Seizing the Second Chance: Delayed Referral to Cardiac Rehabilitation Following CABG in a Middle-Aged Male with Uncontrolled Hypertension and Obesity: A Case Report

Arpita A. Bhondve[1] Varoon C. Jaiswal[1]

[1] Department of Cardiovascular and Respiratory Physiotherapy, MAEER's Physiotherapy College, Talegaon Dabhade, Maharashtra, India

Address for correspondence Varoon C. Jaiswal, PhD, MAEER's Physiotherapy College, Talegaon Dabhade, Maharashtra, India (e-mail: drvaroon@gmail.com).

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Abstract

This case report describes a male patient, referred to the physiotherapy department 2 years and 6 months after coronary artery bypass grafting. After assessment and 1 month of a customized, supervised exercise program, there was significant improvement in the 6-minute walk distance and 12-Item Short Form Survey scores, indicating a considerable increase in overall quality of life.

Keywords

- CABG
- cardiac rehabilitation
- hypertension
- obesity
- referral

Introduction

In the past few decades, coronary heart disease (CHD) and coronary artery bypass grafting (CABG) cases have risen in India, impacting patients' quality of life, exercise tolerance, psychological well-being, and cardiopulmonary function. Cardiac rehabilitation (CR) is crucial post-CABG.[1–3] Despite being recommended by the American Heart Association, CR remains underutilized by patient with cardiovascular disease and patient who has undergone cardiac surgery.[4,5] Reason behind low CR participation and completion rate is multifactorial and includes– low rate of referral by physician; lack of physician endorsement which can be attributed to low levels of awareness among the physicians and patient- related factors such as presence of multiple medical comorbidities, lower socio- economic status of patients and the associate psychological factors.[6,7]

This case report is an example that even after delayed referral to CR, there can be improvement in cardiopulmonary endurance and overall quality of life by supervised exercise training program.[8]

Case Report

A 56 years old male, carpenter, was referred to a cardiovascular and respiratory physiotherapy outpatient clinic for exercise prescription. On interviewing, the patient complained of dyspnea and chest tightness on exertion (New York Heart Association Class 2), along with uncontrolled blood pressure (BP) 160/110 mm Hg. History consisted of CHD for 3 years, hypertension for 23 years, and on interviewing him further, his personal history disclosed that he had been a chronic alcoholic for 35 years; he also had a family history of hypertension, and he underwent CABG 2 years and 6 months ago. Coronary angiography reports showed signif-

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icant blockage, with 85% blockage in the left anterior descending artery, 90% blockage in the left circumflex artery, and complete blockage (100%) of the right coronary artery. The echocardiogram showed that the ejection fraction was reduced to 55%. During CABG three grafts were taken from the left internal mammary artery to the left anterior descending artery, right saphenous vein to obtuse marginal artery, and left saphenous vein to the posterior descending artery. Following surgery, the patient was prescribed antihypertensive, antihyperlipidemic, and antiplatelet drugs. During general examinations, the resting vital signs were as follows: BP 138/92 mm Hg, pulse rate (PR) 80 beats per minute (bpm), respiratory rate 22 bpm, and body mass index 34.3 kg/m^2. The patient was currently on antihypertensive and nitrate medications. Considering the patient's fluctuating BP, an exercise protocol was initiated to address these issues. The protocol began with Jacobson relaxation techniques involving guided imagery and breathing exercises, followed by mobility exercises. This protocol was followed for a week to allow the patient to acclimate to exercises.

Then after a week, a 6-minute walk distance (6MWD) was conducted following the guidelines set by the American Thoracic Society.[9] During the test, the patients completed 240 meters. Prior to the 6MW test, the patient's vital signs were measured as follows: BP of 130/89 mm Hg, Oxygen saturation 98% on room air, PR 80 bpm, and rating of perceived exertion (RPE) 11 on a 6 to 20 Borg scale. Following the 6MW test, the patient's postvitals were recorded as BP of 146/102 mm Hg, Oxygen saturation of 98%, PR of 89 bpm, and an RPE of 13. Patient's vital parameters returned to baseline within 5 minutes post-intervention. An individualized exercise protocol was formed based on clinical assessment and 6MWD results. It included warmup, interval training (30 seconds fast up to RPE 12, 30 seconds slow up to RPE 9), level walking, cross-trainer, and cool down. Strength training was prescribed based on patient's one repetition maximum (1 RM) and 10 repetition maximum (10 RM), following the American College of Sports Medicine guidelines. The details of the exercise protocol are listed in ►**Table 1**.

The patient's pre-rehabilitation BP was high at 138/96 mm Hg, but decreased significantly to 124/78 mm Hg after the program. The pre-rehabilitation RPE was 13 on the Borg scale, whereas the post-rehabilitation RPE was 6. Initially, the baseline PR was 95 bpm, but after rehabilitation, it decreased to 80 bpm (►**Fig. 1**). ►**Fig. 1** provides a graphical representation of the scientific data, indicating improved PR regulation due to the programs and effectiveness. ►**Table 2** shows the patient's pre- and postvitals. ►**Table 2** outlines the weekly pre- and postrehabilitation vitals of the patient. ►**Table 2** presents scientific findings and data in a structured format.

The 12-Item Short Form Survey (SF-12) survey results obtained before the rehabilitation program showed a physical score of 40.5 and a mental score of 49.5. After completing the program, a follow-up SF-12 assessment demonstrated significant improvements in both physical and mental scores. The postrehabilitation physical score increased to 56.5, and the mental score increased to 60.75. These improvements indicated a significant enhancement in overall well-being through the rehabilitation program. ►**Fig. 2** illustrates the graphical representation of SF-12 scores and 6MWD both before and after rehabilitation, providing insight into the efficacy of the intervention.

Discussion

In this case report, the individual initially had a lower 6MWD than the predicted value, but after exercise-based rehabilitation, there was a significant improvement of 110 m in the

Table 1 Exercise training protocol

Parameters	**Aerobic**
Frequency	5 times/wk
Intensity	40–60% HR max, i.e., 6–10 on 6–20
	Borg RPE scale
Time	40–45 min
Type	Aerobics
Parameters	**Resistance training**
Frequency	2–3 d/wk
Intensity	30–40% of 1 RM for upper extremity
	50–60% of 1 RM for lower body
	[Load was increased by 5% increments when the patient can comfortably lift 12 to 15 repetitions]
	Rating of RPE of 11 to 13 was used on 6–20 Borg RPE scale as a subjective guide of effort
Duration	2 sets of 10–12 repetition
Type	Resistance training involving
	3–4 large muscle group of upper limbs and lower limbs
	.

Abbreviations: HR, heart rate; RM, repetition maximum; RPE, rate of perceive exertion.

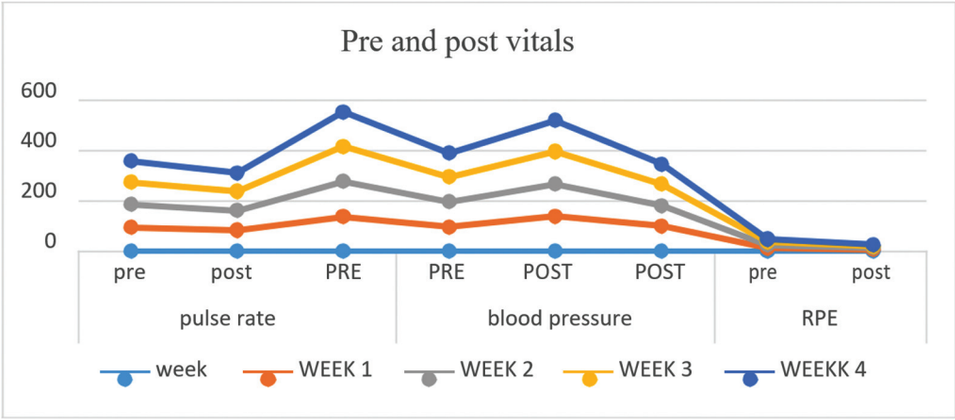

Fig. 1 Graphical representation of pre- and postcardiac rehabilitation vitals.

Table 2 The weekly pre- and postcardiac rehabilitation vitals of the patient

Training	Average blood pressure (mm Hg)		Average pulse rate (beats/min)		Average RPE	
	Pre	Post	Pre	Post	Pre	Post
• **Week 1** • Relaxation (Jacobson, guided imagery, breathing exercises) • Upper limb and lower limb mobility exercises.	138/96	140/100	95	84	13	7
Week 2 cardiac rehab program						
	Pre	Post	Pre	Post	Pre	Post
• Warmup	140/100	124/86	95	78	11	09
• Aerobic training 1. Level walking 2. Cycling (30 s fast, 30 s slow) 3. Cross-trainer	124/86	138/92	82	90	06	11
• Cool Down	138/88	128/82	86	78	11	06
Week 3 cardiac rehab program						
• Warmup	138/100	128/86	85	74	13	09
• Aerobic training 1. Level walking 2. Cycling (30 s fast, 30 s slow) • Strength training (3–4 major muscles)	124/86	138/90	82	90	06	11
• Cool down	134/86	128/86	88	78	11	06
Week 4 cardiac rehab program						
• Warmup	138/94	132/88	84	78	11	09
• Aerobic training 1. Level walking 2. Cycling (30 s fast, 30 s slow) • Strength training (3–4 major muscles)	132/84	138/90	82	90	09	11
• Cool down	138/90	124/78	86	80	11	06

Abbreviation: RPE, rate of perceive exertion.

6MWD. The RPE also improved by two points. The SF-12 scale demonstrated a significant enhancement in quality of life, with a 16-point improvement in the physical score and an 11.2 improvement in the mental score.

In this case report, physiotherapy rehabilitation led to clear improvements in the walking distance and quality of life. The patient's walking distance improved by 110 m and the perceived exertion decreased on the Borg scale.

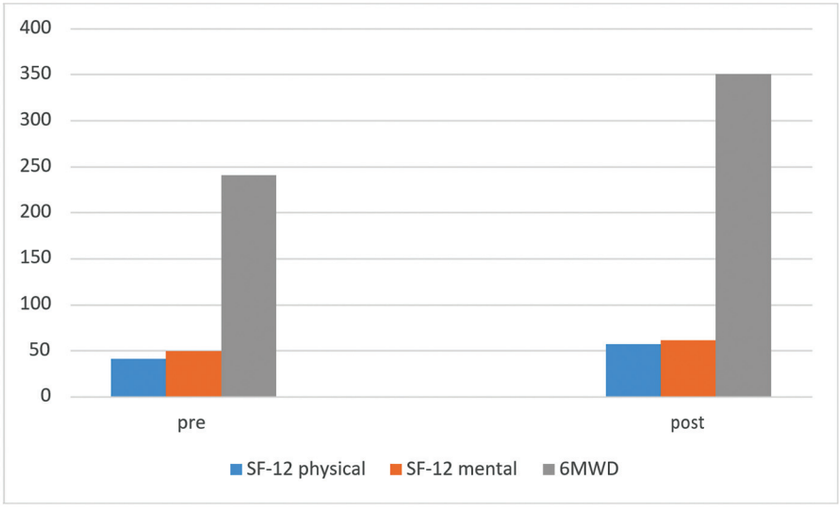

Fig. 2 Graphical representation of 12-Item Short Form Survey (SF-12) and 6-minute walk distance (6MWD) pre- and postrehabilitation.

The SF-12 scores showed improvements in both the physical and mental domains of quality of life compared with prerehabilitation. The drawback of the current study is that it is a single case report; therefore, it needs to be replicated in a larger sample through a randomized controlled trial.

Conclusion

The patient experienced positive changes after the training program, including weight and BP reduction, decreased anxiety and depression, better sleep, and overall better quality of life. Exercise training benefits post-CABG patients by enhancing functional capacity, reducing cardiovascular risk factors, and improving psychosocial outcomes and overall well-being.

Note

The manuscript has been read and approved by all the authors, the requirements for authorship, as stated in this document, have been met, and each author believes that the manuscript represents honest work if that information is not provided in another form.

Conflict of Interest

None declared.

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