

Role Of Physiotherapy Rehabilitation in Post-Transplant Polymyositis: A Case Report of Graded, Phase Wise Rehabilitation in An Elderly Heart-Transplant Recipient

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Abstract—Background: Polymyositis is a rare idiopathic inflammatory myopathy characterized by symmetrical proximal muscle weakness. Its appearance in a patient who is already living with a transplanted heart is exceptional, because chronic immunosuppression is generally expected to protect against new-onset autoimmunity. Little guidance exists on structuring physiotherapy for such a patient, in whom myositis-related weakness, transplant physiology, advanced age and deconditioning coexist. Case presentation: A 77-year-old man who had undergone orthotopic heart transplantation in 2019, and who had remained functionally independent thereafter, developed insidious, gradually progressive bilateral lower-limb weakness of about one year's duration, first declaring itself as a sudden giving-way of the legs while driving. He subsequently developed generalized weakness, weight loss, dysphagia, cutaneous changes, painful lower-limb spasms, a dropped-head posture with marked cervical flexion and a kyphotic attitude. Investigations revealed an elevated creatine phosphokinase level, low vitamin B12, and electromyographic features of myopathy, and a diagnosis of polymyositis was made. An eight-month, four-phase physiotherapy program was designed, progressing from passive range-of-motion exercises and Rood's sensorimotor facilitation through active-assisted, free active and finally resisted exercise, together with tendo-Achilles and cervical stretching, McKenzie-based cervical retraction, sit-to-stand training, standing balance, reach-outs and progressive gait training, with the protocol reviewed and advanced monthly.

Outcomes: Manual muscle testing of the major proximal groups improved from an average of grade 3/5 to 4+/5, six-minute walk distance increased from 200 m to 350 m, Timed Up and Go time fell from 90 s to 50 s, Fatigue Severity Scale score reduced from 6/7 to 3/7, pain on the visual analogue scale fell from 7/10 to 2/10, the dropped-head attitude improved from approximately 90° to 0° of

lateral flexion, and Short Form-36 physical functioning and vitality domains improved. The patient progressed from walker-dependent ambulation to independent standing for activities of daily living. **Conclusion:** A structured, criterion-progressed physiotherapy protocol appears safe and effective in polymyositis presenting after heart transplantation, and early diagnosis with graded rehabilitation may be central to restoring function and quality of life in this rare clinical setting.

Index Terms—polymyositis; heart transplantation; physiotherapy; rehabilitation; inflammatory myopathy; dropped head; case report

I. INTRODUCTION

Polymyositis is a chronic idiopathic inflammatory myopathy in which skeletal muscle is injured by an immune-mediated process dominated by lymphocytic infiltration of the endomysium, producing symmetrical, predominantly proximal muscle weakness that evolves over weeks to months^{1,2}. When comparable muscle disease occurs together with the characteristic rash the condition is labelled dermatomyositis, whereas the term polymyositis is reserved for disease that spares the skin^{1,3}. Although its precise cause remains unknown, the disorder shares the hallmarks of autoimmunity, and its diagnosis rests on the combination of clinical weakness, elevated muscle enzymes, myopathic electromyography and, where performed, muscle histology, as embedded in the Bohan and Peter framework and the more recent EULAR/ACR classification criteria^{3,4}.

Beyond limb weakness, polymyositis may involve the pharyngeal and esophageal musculature, producing dysphagia with attendant weight loss and the risk of

aspiration pneumonia, and may affect the respiratory pump sufficiently to cause exertional breathlessness or, rarely, ventilatory failure^{1,5}. Axial involvement can manifest as weakness of the neck extensors with a dropped-head attitude and stooped posture. These extra muscular and axial features contribute substantially to the morbidity and mortality of the disease^{5,6}.

Cardiac involvement deserves particular emphasis. Although once considered uncommon, it is now recognized in a large proportion of patients when sought systematically encompassing myocarditis, cardiomyopathy, conduction-system disease, coronary artery disease, valvular abnormalities and pericardial disease and it ranks among the leading causes of death in inflammatory myopathy^{7,8}. Autopsy and clinical series have documented myocardial inflammation and heart failure at variable frequencies^{9,10}, electrocardiographic abnormalities are described in a majority of patients⁷, and, at the extreme end of the spectrum, dilated cardiomyopathy attributable to polymyositis has culminated in orthotopic heart transplantation¹¹.

The reverse sequence of an inflammatory myopathy declaring itself for the first time after solid-organ transplantation, in a patient on maintenance immunosuppression is far rarer. Isolated reports describe biopsy-proven polymyositis-like inflammatory myopathy in liver and kidney recipients receiving calcineurin-inhibitor therapy¹², and myositis is a recognized, if uncommon, neuromuscular complication after hematopoietic stem-cell transplantation¹³. To the best of our knowledge, a physiotherapy led rehabilitation program for polymyositis arising after heart transplantation has not previously been described in detail.

Therapeutic exercise, once discouraged in myositis for fear of aggravating muscle inflammation, is today regarded as an essential component of management: accumulated evidence supports both the safety and the efficacy of graded exercise across the idiopathic inflammatory myopathies^{14,15}. The present report describes the design, phase wise progression and outcomes of an eight month physiotherapy protocol in an elderly heart transplant recipient with polymyositis, a clinical intersection in which published rehabilitation guidance is essentially absent.

II. CASE PRESENTATION

1. Patient information and history

This report has been prepared in line with the CARE case report guidelines¹⁶. A 77-year-old man had undergone orthotopic heart transplantation in 2019 and had thereafter remained on long-term maintenance immunosuppressive therapy with well-preserved fitness and full independence in daily life. His present illness began abruptly when, while driving, he experienced sudden weakness of the lower limbs that resulted in a road accident, after which he restricted himself to rest at home.

Over the following months he developed insidious, gradually progressive bilateral lower-limb weakness of approximately one year's duration, accompanied by cutaneous changes, sudden painful spasms in the lower limbs, generalized body weakness, unintentional weight loss and difficulty in swallowing. He went on to develop an inability to hold the head erect, adopting a dropped-head posture with an associated kyphotic attitude of the trunk, a pattern consistent with the dropped-head syndrome described in neuromuscular disease¹⁷. He then consulted a physiotherapist, and a detailed assessment was undertaken.

2. Clinical findings and physiotherapy assessment

On examination the patient demonstrated symmetrical proximal-predominant weakness, most marked in the shoulder abductors and hip flexors, with manual muscle testing averaging grade 3/5 across the major proximal groups on the Medical Research Council scheme¹⁸.

Marked weakness of the cervical extensors produced a side flexed head attitude of approximately 40°, and the patient was unable to maintain horizontal gaze. He was dependent on a walker for ambulation and fatigued rapidly.

Baseline functional testing recorded a six-minute walk distance of 200 m¹⁹ and a Timed Up and Go time of 90 s²⁰, indicating severely limited functional mobility and a high falls risk. Fatigue was severe, with a Fatigue Severity Scale score of 6/7²¹, pain intensity was 7/10 on a visual analogue scale, and health-related quality of life measured with the Short Form-36 survey was reduced, particularly in the physical functioning and vitality domains²².

3. Diagnostic assessment

Following the physiotherapy assessment, the patient was advised to undergo laboratory investigation, which revealed an elevated creatine phosphokinase level together with a reduced vitamin B12 concentration. Electromyography demonstrated features of a myopathic process. In the light of the clinical picture, the enzyme profile and the electrophysiological findings, a diagnosis of polymyositis was made by the treating physicians, and medical management was instituted. In parallel, a structured physiotherapy protocol was planned, tailored to the coexisting realities of advanced age, transplant physiology and marked deconditioning, and it was agreed that the program would be reassessed and modified at the end of every month according to the patient's response.

III THERAPEUTIC INTERVENTION

An experimental single-case design was adopted, with the intervention delivered over eight months in four

two-month phases of graded intensity. The guiding principle was progression along the continuum from passive to active-assisted, free active and finally resisted exercise, advancing only when the preceding level was tolerated without post-exertional deterioration an approach consistent with contemporary recommendations that exercise in myositis be matched to disease activity and individual capacity^{14,15}.

Rood's sensorimotor approach was used throughout to facilitate muscle activation through controlled afferent stimulation²³, and cervical care combined stretching with McKenzie-based retraction and extension principles to address the dropped-head posture²⁴. Sustained stretching of the tendo-Achilles and cervical musculature (three repetitions with an 8–10 second hold) was continued across all phases to counter the tendency to contracture. The complete phase-wise protocol is summarized in Table 1.

Table 1. Phase-wise eight-month physiotherapy protocol. The program was reviewed at the end of each month and advanced or modified according to the patient's condition.

Phase (months)	Components	Dosage
Phase I (1–2)	Passive range-of-motion exercises for all limbs; ankle-toe movements; heel slides; Rood's sensorimotor facilitation; tendo-Achilles and cervical stretching; McKenzie cervical protocol	ROM/ankle-toe/heel slides: 10 repetitions × 3 sets Stretches: 3 repetitions, 8–10 s hold
Phase II (3–4)	Progression to active-assisted range of motion; ankle-toe movements; heel slides; dynamic quadriceps exercises; sit-to-stand training; walking with support; Rood's approach; stretching and McKenzie cervical protocol continued	Exercises: 10 repetitions × 3 sets Sit-to-stand: 5 repetitions Stretches: 3 repetitions, 8–10 s hold
Phase III (5–6)	Free active range-of-motion exercises; ankle-toe movements; heel slides; dynamic quadriceps; sit-to-stand; supported standing with functional reach-outs; walking with support; Rood's approach; stretching and McKenzie cervical protocol continued	Exercises: 10 repetitions × 3 sets Sit-to-stand: 5 repetitions Stretches: 3 repetitions, 8–10 s hold
Phase IV (7–8)	Active-resisted range-of-motion exercises; ankle-toe movements; heel slides; dynamic quadriceps; sit-to-stand; standing without support; reach-outs; Rood's approach; stretching and McKenzie cervical protocol continued	Exercises: 10 repetitions × 3 sets Sit-to-stand: 5 repetitions Stretches: 3 repetitions, 8–10 s hold

IV. FOLLOW UP AND OUTCOMES

The program was completed without adverse events, without post-exercise flares of muscle pain suggestive of disease aggravation, and without interruption to the patient's transplant follow-up.

After eight months, proximal muscle strength had improved substantially, with manual muscle testing rising from an average of grade 3/5 to 4+/5 in the major muscle groups, most notably the shoulder abductors and hip flexors. Functional mobility improved in parallel: six-minute walk distance

increased from 200 m to 350 m and the Timed Up and Go time fell from 90 s to 50 s. Fatigue severity reduced from 6/7 to 3/7 on the Fatigue Severity Scale, pain fell from 7/10 to 2/10 on the visual analogue scale, and Short Form-36 scores improved, particularly in the physical functioning and vitality domains, together with greater participation in social activities. The dropped-head attitude corrected from approximately

90° of forward flexion to approximately 40°, allowing the patient to regain horizontal gaze for most activities. Functionally, he progressed from walker-dependent ambulation at the outset to independent standing at the washbasin for self-care; the corresponding change in cervical posture is shown in Figure 2, and the pre–post outcome profile is summarized in Table 2 and Figure 3.

Table 2. Outcome measures before and after the eight-month physiotherapy program ADL: activities of daily living; MRC: Medical Research Council.

Outcome measure	Instrument	Pre-rehabilitation	Post-rehabilitation
Proximal muscle strength (average, major groups)	Manual muscle testing (MRC)	Grade 3/5	Grade 4+/5
Walking capacity	Six-Minute Walk Test	200 m	350 m
Functional mobility / falls risk	Timed Up and Go	90 s	50 s
Cervical posture (dropped head)	Side flexion attitude	≈40°	≈90°
Fatigue	Fatigue Severity Scale	6/7 (severe)	3/7 (moderate)
Pain intensity	Visual Analogue Scale	7/10	2/10
Health-related quality of life	Short Form-36	Reduced, lowest in physical functioning and vitality	Improved, particularly physical functioning and vitality
Ambulation status	Clinical observation	Walker-dependent	Independent standing for ADL; walking with minimal support



Fig:1(A)



Fig:1(B)

Figure 1. Functional status before and after rehabilitation. (A) Before: stooped, forward-flexed posture. (B) After: independent standing with neck holding



Fig:2(A)



Fig:2(B)

Figure 2. Cervical posture before and after rehabilitation. (A) Before: Head attitude with approximately 90° of lateral Flexion cervical due to marked neck opp. Lateral flexor weakness. (B) After: near-neutral head position (approximately 0° improvement) following cervical strengthening, stretching and McKenzie-based retraining. Reproduced with the patient's written informed consent.

Outcome measures before and after the 8-month physiotherapy programme

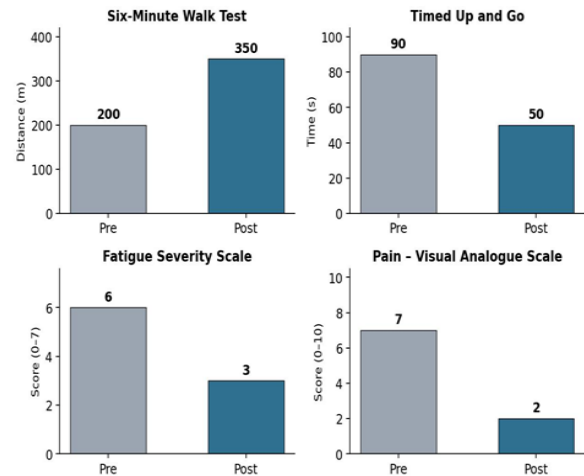


Figure 3. Pre-post comparison of quantitative outcome measures: six-minute walk distance, Timed Up and Go time, Fatigue Severity Scale and pain visual analogue scale.

V. DISCUSSION

This report is unusual in two respects: the direction of the transplant myositis relationship, and the age at which rehabilitation was undertaken. The published intersection of polymyositis and cardiac transplantation runs almost entirely in one direction myocardial involvement of the disease progressing to end-stage cardiomyopathy that is ultimately treated by transplantation^{7,11}. Here the sequence was reversed: an elderly recipient with a well-functioning graft, several years after surgery and on maintenance immunosuppression, developed a new inflammatory myopathy. New onset polymyositis in this setting is counter intuitive, because calcineurin inhibitor-based regimens suppress the very T-cell responses that drive the disease; nevertheless, biopsy confirmed polymyositis has been reported in solid organ recipients on tacrolimus¹², and inflammatory myopathy is a recognized complication in the transplant population more broadly¹³. The differential diagnosis in such patients is wide encompassing drug related toxic myopathies, corticosteroid myopathy and deconditioning and in the present case the combination of progressive proximal weakness, dysphagia, elevated creatine phosphokinase and myopathic electromyography pointed to an inflammatory process^{1,3}.

The clinical burden in this patient was dominated less by the laboratory abnormality than by its functional consequences: loss of independent ambulation, severe fatigue, pain and a dropped-head posture that abolished horizontal gaze. Dropped head syndrome reflects disproportionate weakness of the cervical paraspinal extensors and is well described in neuromuscular disease¹⁷; in this case it responded meaningfully to a combination of graded cervical strengthening, sustained stretching and McKenzie based retraction principles²⁴, improving from approximately 90° to 40° of forward flexion.

The rehabilitation literature in myositis supports the approach taken. Early training studies demonstrated that structured exercise improves fitness and strength in polymyositis and dermatomyositis without provoking enzyme rises²⁵, home-based programs were subsequently shown to be safe even in recent onset active disease²⁶, intensive resistance training improved function in chronic disease²⁷, and a multicenter randomized trial of endurance exercise reported improved health and a possible reduction in disease activity²⁸. Systematic reviews and contemporary expert guidance converge on the position that exercise, dosed to disease activity and individual tolerance, is a core element of myositis care rather than a hazard^{14,15}. The present protocol translated these principles to a frail, elderly transplant recipient by beginning at the passive end of the exercise continuum, embedding sensorimotor facilitation²³, and advancing every two months only as tolerance allowed, with formal monthly review.

The transplant context adds a second evidence stream. Exercise-based rehabilitation after heart transplantation is itself supported by randomized evidence showing improved exercise capacity²⁹, and the physiology of the denervated, later partially reinnervated, graft with its blunted heart-rate response and reliance on gradual warm-up argues for exactly the kind of prolonged, progressive loading used here³⁰. In effect, the programme had to satisfy two sets of constraints simultaneously: the myositis literature's caution against overloading inflamed muscle, and the transplant literature's requirement for graded cardiovascular progression. The absence of adverse events, alongside clinically meaningful gains in strength, walking distance, mobility, fatigue, pain, posture and quality of life, suggests that these

constraints can be reconciled within a single, coherent protocol.

The magnitude of change deserves comment. A 150 m gain in six-minute walk distance and a 40s reduction in Timed Up and Go both far exceed usual thresholds of clinically important change for older adults, and the shift in Timed Up and Go from 90s to 50s, while still indicating impairment, represents movement away from the extreme falls risk category. Improvements of this size in a 77-year-old with dual pathology argue that advanced age and transplant status should not, in themselves, exclude patients from ambitious rehabilitation.

Limitations must be acknowledged. This is a single, unblinded case; concurrent medical management and natural disease evolution will have contributed to recovery, and their effects cannot be separated from those of physiotherapy. Muscle biopsy and myositis-specific antibody data were not available to us, so diagnostic certainty rests on the clinical, enzymatic and electromyographic picture. Outcome assessment was unblinded, and quality-of-life change was captured at domain level rather than as full-scale scores. These caveats notwithstanding, single-case reports remain the principal vehicle by which rare clinical intersections such as this one enters the literature, and the structured, criterion-based progression described here offers a reproducible template that future prospective work can test.

VI. CONCLUSION

Polymyositis arising after heart transplantation is a rare and challenging presentation in which muscle inflammation, transplant physiology, advanced age and deconditioning converge. In this 77-year-old recipient, an eight-month, four-phase physiotherapy protocol progressing from passive movement and sensorimotor facilitation to resisted exercise and combining cervical retraining with functional and gait re-education produced clinically important improvements in strength, walking capacity, mobility, fatigue, pain, head posture and quality of life without adverse events. The case supports early physiotherapy referral and structured, monthly-reviewed, graded rehabilitation as central elements of care in post-transplant polymyositis and underlines that early diagnosis and management remain the key to recovery and to a better quality of life.

PATIENT PERSPECTIVE

The patient reported that regaining the ability to stand at the washbasin and manage his own self-care, and to hold his head up to look at people while talking, mattered most to him, and that the month-by-month structure of the programmed helped him persist through the early phases when progress felt slow.

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