

CARDIAC REHABILITATION AFTER MYOCARDIAL INFARCTION IN AN ATHLETE PATIENT

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Abstract

All acute coronary syndrome patients should be included in a comprehensive cardiac rehabilitation programme, which should be initiated as soon as possible after the acute event. Exercise-based cardiac rehabilitation is recommended in all subjects with coronary artery disease to reduce cardiac mortality and rehospitalization rate. We report the case of a 50 year old male patient, a professional athlete, martial arts and box fighter, with a history of anterior myocardial infarction in 2023, diagnosed with two-vessel coronary artery disease, treated with primary percutaneous coronary angioplasty with drug-eluting stent at the level of the left anterior descending artery (LAD), complicated with heart failure with reduced ejection fraction, who was included in the cardiac rehabilitation program after the acute event, with a significant improvement noted in terms of left ventricular ejection fraction and controlled physical exercise, as shown through repeated cardiopulmonary exercise testing. Regarding the return to sport after an acute coronary event, careful individual evaluation is required before starting high-intensity competitive sports.

Despite proven benefits, the rates of referral to, participation in, and implementation of cardiac rehabilitation programmes are low.

Keywords: cardiac rehabilitation; cardiopulmonary exercise test; post-myocardial infarction patient; return to competitive sports

Rezumat

Toți pacienții cu sindrom coronarian acut ar trebui incluși într-un program comprehensiv de reabilitare cardiovasculară, care ar trebui să înceapă cât mai curând posibil după evenimentul acut. Reabilitarea cardiacă bazată pe exerciții fizice este recomandată la toate persoanele cu boală coronariană pentru a reduce mortalitatea de cauză cardiovasculară și rata de respitalizare. Prezentăm cazul unui pacient de gen masculin în vârstă de 50 de ani, sportive de



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performanta practicant de arte marțiale și box, cu antecedente de infarct miocardic anterior în 2023, diagnosticat cu boală coronariană ischemică cu leziuni bicoronariene, tratat prin angioplastie coronariană percutanată primară cu stent farmacologic activ la nivelul arterei descendente anterioare, complicat cu insuficiență cardiacă cu fracție de ejeție redusă, care a urmat un program de reabilitare cardiacă după evenimentul acut, cu o îmbunătățire semnificativă observată în ceea ce privește fracția de ejeție a ventriculului stâng și exercițiile fizice controlate, demonstrată prin teste de efort cardiopulmonar repetate în evoluție. În ceea ce privește revenirea la activități sportive după un eveniment coronarian acut, este necesară o evaluare individuală atentă înainte de începerea sporturilor competitive de mare intensitate. În ciuda beneficiilor dovedite, ratele de trimitere, participare și implementare a programelor de reabilitare cardiacă sunt încă scăzute.

Cuvinte cheie: reabilitare cardiacă; test de efort cardiopulmonar; pacient post-infarct miocardic; revenire la sporturi de performanță

Introduction

Secondary prevention is most effectively provided through cardiac rehabilitation (CR). All acute coronary syndrome patients should be included in a comprehensive CR programme, which should start as soon as possible after the acute event. Comprehensive CR is a multidisciplinary intervention, supervised and performed by a team of healthcare professionals. The core components of CR include patient assessment, management and control of CV risk factors, physical activity counselling, prescription of exercise training, dietary advice, tobacco cessation counselling, patient education, psychosocial management, and vocational support.

Several studies have found that CR programmes after atherosclerotic cardiovascular disease events or revascularization reduce CV hospitalizations, myocardial infarction rate, cardiovascular mortality and all-cause mortality. Despite proven benefits, the rates of referral to, participation in, and implementation of CR programmes are low. There is consistent evidence that physical conditioning by exercise training improves exercise tolerance, and health-related quality of life in patients with heart failure.^[1,2,3,4]

Case presentation

A 50 year old male patient, a martial arts and box fighter, with a history of anterior myocardial infarction in 2023, diagnosed with

two-vessel coronary artery disease (subocclusion of the left anterior descending artery segment II and chronic total coronary occlusion of the right coronary artery), treated with primary percutaneous coronary angioplasty with drug-eluting stent at the level of the LAD, complicated with heart failure with reduced ejection fraction (LVEF during the first evaluation: 25%), is admitted for continuing the cardiovascular rehabilitation program.

The patient had several cardiovascular risk factors, namely: he was a former chronic cigarette smoker and had diagnosed dyslipidaemia. His family history included several cardiovascular pathologies:

his father died at the age of 70 of myocardial infarction, having a history of stroke at the age of 58.

After the acute phase in September 2023, the patient was admitted for cardiac rehabilitation in November 2023; since then he was periodically evaluated; he quit smoking and is therapeutically compliant. He is under medication, namely betablocker, ivabradine, ARNI, SGLT2, antiplatelet (low dose aspirin) and lipid lowering drugs (high dose statin and ezetimibe).

On clinical examination the BMI measured 27 kg/m² with well-represented muscle mass. His blood pressure was 140/75 mmHg on the right arm, measured in a seated position after five minutes of rest. His heart rate was 80 bpm, regular, and peripheral pulses were palpable bilaterally with no evidence of bruits. The cardiovascular examination revealed no murmurs, gallops, or peripheral oedema. On auscultation of the lungs, breath sounds were normal, with no signs of pulmonary congestion. The abdominal examination showed no palpable masses or tenderness, and no audible bruits were detected over the renal arteries. Neurological examination was normal, with no focal deficits or signs of

encephalopathy. Significant laboratory findings: LDL cholesterol of 79 mg/dl despite high dose statin and ezetimibe; normal blood cell count, hepatic, renal function, normal blood glucose.

Resting electrocardiogram shows normal sinus rhythm, 90 bpm, intermediate QRS axis, sequelae of anterior and inferior infarction.

Transthoracic echocardiography shows a dilated left ventricle (LVIDd 62 mm) with a LVEF of 40%, apical crown and apex hypokinesia and inferior wall basal half severe hypokinesia; GLS LV - 6,4 %, minor mitral regurgitation. In 2023, he presented with an LVEF of 35% at the first evaluation in the rehabilitation clinic.

The control cardiopulmonary exercise test (CPET), after completing the recovery program, reflected a slight reduction in the patient's functional capacity (Weber class A). In comparison, in 2023, the patient presented with a Weber class B (a moderate reduction in his functional capacity). The patient showed good adaptation to exercise with a ventilatory efficiency within normal limits, with an oxygen pulse value obtained even above the predicted values. He was prescribed aerobic physical training with a target value of 107 bpm (55W, 1.8 METs).

The heart rate during cardiopulmonary testing proved to have good/normal dynamics, and the ECG did not record ischaemia changes.

For the medical management after an acute coronary event, according to international guidelines, correction of cardiovascular risk factors is essential. One objective is optimal blood pressure control (BP < 140/90 mmHg) - the ARNI dose was titrated to maximal dose, with good clinical tolerance. For the lipid management: LDL col target < 55 mg/dl - alongside high dose statin and ezetimibe,



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PCSK9 inhibitors were associated, plus diet additional advice. The patient stopped smoking immediately after the acute event. Exercise-based cardiac rehabilitation is recommended in all individuals with coronary artery disease to reduce cardiac mortality and rehospitalization, as stated in the ESC guidelines.

Rehabilitation physiotherapy

In this case, the physical exercise program carried out in the hospital was represented by interval aerobic training (20 min) at an intensity of 40 and 55 W, respectively, with good dynamics of vital parameters. Compared to the first physiotherapy session, a significant improvement was noted in terms of controlled physical exercise. A significant increase in intensity was observed (from 30 W to 55 W), with very good dynamics in terms of both blood pressure and heart rate. He was prescribed upon home discharge, moderate physical activity minimum 30 min/day, 5 days/week; aerobic physical training minimum 3 (4) sessions/week and resistance training 2 sessions/week.

There are clear recommendations provided by the ESC guidelines for participation in recreational sports activities and participation in structured progressive exercise programs. All types of sports activities may be considered, using an appropriate intensity for the patient. Contact sports involve high-intensity exercise, inappropriate for this

patient with heart failure with reduced EF and still impaired functional capacity. The risk of arrhythmias due to the infarct scar, as well as the risks of antiplatelet treatment, must be considered.

Discussion

According to the latest ESC guideline of management of patients with acute coronary syndromes, all acute coronary syndrome patients should be included in a comprehensive CR programme, which should start as early as possible after the acute event. Several controlled cohort studies and meta-analyses have found a survival benefit for patients who are included in cardiac rehabilitation after ACS compared with no cardiac rehabilitation (26% reduction of cardiac mortality, 18% recurrent hospitalization), even in the modern era of early revascularization and statins, with a proven cost-effectiveness.^[2,5]

Most of the evidence regarding exercise in chronic heart failure is derived from studies implementing exercise training programmes that are considered safe and highly recommended in stable patients on optimal medical therapy. Meta-analyses of these studies have demonstrated a significant improvement in exercise tolerance and quality of life and a modest effect on all-cause and HF-specific mortality and hospitalization. Exercise intervention should only be initiated in a clinically stable individual after medical

therapy for HF has been optimized. A maximal exercise test (preferably CPET) is important to assess functional capacity, exercise-induced arrhythmias or haemodynamic abnormalities and for prescription of exercise intensity, based on VO₂peak, or on resting and maximal heart rate during exercise.^[6,7,8,9]

According to the ESC Sports Cardiology guideline, competitive sports are not recommended in individuals at high risk of exercise-induced adverse events or those with residual ischaemia, except for individually recommended skill sports. The high-risk features for exercise-induced adverse cardiac events in patients with atherosclerotic coronary artery disease include basal left ventricular ejection fraction $\leq 50\%$ and wall motion abnormalities, therefore the presented patient cannot resume competitive sports, especially full contact high intensity sports.^[10,11]

Conclusion

This case is illustrative for the importance of cardiac rehabilitation in patients after acute coronary syndromes, with improvement of medical adherence, better level of education regarding cardiovascular risk factors, improvement of LVEF and exercise functional tolerance, as proven through repeated cardiopulmonary exercise test. Regarding the return to sport after an acute coronary event, careful individual evaluation is required before participating in high-intensity competitive sports.

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