CASE REPORT

Convalescent Rehabilitation for an Elderly Patient with Giant Cell Myocarditis: Case Report

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Background: Giant cell myocarditis (GCM) is a rare inflammatory heart disease that, left untreated, rapidly progresses and is fatal without transplantation. Most patients with GCM die of congestive heart failure, but some survive for long periods, often after receiving immunosuppressive therapy. Although rehabilitation is crucial for improving activities of daily living (ADL) after discharge, no reports are available on the rehabilitation of patients with GCM. Here, we report the case of an elderly patient with GCM who was hospitalized for rehabilitation in the recovery phase. Case: The patient was a 78-year-old woman who was hospitalized because of the exacerbation of chronic heart failure. She was diagnosed with GCM based on the histological findings. The patient was administered immunosuppressive therapy, and intra-aortic balloon pumping, percutaneous cardiopulmonary support, and artificial respiration were performed. Cardiac function gradually improved, and the patient was transferred to our hospital for convalescent rehabilitation. Rehabilitation, including calisthenics, upper and lower limb resistance training, walking, and endurance exercise on a bicycle ergometer, improved the patient’s physical function, ADL, and cardiac function. Discussion: Rehabilitation was safely and effectively conducted in a patient with GCM. This single report might be considered inadequate for ascertaining the efficacy of rehabilitation for patients with GCM, but it could be used as a reference when considering rehabilitation for other GCM patients.

Key Words: chronic heart failure; convalescent rehabilitation; giant cell myocarditis; immunosuppressive therapy

INTRODUCTION

Giant cell myocarditis (GCM) is a rare inflammatory heart disease that rapidly progresses and is fatal without transplantation.1–3) Most patients with GCM die of congestive heart failure, but some survive for long periods, often after receiving immunosuppressive therapy.2) Transplant-free survival of patients treated with immunosuppressive therapy since diagnosis was reported to be 77% at 1 year and 63% at both 2 and 5 years.3) Rehabilitation is crucial for improving activities of daily living (ADL) after discharge. To the best of our knowledge, to date, only one case report of rehabilitation in a patient with myocarditis other than GCM has been published.4) No reports are currently available on rehabilitation for patients with GCM. Here, we report the case of an elderly patient with GCM who was hospitalized for rehabilitation in the recovery phase.

CASE

A 78-year-old woman with a history of pituitary tumor was admitted to an acute hospital with the chief complaint of chest pain. Ischemic heart disease, sarcoidosis, and myocarditis were suspected, but these conditions were not identified by coronary angiography or endomyocardial biopsy. Five months later, the patient presented with general fatigue and weight gain. Chest radiography revealed cardiac dilatation (cardiothoracic ratio, 67.0%) and pleural effusion without pulmonary congestion. Electrocardiography revealed normal sinus rhythm with incomplete right bundle branch block (IRBBB). Transthoracic echocardiography revealed that the left ventricular (LV) end-diastolic diameter (LVDd) and end-systolic diameter (LVDs) were 49 and 45 mm, respectively. Hypokinesis of the anteroseptal portion with LV systolic...
dysfunction [LV ejection fraction (LVEF), 39.0%] and moderate pericardial effusion were observed. The patient was hospitalized because of exacerbation of chronic heart failure and was diagnosed with GCM based on the histological findings from hematoxylin–eosin staining of samples from the right ventricle on day 1 of an acute hospital. These samples showed giant cell infiltration, necrotic eosinophils, and severe myocardial contusion. The patient was administered immunosuppressive therapy comprising a 3-day course (from days 2 to 4) of intravenous methylprednisolone sodium succinate (Solu-Medrol® 1000 mg), followed by a maintenance dose of 50 mg prednisolone (Predonine®) daily from day 5 (which was gradually tapered to 15 mg daily), and cyclosporine (Neoral®; target serum concentration, 100–150 ng/ml) from day 4. Additionally, intra-aortic balloon pumping (IABP) was performed from day 3 and percutaneous cardiopulmonary support (PCPS) and artificial respiration was performed from day 4. The patient’s cardiac function gradually improved; weaning from PCPS was carried out on day 10, weaning from IABP on day 11, and weaning from artificial respiration on day 12. Rehabilitation was initiated on day 15. Eventually, on day 99, the patient was able to walk 400 m per day using a T-cane. Subsequently, the patient was transferred to our hospital for convalescent rehabilitation on day 100.

On admission to our hospital, the patient’s height and weight were 160 cm and 38.5 kg, respectively. All vital signs were normal (blood pressure, 102/61 mmHg; heart rate, 81 beats/min (regular); respiratory rate, 19 breaths/min; percutaneous arterial oxygen saturation, 99%). Assessment of heart sounds revealed a systolic ejection murmur on the left border of the second intercostal sternum. The patient was classified as New York Heart Association (NYHA) class I. Chest radiography showed cardiac dilatation (cardiothoracic ratio, 59.8%) without pleural effusion and without pulmonary congestion. Electrocardiography revealed IRBBB with negative T waves in leads III and aVF. Transthoracic echocardiography indicated that the LVDd and LVDs were 49 and 34 mm, respectively. LVEF was 58.0%, with normal LV systolic function. The troponin T level was < 100 ng/L, and the N-terminal pro-B-type natriuretic peptide (NT-ProBNP; 1734 pg/ml) level was elevated. The patient was treated with prednisolone (15 mg daily), cyclosporine (100 mg daily), enalapril maleate (Renviace®, 1.25 mg daily), carvedilol (Artist®, 2.5 mg daily), spironolactone (Aldactone-A®, 50 mg daily), edoxaban tosylate hydrate (Lixiana®, 30 mg daily), sulfamethoxazole/trimethoprim [Bactrim®; 400/80 mg daily], dried ferrous sulfate (Fero-Gradumet®, 105 mg daily), magnesium oxide (990 mg daily), esomeprazole magnesium hydrate (Nexium®, 20 mg daily), and insulin aspart (NovoRapid®; 26 units per day, three times/day before each meal). The Hasegawa Dementia Rating Scale–Revised score was 27. The gross muscle testing (GMT) score was 4 for both the upper and lower limbs and 3 for the trunk. The range of joint motion was not restricted. The Functional Independence Measure (FIM) score was 80 (45 for motor items and 35 for cognitive items). Rehabilitation was aimed at achieving independent walking and improving ADL in the patient. The patient underwent three 20-min sessions of three to five Metabolic Equivalent of Tasks of physical activity for physical therapy (PT) and occupational therapy (OT) daily (i.e., six sessions daily for approximately 90 days). Subsequently, calisthenics, upper and lower limb resistance training, walking, and endurance exercise on a bicycle ergometer were planned. Before initiating rehabilitation, vital signs, weight, and pedal edema were checked. During rehabilitation, the exercise intensity was adjusted based on the vital signs and Borg scale indices. The Japanese Circulation Society (JCS) and Japanese Association of Rehabilitation Medicine (JARM) standards were used for discontinuing rehabilitation.5,6 After rehabilitation, the patient’s vital signs and any physical changes were carefully monitored. Heart failure was monitored through changes in subjective symptoms (e.g., general fatigue and dyspnea on effort), weight gain (increases ≥ 2 kg/week), increased heart rate, and NT-ProBNP levels. In the absence of any of these negative indicators, the exercise intensity was gradually increased. Informed consent for this program of rehabilitation was obtained from the patients and her family.

For PT, calisthenics, upper and lower limb resistance training, and walking were initiated on day 1. The calisthenics regimen involved static stretches performed in a seated position, with each stretch held for at least 10 s. Resistance training was conducted at an intensity of 50%–60% of one repetition maximum, and two upper limb and two lower limb exercises were carried out. Two sets of ten repetitions were performed for each upper and lower limb exercise. Walking using a walking assistance device (WAD) was initiated at a distance of 120 m. The distance was gradually increased at an approximately perceived exertion rating of 11–13 on the Borg scale. Subsequently, the patient was able to walk for 1000 m using a WAD; gait training using a T-cane was then initiated on day 20. On day 22, the patient was able to walk continuously for 233 m in 6 min using a WAD. The NT-ProBNP level was 1215 pg/ml on day 27. Further, the patient could walk for 2000 m using a WAD or T-cane, and independent walking was initiated on day 33. Endurance exercise carried out on
A bicycle ergometer (Medergo EM-350; OG Wellness Technologies Co., Ltd. Okayama, Japan) was conducted on day 35. The exercise intensity and the target total exercise duration were 10 N m and 5 min, respectively. Except during formal rehabilitation training, nurses implemented gait training after hospitalization day 36. Climbing up and down a staircase was started with 20 steps on day 40 and was increased to 60 steps on day 42. Outdoor walking using a T-cane was started with 500 m distance on day 44. Walking using a T-cane as unsupervised exercise therapy was initiated on day 50. The NT-ProBNP level was 1152 pg/ml on day 58. On day 64, outdoor walking using a T-cane was increased to >1000 m, and the patient was able to walk for >3000 m per day. As part of the OT regimen, resistance training was performed on days 1 and 2, and training of activities related to bathing was conducted on day 58. The patient underwent six PT sessions every day, except when OT was conducted. On day 85, the GMT score recorded for the patient was 5 for the both upper and lower limbs and the trunk. The 6-min walking test (SMWT) distance was 276 m, and the total distance walked per day was 3700 m; additionally, the patient’s FIM score improved to 123 (88 for motor items and 35 for cognitive items), and a decrease in NT-ProBNP level to 1109 pg/ml was observed without exacerbation of heart failure (Fig. 1). Vital signs were mostly within the normal ranges, and no marked changes were observed in the patient’s weight or NYHA class during hospitalization (Fig. 2). The patient, treated with prednisolone (15 mg daily) and cyclosporine (100 mg daily), was discharged on day 86. She was instructed to perform home exercises, such as calisthenics, upper and lower limb resistance training, and walking for 1000–2000 m three to five times per week.

This study was approved by the Research Ethics committee of Toyonaka Heisei Hospital and was carried in accordance with the principles of the Declaration of Helsinki and CARE guidelines.
Informed consent was obtained from the patient for publication of this case report.

**DISCUSSION**

Convalescent rehabilitation improved the physical function, ADL, and the cardiac function of a patient with GCM. Exercise loading is contraindicated for patients with acute myocarditis. However, our patient, who had non-acute myocarditis, successfully underwent rehabilitation. The reported average age of patients with GCM is 50 years, and GCM is a frequently fatal myocardial disease in young and middle-aged adults. Our patient was a 78-year-old woman; however, despite her advanced age, she was able to perform rehabilitation without any problems, such as marked cardiac dysfunction, movement disorders, cerebral stroke, or dementia.

Immunosuppressive therapy was continued during hospitalization. This therapy is considered as the mainstay of treatment in patients with GCM. Immunosuppressive therapy reportedly arrests the disease process in two-thirds of patients with GCM, resulting in clinical remission that is sufficient for transplantation-free survival. Although data are insufficient to provide guidance for immunosuppressive therapy for long-term maintenance of remission in GCM, abrupt withdrawal of immunosuppression can result in...
In patients receiving immunosuppressive therapy, the main presenting manifestations include heart failure, high-grade atroventricular block, complete atroventricular block, ventricular tachyarrhythmias, and an acute myocardial infarction-like syndrome with sudden death, despite the patient having normal epicardial coronary arteries. Following discontinuation of rehabilitation using the JCS and JARM standards and careful monitoring of vital signs and physical changes in the current patient, no cardiovascular events, such as GCM exacerbation, were noted during the intervention period.

Rehabilitation using exercises such as calisthenics, upper and lower limb resistance training, walking, and endurance exercise on a bicycle ergometer was reported to improve physical capacity and exercise tolerance in a patient with chronic-stage polymyositis complicated by post-myocarditis cardiomyopathy. Moreover, aerobic exercise, such as walking, mainly improved the patient’s condition. The SMWT, upper and lower limb muscle strength, and gait velocity are known to be relevant in the prognosis and readmission of patients with heart failure. For our current patient, an improved prognosis and readmission reduction are expected because all the abovementioned parameters improved with rehabilitation. Both supervised and unsupervised exercise therapies reportedly improved the physical capacity and exercise tolerance in a patient with post-myocarditis cardiomyopathy. Our patient performed unsupervised exercise (walking using a T-cane) during hospitalization and was instructed to continue the same at home after discharge. Home exercises (e.g., aerobic exercise and resistance training) should be carried out by the patient three to five times per week, as recommended by the current guidelines.

To summarize, rehabilitation was safely and effectively conducted in a patient with GCM. This single report might be considered inadequate to ascertain the efficacy of rehabilitation for patients with GCM in general, but the data shown here could be used as a reference for other GCM patients undergoing rehabilitation.

ACKNOWLEDGEMENTS

This work was not supported by any grant.

CONFLICTS OF INTEREST

The authors report no conflicts of interest.
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