important that patients maintain proper CRF level continuously after CR, but in this study, the participants did not keep their CRF level adequately one year after CR, especially those in CBCR group. This implies that it is difficult to make behavioral changes in short-term CR program to keep constant physical exercise afterwards. According to the results, continuous support should be given to patients to maintain optimal CRF level after completing CR program.

Table 1. Characteristics of patients in CBCR group and HBCR group

Characteristic		CBCR (n = 41)	HBCR (n = 37)	p-value	
Age (years)		62.1 ± 9.6	63.5 ± 9.3	0.53	
Sex, male : female		35 : 6	28 : 9	0.29	
BMI (kg/m ²)		26.2 ± 3.2	24.8 ± 3.6	0.09	
LVEF (%)		57.9 ± 10.4	58.5 ± 12.7	0.83	
Smoking history	Never	13 (31.7)	22 (59.5)	0.01	
	Ex-smoker	10 (24.4)	6 (16.2)	0.37	
	Current	18 (43.9)	9 (24.3)	0.07	
Cardiac diagnosis	STEMI	14 (34.2)	16 (43.3)	0.41	
	Non-STEMI	12 (29.3)	7 (18.9)	0.29	
	UA	15 (36.5)	14 (37.8)	0.91	
Comorbidity	Hypertension	20 (48.8)	21 (56.8)	0.48	
	DM	None	30 (73.2)	28 (75.7)	0.80
		NIDDM	10 (24.4)	8 (21.6)	0.76
		IDDM	1 (2.4)	1 (2.7)	0.35
	Dyslipidemia	12 (29.3)	13 (35.1)	0.58	
	Heart failure	2 (4.9)	4 (10.8)	0.59	
	Others	8 (19.5)	5 (13.5)	0.66	
None	5 (12.1)	7 (18.9)	0.95		
Revascularization procedure	PCI	39 (95.1)	34 (91.9)	0.56	
	CABG	2 (4.9)	2 (5.4)	0.91	
	Others	0 (0)	1 (2.7)	0.29	
No. of diseased vessel		1.63 ± 0.8	1.57 ± 0.7	0.71	
No. of inserted stent		1.12 ± 0.6	1.24 ± 0.7	0.39	
No. of follow-up CPX test		10.0 ± 2.5	9.1 ± 1.8	0.72	

Data are expressed as mean ± SD or number (%). CBCR: community-based cardiac rehabilitation; HBCR: hospital-based cardiac rehabilitation; BMI: body mass index; LVEF: left ventricle ejection fraction; CPX: cardiopulmonary exercise; STEMI: ST-segment elevation myocardial infarction; UA: unstable angina; DM: diabetes mellitus; IDDM: insulin-dependent DM; PCI: percutaneous coronary intervention; CABG: coronary artery bypass graft; No.: number

Table 2. Comparison of Cardiopulmonary Exercise Test Results between Two Groups

CPX Results	CBCR (n = 41)								HBCR (n = 37)							
	Baseline	6wks	12wks	6ms	12ms	2years	3years	5years	Baseline	6wks	12wks	6ms	12ms	2years	3years	5years
VO _{2max}	30.4±7.8§	31.1±7.5	31.4±7.1	33.2±7.4	33.1±8.3	31.9±9.1	29.8±7.2	29.0±7	26.4±6.4§	30.0±9.0¶	30.2±7.6¶	30.9±8.8¶	32.0±11.0¶	31.3±9.6¶	28.5±8.0	26.4±6.5
METs	8.9±2.6	8.9±2.1	9.0±2.0	9.5±2.1	9.4±2.4¶	9.1±2.6	8.5±2.1	8.3±2	7.6±1.8	8.8±2.9¶	8.6±2.2	8.8±2.5¶	9.2±3.1¶	8.9±2.7¶	8.1±2.3	7.6±1.9
VO _{2AT}	15.7±3.4	19.0±3.9	18.0±4.5	17.1±6.5	17.9±5.8	19.6±6.3	18.5±5.0	19.9±5	15.3±4.5	17.9±6.2¶	17.1±5.0	18.2±4.6¶	17.6±6.8	18.4±5.4¶	16.5±5.8	17.9±4.4
SBP _{rest}	117.8±13	117.0±13	119.7±14	119.6±16	122.7±13	124±15	124±15	119.9±1	115±13.2	118±14.8	115±14.3	117±13.8	120.4±13.3	123.8±14.4	122±17	118±15
SBP _{max}	172.7±26	175.4±26	176.7±29	179.0±23	180.7±26	186±25	185±25	187.2±3	173±33	176±28.7	175±28.3	180±28.8	182.1±26.1	179.6±30.5	185±30	179±23
HR _{rest}	66.9±13	64.4±13.0	64.2±13	64.9±11	66.4±12	65.5±11	67.3±10	67.4±1	69.6±11	65.8±11.7	66.5±9.3	65.6±9.4	65.3±10.1	68.9±10.9	68.0±11	69±10.8
HR _{max}	144.2±18	147.5±18	147.4±17	150.8±15	152.1±16	149±19	149±16	150.8±1	139±21.1	145±18.6	145±19.4	146±20.3	146.6±19.5	149.2±22.6	148±21	146±23
RPP _{3/100}	146±40	132±46	133±31	136±42	140±27	158±56	149±39	142±32	148±38	127±28¶	131±28¶	131±26¶	135±33¶	144±38	145±31	148±39
RPE ₃	9.7±2.8	8.5±1.9	8.3±1.6	8.4±1.9§	8.6±1.6§	9.9±2.8	10.1±2.4	12.5±2	10.3±2.4	8.9±2.2¶	8.7±1.7¶	9.4±1.7§	9.5±1.7§	9.3±2.1	10.0±2.0	9.8±1.7

§: significant differences between the two groups at the same time, ¶: significant differences from baseline

Data are expressed as mean ± SD. SBP: systolic blood pressure; RPP₃: rate pressure product at stage 3; RPE₃: rate of perceived exertion at stage 3

Units of VO₂: ml/kg/min; SBP: mmHg; HR: beat/min

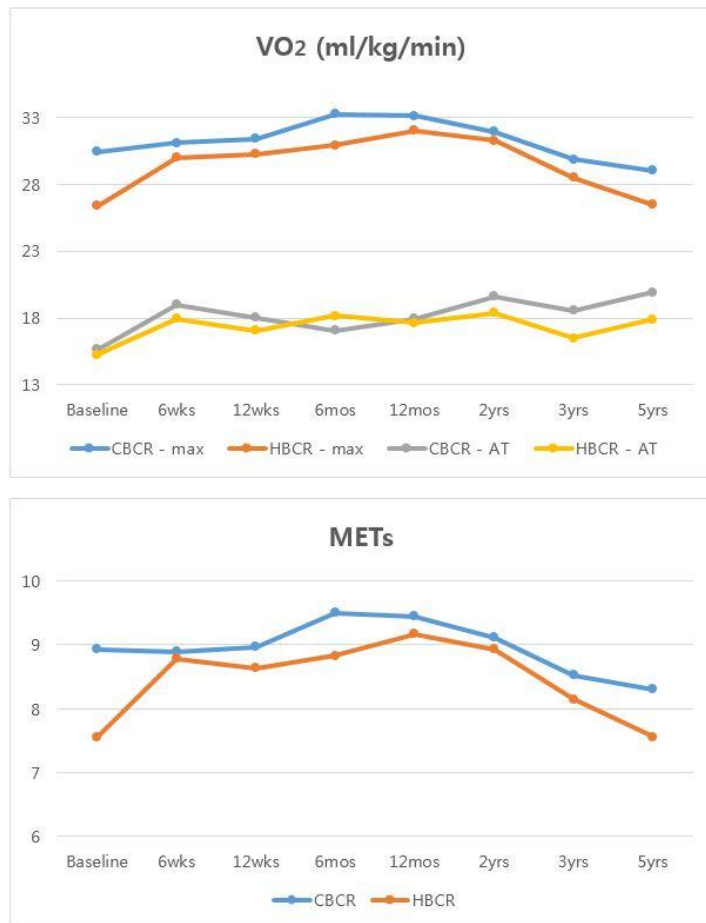


Figure 1. Five years trend of VO₂max, VO₂AT, and METs.

CBCR, community-based cardiac rehabilitation; HBCR, hospital-based cardiac rehabilitation; METs, metabolic equivalents of task; AT, anaerobic threshold.