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)

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Heart Rate Recovery after Hospital-based Rehabilitation in MI with low ejection fraction

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Introduction

Heart rate recovery (HRR) is defined as the rate at which heart rate decrease within the following minutes after the cessation of physical exercise and is non-invasive assessment of autonomic cardiac dysfunction. It has been implicated with risk of cardiovascular events and mortality. Thus, it is widely used as a guide to monitor changes in training status. And several studies showed CR improved HRR in the patients with various heart diseases.

Objectives

To evaluate the effects of hospital-based cardiac rehabilitation (CR) on HRR and functional capacity according to the ejection fraction (EF) after acute myocardial infarction (AMI).

Method

We retrospectively reviewed the medical records of the AMI patients who had done Hospital-based CR from 2016 to 2018. Thirty three patients were recruited. The patients were divided into two groups according to EF. Patients with EF 50% and over were allocated to normal EF group and patients with EF under 50% were to low EF group. All patients underwent an exercise tolerance test (ETT) 2 weeks after AMI for the first time. According to the result of initial ETT and functional ability, patients started hospital-based CR. And second test was conducted 3 months after AMI. After achieving a peak workload, the treadmill was stopped and the patients recovered in a comfortable and relaxed seated or standing position. HRR was defined as the difference between the maximal heart rate (HR) and the HR measured at specific time intervals – one minute after cessation (HRR1) and 5 minutes after cessation (HRR5).

Results

There were no significant differences in the baseline characteristics between two groups except for ejection fraction (Table 1). After hospital-based CR, normal EF group showed improvements in maximal HR, exercise time and HRR5. Low EF group showed improvements in maximal systolic blood pressure, peak oxygen consumption, maximal

metabolic equivalents, exercise time and HRR5 (Table 2). After hospital-based CR, the changes in maximal systolic blood pressure, maximal heart rate, heart rate immediately and 5 minutes after cessation of the test between groups showed significant differences (Table 3).

Conclusion

The results showed that hospital-based CR improved HRR and functional capacity, irrespective of initial ejection fraction. But the difference of effect size on HRR and functional capacity seemed not significant, when patients were divided by the criteria of EF 50%.

Table 1. Baseline characteristics

	Normal EF (n=15)	Low EF (n=18)	p-value
Age (year)	60.33±8.809	55.77±8.75	0.145
Sex (Man:Woman)	10:5	15:3	
Type (STEMI:NSTEMI)	9:6	12:6	
BMI (kg/m2)	25.3±2.06	24.54±1.99	0.155
Ejection fraction (%)	57.72±7.19	38.38±6.01	<0.001
Height (cm)	162.36±10.38	166.12±7.09	0.401
Weight (Kg)	66.42±9.61	67.99±8.49	0.486
DM	4	4	0.845
HTN	8	8	0.682
Dyslipidemia	4	6	0.941
Smoking	2	9	0.073
Alcohol drinking	14	16	0.943

Values are presented as mean±standard deviation or number of patients.

STEMI, ST-elevation myocardial infarction; NSTEMI, non-ST-elevationmyocardial infarction; BMI, body mass index; DM, diabetes mellitus; HTN, hypertension

Table 2. Comparison of exercise capacity in exercise tolerance test

	Normal EF (n=15)			Low EF (n=18)		
	Initial	3 month	p-value	Initial	3 month	p-value
HRrest	72.87±12.58	72.67±13.42	0.851	74.39±13.13	70.39±10.69	0.191
SBPrest	109.73±11.90	114.33±16.16	0.209	112.56±23.30	111.06±23.00	0.695
DBPrest	67.07±8.67	69.33±7.01	0.462	68.11±10.07	68.50±13.15	0.793
HRmax	140.27±18.66	155.80±20.94	0.011*	135.33±24.09	136.33±25.31	0.965
HRcool	118.87±14.61	127.60±14.10	0.052	114.44±19.13	110.72±19.28	0.257
HRcool5	97.00±15.33	94.93±14.44	0.729	96.33±15.11	89.61±11.76	0.014*
SBPmax	164.40±23.91	127.60±14.11	0.669	146.33±28.38	157.44±27.69	0.036*
DBPmax	79.47±9.50	81.80±10.13	0.660	80.61±15.78	78.56±17.23	0.906
VO2peak	24.15±5.22	26.24±5.68	0.158	23.13±6.44	26.22±7.23	0.025*
AT	19.43±3.58	20.32±6.55	0.510	19.47±5.21	20.65±5.69	0.185
Peak METs	6.94±1.49	7.79±1.68	0.064	6.61±1.84	7.49±2.07	0.025*
Exercise time	13.53±1.92	15.47±1.41	0.003*	12.72±2.89	14.67±2.54	0.002*
HRR1	21.40±7.81	28.20±14.31	0.068	20.89±12.52	25.61±16.03	0.144
HRR5	43.27±13.43	60.87±21.24	0.002*	39.00±17.96	46.72±19.04	0.013*

Values are presented as mean±standard deviation.

HRrest, resting heart rate; SBPrest, resting systolic blood pressure; DBPrest, resting diastolic blood pressure; HRmax, maximal heart rate; HRcool, heart rate 1 minute after cessation; HRcool5, heart rate 5 minutes after cessation; SBPmax, maximal systolic blood pressure; DBPmax, maximal diastolic blood pressure; VO2peak, peak oxygen consumption; AT, anaerobic threshold; METs, metabolic equivalent tasks; HRR1, heart rate recovery 1 minute after cessation; HRR5, heart rate recovery 5 minutes after cessation

***p<0.05 for comparison with initial results in each group by the Wilcoxon signed-rank test**

Table 3. Comparison of changes in exercise capacity after hospital-based cardiac rehabilitation

	Normal EF (n=15)	Low EF (n=18)	P-value
HRrest	-0.2±12.01	-4±11.66	0.478
SBPrest	4.6±15.73	-1.5±18.39	0.411
DBPrest	2.26±9.88	0.38±9.22	0.682
HRmax	15.33±18.37	1±10.61	0.009*
HRcool	8.73±14.39	-3.72±14.65	0.027*
HRcool5	-2.06±12.03	-6.72±10.08	0.033*
SBPmax	2.20±25.86	11.11±19.65	0.049*
DBPmax	2.33±12.32	-2.05±18.13	0.970
VO2peak	2.08±5.15	3.08±4.60	0.278
AT	0.89±5.36	1.17±4.09	0.423
Peak METs	0.85±1.55	0.08±1.31	0.628
Exercise time (min)	1.93±1.53	1.94±1.86	0.766
HRR1	6.8±12.60	4.72±12.68	0.551
HRR5	17.6±15.68	7.72±11.29	0.082

Values are presented as mean±standard deviation.

HRrest, resting heart rate; SBPrest, resting systolic blood pressure; DBPrest, resting diastolic blood pressure; HRmax, maximal heart rate; HRcool, heart rate 1 minute after cessation; HRcool5, heart rate 5 minutes after cessation; SBPmax, maximal systolic blood pressure; DBPmax, maximal diastolic blood pressure; VO2peak, peak oxygen consumption; AT, anaerobic threshold; METs, metabolic equivalent tasks; HRR1, heart rate recovery 1 minute after cessation; HRR5, heart rate recovery 5 minutes after cessation

***p<0.05 by Mann–Whitney U test**