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Benefits of Exercise Retraining in Patients Admitted to the SSR Unit at Montluçon – Néris Les Bains Hospital

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ABSTRACT

Introduction: *Long overlooked, CR is a new discipline in cardiology that involves comprehensive and optimal care for patients with chronic diseases, particularly cardiovascular diseases. It has been clearly established that participation in a cardiovascular rehabilitation programme, and in particular aerobic exercise reconditioning sessions (ERS), improves functional and vital prognosis, particularly in post-infarction and heart failure patients.*

Method: *we carried out this work following care and rehabilitation (SSR) at the Montlucon-Néris les Bains hospital centre in France, which has a daily capacity of 10 patients divided into two groups of five patients. This was a descriptive cross-sectional study covering a three-month period from 5 June to 5 September 2024. Patients were referred by their cardiologist after the acute phase of their heart disease and agreed to participate in the cardiovascular rehabilitation programme.*

Results: *In this study, we collected data on 50 patients, including 40 patients who had had a coronary event (80%) and 9 patients (18%) with heart failure. The average time between the coronary event and the start of CVR was 34.51 ± 13.83 days, ranging from 10 days to 78 days. The average age of our patients was 59 ± 7.84, ranging from 45 to 79 years. There was a male predominance of 39 men to 11 women, giving a male-to-female ratio of 3.5 (chi2 = 11.11, ddl = 1, 1- p = 99.91%). The risk factors identified were mainly hypertension in 41 cases, followed by dyslipidaemia in 34 cases, with respective frequencies of 82% and 68%; all of our patients had undergone at least 9 sessions on average. The maximum workload was significantly higher (from 141.09 ± 37.02 to 165 ± 44.01 watts, p = 0.01) and there was a clear improvement in VO2max (from 19.59 ± 4.86 to 21.63 ± 6.08 ml/kg/min, p = 0.02). Functional capacity before and after retraining increased, with the average rising from 5.79 ± 1.76 to 6.50 ± 1.89 METs.*

Conclusion: *Exercise retraining after a cardiovascular event has a long-term beneficial effect on functional capacity, control of cardiovascular risk factors and treatment compliance.*

Keywords
Exercise retraining, Heart failure, Coronary artery disease.

Introduction
Long overlooked, CR is a new discipline in cardiology that involves comprehensive and optimal care for patients with chronic diseases, particularly cardiovascular disease. It was defined by the World Health Organisation (WHO) in 1993 (Copenhagen) as "all activities necessary to positively influence the disease process and to ensure that patients are in the best possible physical condition so that they can, through their own efforts, maintain or regain as normal a place in the community as possible". [1]. This comprehensive care combines exercise reconditioning, therapeutic optimisation (adapting treatment according to clinical tolerance at rest and during exercise), therapeutic and dietary education, psychological support, control of cardiovascular risk factors and social reintegration. It has been clearly established that participation in a cardiovascular rehabilitation programme, and in

particular aerobic REF exercise reconditioning sessions, improves functional and vital prognosis, particularly in post-infarction and heart failure patients (2,3). This benefit on vital prognosis has been strongly suggested by the results of the Extramatch meta-analysis (4). ERT is also indicated in many other cardiac situations (after valve surgery, in arteritis) but also in primary prevention in patients at high cardiovascular risk. It is prescribed following a stress test (ST) on a cycle ergometer or treadmill, with or without EEVO2, which remains a key cardiological test for the diagnosis of myocardial ischaemia and the clinical assessment of other heart diseases. The cardiorespiratory test (EEVO2), based on the analysis of exhaled gas measurements, can determine individual functional capacity and estimate the prognosis for heart disease. The analysis of an EEVO2 must be based on pulmonary, cardiovascular and muscular responses to exercise. Spirometry prior to an EEVO2 is mandatory to detect potential pulmonary limitation. The subject's haemoglobin level must also be taken into account. Its interpretation must be structured and multivariate. Functional capacity is a powerful predictor of all-cause mortality and cardiovascular events, and certain safety rules must be strictly adhered to when performing the test.

The overall objective of this study was to determine the benefits of exercise retraining in patients admitted to the SSR at Montluçon – Neris Les Bains Hospital.

Patients and Methods

This study was conducted at the cardiovascular rehabilitation centre at the Montluçon-Néris les Bains Hospital Rehabilitation Unit, which was established two years ago. It has a daily capacity of 10 patients divided into two groups of five patients. It includes: a cardio-respiratory stress test room equipped with all resuscitation equipment, a swimming pool for balneotherapy, and a conference room for educational workshops.

The team consists of three cardiologists, two nurses specialising in adapted physical activity, a dietician, a psychologist and a tobacco specialist.

This was a descriptive cross-sectional study conducted from 5 June to 5 September 2024.

Patients were referred by their cardiologist after the acute phase of their heart disease and having agreed to participate in the cardiovascular rehabilitation programme.

The protocol

All of our patients underwent an initial assessment consisting of a clinical and paraclinical examination.

The 6-minute walk test (6MWT) and the initial and final sit-to-stand test were performed on all patients and reported in relation to the theoretical value Cardiorespiratory stress testing was also performed on all our patients to assess their level of deconditioning to exercise and to prescribe retraining according to intensity, frequency, type and duration.

This exercise reconditioning programme was carried out exclusively on a cycle ergometer, either continuously or in intervals of 40 to 45 minutes, followed by muscle strengthening and stretching, the patient's response (BORG scale), dyspnoea perception scale, blood pressure, heart rate, oxygen saturation and real-time electrocardiogram connected via a heart rate monitor belt were the main parameters monitored during the retraining sessions. During their rehabilitation stay, all our patients were offered group educational workshops to help them learn more about their conditions and how to manage them. At the end of the programme, patients receive a letter confirming completion of their cardiovascular rehabilitation, which they present to their referring cardiologist.

Results

This single-centre study, conducted over a period of three months at the SSR department of the Montluçon-Néris les Bains hospital centre, included 50 patients. Data was collected on a pre-established survey form and analysed using Sphinx Millenium 4.5.1 software.

Table 1: Distribution of patients according to the nature of cardiac damage.

Nature of cardiac impairment	Number of patients	% Obs.
Coronary	40	80
Heart failure	9	18
High-risk patient	1	2
Total	50	100

Table 2: Distribution of patients according to gender.

Gender	Number	% Obs.
Male	39	78
Female	11	22
Total	50	100

Table 3: Distribution of patients by age group.

Age group	Number	% Obs.
Under 48	2	4
From 48 to 55	14	28
From 56 to 63	19	38
From 64 to 71	12	24
72 and over	3	6
Total	50	100

Average: 59.4; Median: 59; Standard deviation: 7.84; Min - Max: 45 - 79;

Table 4: Distribution of patients according to cardiovascular risk factors (CVRF).

CVRF	Number	% Obs.
HTA	41	82
DIABETES	6	12
TOBACCO	15	30
DYSLIPIDAEMIA	34	68
OBESITY	9	18
Total	50	

Table 5: Number of retraining sessions.

Number of sessions	Staff	% Obs.
Less than 9	3	6
9 to 12	12	24
From 13 to 17	11	22
From 18 to 22	23	46
23 and over	1	2
Total	50	100%

Average: 15.16; Median: 17; Standard deviation: 4.66

Table 6: Distribution of patients according to training method.

Training method	Number	% Obs.
Interval	2	4
Continuous	12	24
Mixed	36	72
Total	50	100

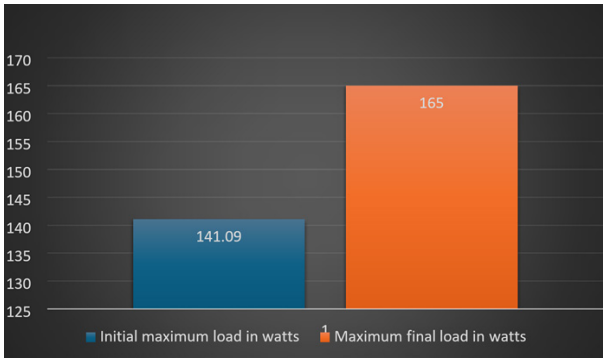

Figure 1: Distribution of patients according to initial and final maximum load in watts.

Table 7: Distribution of patients according to initial and final VO2 max.

Initial VO2 max	Mean	Standard deviation	Median	Min - Max	Sum	Number
Measured VO2max	19.6	5.28	19	9 - 34	980	50
Theoretical VO2	74.48	20.84	73.5	40 - 137	3724	50
Final VO2max	**Average**	**Standard deviation**	**Median**	**Min - Max**	**Sum**	**Number**
Measured VO2max	21.1	5.95	21	3 - 36	1055	50
Theoretical VO2	80.26	21.19	76	46 - 144	4013	50

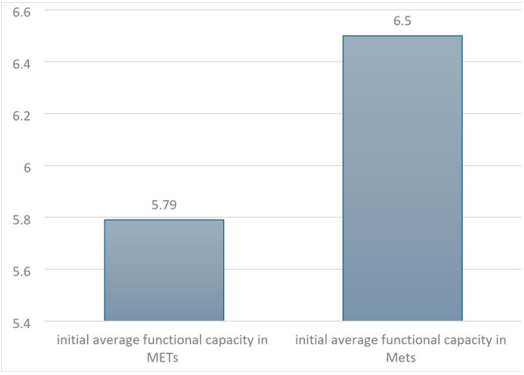

Figure 2: Distribution of patients according to initial and final functional capacity.

Discussion

Various studies have demonstrated the benefits and safety of cardiac rehabilitation following coronary syndrome in terms of all-cause mortality, cardiac mortality, quality of life and return to work or daily activity [5, 6, 7]. In our study, we collected data on 50 patients, including 40 patients who had a coronary event (80%) and 9 patients (18%) with heart failure. The average time between the cardiac event and the start of CR was 34.51 ± 13.83 days, ranging from 10 days to 78 days. In the series by Jérôme Corré et al. on inpatient cardiac rehabilitation after myocardial infarction in France, the median time between ACS and the start of CR was 31 days, with extremes ranging from 7 to 76 days [8]. The mean age of our patients was 59.4 ±7.84, ranging from 45 to 79 years. There was a male predominance of 39 men to 11 women, giving a male-to-female ratio of 3.5 (chi2 = 11.11, ddl = 1, 1-p = 99.91%). The low representation of women in rehabilitation has been widely reported by many other studies, but in varying proportions. B. Pavy et al., in their study on cardiac rehabilitation in coronary patients, found a male predominance of 93% to 7% [9]. This low representation among women could be explained by the fact that women have less interest in exercise training or physical activity on the one hand, and on the other hand, by the fact that they are more prone to ACS at a later age than men. The risk factors found were mainly represented by hypertension in 41 cases, followed by dyslipidaemia in 34 cases, with respective frequencies of 82% and 68%. The maximum VO2 value recorded during an exercise test is an indicator of a patient's maximum exercise capacity. In most cases, a VO2 peak is obtained rather than "VO2max", which implies a plateau in the oxygen consumption curve at maximum exertion, i.e. a stagnation in oxygen consumption as the intensity of the exertion required increases. In a healthy subject, the normal VO2 peak is between 30 and 35 mL/kg/min. This figure is lower in people with heart failure, most often between 10 and 20 mL/kg/min. Conversely, it is increased in endurance athletes, reaching 70 to 80 mL/kg/min in marathon runners or high-level cyclists. In practice, its normal value is greater than or equal to 25 mL/kg/min or greater than 80-85% of the theoretical value. In our series, all of our patients had at least 9 sessions on average with a significantly higher maximum workload (from 141.09 ± 37.02 to 165 ± 44.01 watts, p = 0.01) and a clear improvement in VO2max (from 19.59 ± 4.86 to 21.63 ± 6.08 ml/kg/min, p = 0.02).

Functional capacity is a powerful predictor of all-cause mortality and cardiovascular events. Appropriate physical exercise has beneficial effects in both primary and secondary prevention. Any gain in functional capacity of 1, Mets (3.5 ml/min/kg of oxygen) is accompanied by a decrease in mortality of nearly 15%. In our study, functional capacity before and after retraining increased from an average of 5.79 ± 1.76 to 6.50 ± 1.89 METs.

Conclusion

The cardiac rehabilitation programme has a long-term beneficial effect on aerobic capacity, cardiovascular risk factors and quality of life, as well as reducing cardiovascular morbidity and mortality.

Exercise retraining should not be considered an optional addition to coronary care. It should be viewed by both cardiologists and patients as an integral and essential part of the overall treatment of myocardial infarction.

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