CASE REPORT

Cardiac Rehabilitation in Patient with Inferior STEMI, CAD 3VD Post Stent to RCA, DM Type II, Dyslipidemia, and Obesity Grade I

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ABSTRACT

Objective: to assess the benefit of Cardiac Rehabilitation (CR) in patient with Inferior STEMI, CAD 3VD Post Stent to RCA, DM Type II, Dyslipidemia, and Obesity Grade I

Methods: A retired 59 years old man with presenting diagnosis of STEMI Inferior, CAD 3VD Post Stent to RCA, DM Type II, Dyslipidemia, and Obesity Grade I. His medical rehabilitation problems were myocardial ischemia post revascularization, immobilization, low endurance cardiorespiration, mild dependency of ADL, resolved chest pain and discomfort, and obesity grade I. His rehabilitation diagnosis (ICF) were B4 of body function and S4 of body structures in cardiovascular, immunological, and respiratory system functions; and D2 of activities and participation in general tasks and demands. His non-pharmacologic therapies of phase I CR program plans included patient education; chest physical therapy, such as deep breathing exercise, chest expansion exercise; mobility by sitting on a chair and walking around the room for about 5 – 10 minutes in duration, 2 – 3 times/ day under supervision; physical Activities about 2-3 Mets, and meet independent ADL. Five days after admission, patient underwent 2.5-3 Mets physical activities, starting from getting in and out of the bed with partially independent ADL. Pre-discharge examinations performed were 6 Minute Walking Test (6MWT). Patients were then assessed on the second week post-discharge for walking distance, VO2max, vital signs, O2 Saturation, Modified Borg Scale before and after tests.

Results: On the 5th day of hospitalization when meet the 2.5-3 Mets physical activities, patient was capable of walking for 100 meters with stabile vital sign (Before: BP 130/70mmHg, HR 70x/m, RR 18x/m, and SpO_2 98%; After: BP 131/65mmhg, HR 75x/m, RR 18x/m, and SpO_2 98%) and no significant symptoms presented. Pre-discharge 6MWT showed EF 62% without significant symptoms, maximum distance of 220 meters and VO_2 max associated with 3 Mets. Pre-test results showed BP 125/73 mmHg, HR 61 x/m, RR 18 x/m, and SpO_2 98%, and Modified Borg Scale 9-0-0. Post-test results included BP 142/76 mmHg, HR 71 x/m, RR 22 x/m, SpO_2 98%, Modified Borg Scale 11-0.5-0. On the second week post-discharge, the 6MWT was re-performed and showed maximum distance of 333 meters and VO_2 max was associated with 4 Mets. He presented no significant symptoms with stabile vital signs (Pre-test results: BP 120/80 mmHg, HR 87x/m, RR 18 x/m, SpO_2 97-98%, and Modified Borg Scale 7-0-0; Post-test results: BP 142/76 mmHg, HR 107 x/m, RR 20 x/m, SpO_2 96-98%, and Modified Borg Scale 9-0-0).

Conclusion: CR is essential in comprehensive care of cardiovascular disease patients considering it's effectivity and efficiency. CR should be monitored and carried out by highly trained health professional along with the active participation of patients and their families. CR will provide satisfying outcome if it is carried out and monitored in a good way.

Keywords: *Cardiac Rehabilitation, Coronary Artery Disease, Physical Therapy, Exercise, 6MWT*

INTRODUCTION

A heart attack is the end result of a chronic process called Coronary Artery Disease (CAD) or Atherosclerosis for the hardening of arteries. A slow fatty materials build-up (cholesterol plaque) along the inner walls of the coronary arteries causes the arteries to narrowing gradually. This reduces the blood flow to the heart muscle. These cholesterol plaques may rupture or even dislodge causes further narrowing of the artery. This allows the formation of blood clots and causes blood vessel obstruction, which in turn, disrupts blood supply to the heart muscle for an extended period of time. This is what causes a heart attack.[1]

Exercised-based Cardiac Rehabilitation (CR) is associated with the reduction of mortality rate and recurrent myocardial infarction (MI).[1] The World Health Organization (WHO) has defined CR as the sum of activities required to favorably influencing the underlying cause of the disease, as well as the best possible physical, mental, and social conditions, so that they may, by their own efforts, preserve or resume as normal human function as well as in the society. Rehabilitation cannot be regarded as an isolated form of therapy, but must be integrated within the entire treatment.[2,3] Therefore, CR should be part of a comprehensive cardiac management. It is highly suggested that CR should be initiated as early as possible, continuous, properly staged, and individualized depending on patients' clinical.

Myocardial ischaemia is caused by myocardial oxygen supply and consumption imbalance. Myocardial oxygen supply is determined by arterial oxygen saturation and myocardial oxygen extraction, which are relatively fixed under normal circumstances, and coronary flow, which is dependent on the luminal cross sectional area of the coronary artery and arteriolar tone.[4]

Ischaemia-induced sympathetic activation can further increase the severity of ischaemia through a variety of mechanisms including a further increase of myocardial oxygen consumption and coronary vasoconstriction. The ischaemic cascade is characterized by sequential events resulting in metabolic abnormalities, perfusion mismatch, regional and then global diastolic and systolic dysfunction, electrocardiographic (ECG) changes, and angina.[4]

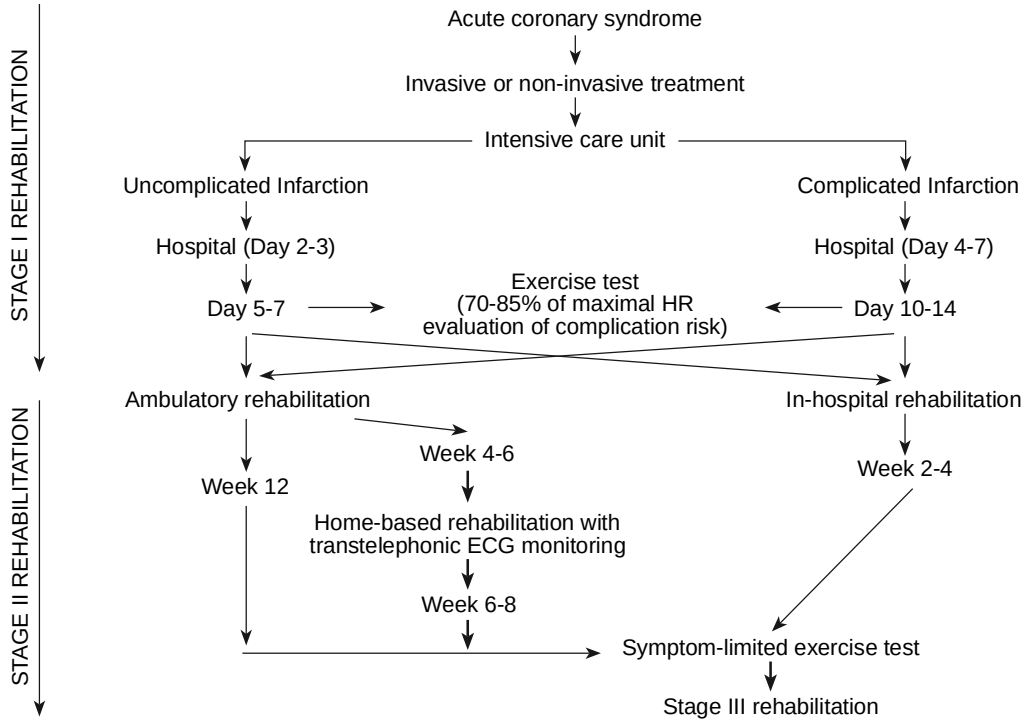

Figure 1. Scheme Overview Cardiac Rehabilitation in Myocardial Infarction[5]

METHODS

A retired 59 years old man, Mr. S came to the medical rehabilitation department with a chief complaint of chest pain since 2 hours ago before hospital admission. Accompanying symptoms included chest discomfort, pain and shortness of breath. His previous examination showed an abnormal result in heart and high blood pressure with chest pain. He received O_2 supply, ISDN sublingually, and oral Aspilet.

During his first heart attack, he felt chest compression with visual analog scale (VAS) of 6 with pain referring to the back and left arm, shortness of breath that relieved with rest and worsen with activities. He experienced no sweating, nausea, vomit, cough and fever. His ECG result showed ST-I depression, AVL + 160/100 mmHg, inferior STEMI while having nasal canule at 2 L/m. Two days after admission, patient was bedridden in ICCU with no chest pain and under vital sign and ECG monitoring.

Patient had past history of Diabetes Mellitus since 15 years ago and controlled with Antidiabetic drugs. His family history showed no sudden death, hyperlipidemia, arrhytmia, and hypertension. Patient ceased smoking 15 years ago. His functional history showed independent level of activities of daily living (ADL). He has been engaged in many community activities, such as being active in the mosque, dropped off and picked up his grand daughter from home to school. His cognitive state was persistent before and after illness. He preferred consuming fried meal and snacks, and didn't aware about daily dietary allowance. In the ICCU, he received DM diet with calories intake of 1500-1700 kcal with steamed rice and 43,2 gram protein.

Patient's physical examination results showed compos mentis; MMSE Score of 30; JVP of 5-2 cmH_20; no ronchi or wheezing in lung; cardiac left border was shifting 2 fingers away from the 5th ICS along the left midclavicular line, normal 1st / 2nd heart sound, no murmur, and no gallop presenting; thoracoabdominal breathing pattern; and chest expansion of 2-4-4. Patient had normal proprioceptive and coordination while presented with glove and stocking phenomenon around 20% reductions in hand and foot.

His supportive findings demonstrated ejection fraction (EF) of 62%, tricuspid annular plane systolic excursion (TAPSE) of 19.1 based on Echocardiogram defined inferior hipokinetic, PW hypertrophy, good RV & RV systolic, and diastolic function; his cardioangiography identifid normal left main stem (LMS), 90% stenosis of left anterior descendent (LAD) and left circumflex (LCX), and total occlusion of right coronary artery (RCA) that concluded coronary artery disease (CAD) with three vessel diseases (3VD), post percutaneous transluminal coronary angioplasty (PTCA) with 3 stents of drug-eluting stent (DES) at the right coronary artery (RCA).

Patient's working diagnosis were day 6th of Inferior STEMI, thrombolysis in myocardial infarction (TIMI) score of 4 post urgent percutaneous coronary intervention (PCI); and history of total atrioventricular (AV) block on temporary pacemaker (TPM) for two days, CAD 3VD and post stent at RCA, DM type II on insulin, dyslipidemia, and obesity grade I.

Rehabilitation diagnosis were made according to the ICF showing B4 of body function and S4 of body structures in cardiovascular, immunological, and respiratory system functions; and D2 of activities and participation in general tasks and demands. Patient's prognosis included dubia ad vitam, bonam ad functionam, and dubia ad sanationam. Prognosis by risk of stratification consisted of low risk on EF, and mild risk of fall.

Short-term management goals were reducing chest pain and discomfort, preventing STEMI progression and immobilization. Furthermore, the long-term goals were motivating patient to build long-term commitment on CR program and encouraging

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him and his family to conduct a healthy lifestyle, and increasing cardiorespiratory endurance.

Patient received pharmacologic therapies of Ascardia 1x160 mg p.o, Simvastatin 1x20 mg, Plavix 1x75 mg p.o, Captopril 2x12,5 mg p.o, ISDN 5 mg k/p, Lanzoprazole capsule 1x30 mg, and Novorapid 3x12 IU intramuscular. He had non-pharmacologic therapies of phase I CR program plans, such as educating patient about his illness, adaptation to his condition and hospital environment, and the importance of early mobilization; Chest Physical Therapy, such as deep breathing exercise, chest expansion exercise; Out of bed mobility by sitting on a chair and walking around the room for about 5 – 10 minutes in duration, 2 – 3 times/ day under supervision; physical Activities about 2-3 Mets, and independent ADL.

Patient had to complete pre-discharge examinations, that was 6 Minute Walking Test (6MWT) in which the maximum distance and VO_2 max (Kahalin Formula) were recorded, including the vital signs, O_2 Saturation by pulse oximetry (SpO_2), and Indonesian version of Borg Scale to assess breathing difficulty or dyspnoea before and after tests (Table 1). Patients were then re-assessed on the second week post-discharge.

Table 1. Bord Scale – Indonesian Version Form

Effort	Dyspnoea	Tired, Aching Feet
6	0 No	0 No
7 Extremely easy	0.5 Not visible	0.5 Not visible
8	1 Very mild	1 Very mild
9 Very Easy	2 Mild	2 Mild
10	3 Moderate	3 Moderate
11 Easy/ Mild	4 Less Heavy	4 Less Heavy
12	5 Heavy	5 Heavy
13 Moderately heavy	6	6
14	7 Very Heavy	7 Very Heavy
15 Heavy	8	8
16	9	9
17 Very heavy	10 Extremely Heavy	10 Extremely Heavy
18	-	-
19 Extremely heavy	-	-
20	? Unbearable	? Unbearable

RESULTS

On the 5th day of hospitalization, patient met the 2.5-3 Mets physical activities and was able to perform 6MWT for 100 meters with stabile vital sign. Pre-test results showed blood pressure (BP) 130/70mmHg, heart rate (HR) 70x/m, respiratory rate (RR) 18x/m, and SpO_2 98%. Post-test results demonstrated BP 131/65mmHg, HR 75x/m, RR 18x/m, and SpO_2 98%; with no significant symptoms presented.

At pre-discharge examination, 6MWT were reassessed and showed EF 62% without significant symptoms, maximum distance of 220 meters and VO_2 max associated with 3 Mets. Pre-test results showed BP 125/73 mmHg, HR 61 x/m, RR 18 x/m, and SpO_2 98%, and Modified Borg Scale 9-0-0. Post-test results included BP 142/76 mmHg, HR 71 x/m, RR 22 x/m, SpO_2 98%, Modified Borg Scale 11-0.5-0.

Two weeks post-hospital discharge, the 6MWT was re-performed and showed maximum distance of 333 meters and VO_2 max was associated with 4 Mets. He admitted to be

active in the CR club. presented no significant symptoms with stabile vital signs (Pre-test results: BP 120/80 mmHg, HR 87x/m, RR 18 x/m, SpO_2 97-98%, and Modified Borg Scale 7-0-0; Post-test results: BP 142/76 mmHg, HR 107 x/m, RR 20 x/m, SpO_2 96-98%, and Modified Borg Scale 9-0-0).

DISCUSSION

Rehabilitation diagnosis made in accordance to ICF shows that patient's disability is greatly affected his body function (B4) and structures (S4) in cardiovascular, immunological, and respiratory system functions. However, his ability to perform general tasks and demands is affected mildly (D2). In more detail, patients has the following health problems, such as myocardial ischemia post revascularization, immobilization, low endurance cardiorespiration, mild dependency of ADL, resolved chest pain and discomfort, and obesity grade I.

His prognosis assessment during hospitalization indicates the uncertainties to live and cured whereas his function is likely to improved. Moreover, he is at low risk or even normal EF (62%) and mild risk of fall. However, he has to manage his DM, dyslipidemia, and Obesity as these would aggravate his disability.

During hospitalization, patient's short-term management goals are reducing chest pain and discomfort, preventing STEMI progression and immobilization. He is therefore receiving cardiovascular medications and the phase I of CR program plan as the non-pharmacologic therapy. He is then able to overcome his acceptance on current conditions and hospital environment, including his compliance to immobilize. Reducing his chest pain and discomfort, he performs chest physical therapy. Once he is confirmed to be ready to ambulate, he begins to move out of bed and sit on a chair and indoor walking in the room for about 5 – 10 minutes in duration, 2 – 3 times/ day under supervision. He needs to achieve 2-3 Mets of physical activities and independent ADL.

On the 5th day of hospitalization, patient is able to conduct 2.5-3 Mets physical activities, starting from getting in and out of the bed, however with partially independent ADL. Fortunately, he can accomplish 100 meters of walking distance with stabile vital signs and presenting no significant symptoms. His BP (pre- 130/70 mmHg, post- 131/65 mmHg), HR (pre- 70x/m, post- 75x/m) and RR (constant RR, 18x/m) are not compromised. Most importantly, his oxygen saturation is persistently 98%.

Before hospital discharge, patient re-performs the 6MWT and shows good tolerance despite of his EF 62%. He is able to complete a maximum distance of 220 meters and VO_2 max was associated with 3 Mets. No significant symptoms occurred during the test. His vital signs are also stabile (BP pre- 125/73 mmHg, post- 142/76 mmHg; HR pre- 61 x/m, post- 71x/m; RR pre- 18 x/m, post- 22x/m) and the O_2 Saturation remains 98%. Meanwhile, his Borg Scale changes show slightly increase effort (9 to 11), minimum invisible dyspnoea (0 to 0.5), and no presenting feet tiredness and aching (0) after completing 6MWT.

Once patient is stable and passes the acute phase, the biggest challenges are maintaining patient's commitment to sustain CR activities and encouraging him and his family to conduct a healthy lifestyle, and increasing cardiorespiratory endurance. These are the long-term management goals.

A week post-hospital discharge, patient is able to do indoor walking at home. Two weeks post-discharge, patient visits the hospital for a regular check up and admits being active in the CR club. He is now entering the ambulatory rehabilitation. He is able to walk outside the house and reaches 500 meters without experiencing significant symptoms. The 6MWT is re-performed and indicates patient's ability to reach maximum distance of 333 meters with VO_2max associated with 4 Mets. He produces no significant symptoms with satisfying cardiovascular responses with the following stabile vital signs (BP pre- 120/80 mmHg, post- 142/76 mmHg; HR pre- 87 x/m, post- 107x/m; RR pre- 18 x/m, post- 20x/m) and the less affected O_2 Saturation, which is around 96-98%. Furthermore, his Borg Scale changes show significantly mild effort (extremely easy (7) to very easy (9)), no dyspnoea and feet tiredness

and aching (0) after completing 6MWT.

Patient is then suggested for home-based CR program (stage II to advance CR stages), such as exercise 3x/weeks for 30 minutes maximum; if possible, increase the distance by 100 meters per exercise. His HR before and after exercise (walking) have to be recorded. He has to do stretching before and after exercise; beware of any symptoms while exercising and remember to stop if symptom(s) occur or do breathing exercise regularly when exercise and after or when symptom(s) appear; adequate nutrition and sleep; and body weight reduction.

CONCLUSION

CR should be integrated in a long comprehensive care of cardiac patients and into the existing healthcare systems at the modest cost. The programs or services should be carried out by highly trained health professionals with active participation of patients themselves and their families. Services should be available to all patients with cardiovascular disease, both children and adults. Health professional at the local level should be trained as a coordinator to ensure the implementation of CR program. Thus, provision to evaluate program's efficacy should and can be maintained.

REFERENCES

1. Thames, Sease, Damian A. Ischemic Heart Disease. An Overview. Adv Stud Med. 2004;4:794-802.
2. Lawler PR, Fillion KB, Eisenberg MJ. Efficacy of exercise-based cardiac rehabilitation post-myocardial infarction: A systematic review and meta analysis of randomized controlled trials. Am Heart J. 2011;162: 571 – 84.
3. Braddom RL. Physical Medicine and Rehabilitation. 3rd ed. Missouri: Elsevier Limited; 2007. p.709–38.
4. Sami, S, Willerson J. Contemporary Treatment of Unstable Angina and Non-ST-Segment-Elevation Myocardial Infarction (Part 2). Tex Heart Ins J. 2010; 37(3):262-75.
5. Piotrowicz R, Wolszakiewicz J. Cardiac rehabilitation following myocardial infarction. Cardiol J. 2008;15: 481–7.