

The influence of extending early stationary rehabilitation by ambulatory form in patients treated interventionally after ACS on the exercise capacity on the components of psychic state of mind and quality of life

Wpływ wydłużenia o formę ambulatoryjną wczesnej stacjonarnej rehabilitacji pacjentów po leczonym interwencyjnie ostrym zespole wieńcowym na wydolność fizyczną oraz elementy stanu psychicznego i jakości życia

Izabela Przywarska^{1,2 (A,B,C,D,E,F)}, Ewa Deskur-Śmielecka^{1 (A,B,C,D,F,G)},
Sławomira Borowicz-Bieńkowska^{1,2 (A,B,D,F)}, Małgorzata Wilk^{1,2,3 (A,B,D,F)}, Aleksandra Brychcy^{2 (A,B,D,F)},
Piotr Dylewicz^{1,2 (A,D,E,F,G)}

¹ Cardiac Rehabilitation Department of the University School of Physical Education in Poznan, Poland,

² Cardiac Rehabilitation Department of the Provincial Hospital in Poznań, Poland,

³ College of Education and Therapy in Poznań, Poland

Key words

Cardiac rehabilitation, acute coronary syndrome, exercise capacity, psychic state, quality of life

Abstract

Objectives: The evaluation of the direct and remote effects of stationary rehabilitation following interventionally treated acute coronary syndrome and its extension by a three-month period of supervised training in ambulatory conditions within the scope of physical capacity psychic state and quality of life.

Materials and methods: The research was conducted in a group of 44 patients (32 men and 12 women) aged 56.9±9, 62 years old for a period of 2-3 weeks following interventional treatment of acute coronary syndrome. All the patients had participated in stationary rehabilitation, 14 of whom expressed a willingness to participate in a further three-month period of ambulatory rehabilitation. All patients prior to the commencement of rehabilitation had treadmill exertion tests. Fear was evaluated by means of the SOPER questionnaire. Basic mood and psychic tension as well as the feeling of health were assessed by means of the VAS scale of the Euro-Qol 5D questionnaire. The set of tests was repeated after the completion of the stationary phase, and after time periods of 3 months and a year.

Results: Patients subjected to the extended 3-month ambulatory phase of rehabilitation displayed a greater increase in exercise tolerance when compared with the group that had merely undergone the 3-week stationary rehabilitation. Patients with extended rehabilitation gradually improved their evaluation of their state of health and after a year maintained it at the level it had been after the completion of the stationary rehabilitation. In patients who did not express a willingness to continue an organised form of exercise in ambulatory conditions the noticeable improvement in health following the end of rehabilitation was not long lasting. After a year, regardless of the programme of rehabilitation selected, an improvement in the psychic state was noted, which was expressed in an increased positive mood although the level of fear did not change to a significant degree.

Conclusions: 1. Extended rehabilitation, combining stationary and ambulatory forms, after interventional treatment of ACS gives a better long-term effect in the area of improving exercise capacity and patient self-evaluation of state of health than is in the case after three-week stationary rehabilitation. 2. The extending of the period of rehabilitation has no influence on attaining the post-rehabilitation changes on the level of mood and fear.

The letters indicate the authors' contribution to the paper: A – research project; B – data collection; C – statistical analysis; D – data interpretation; E – work on the manuscript; F – literature search; G – funds procurement

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Słowa kluczowe

rehabilitacja kardiologiczna, ostry zespół wieńcowy, tolerancja wysiłku, jakość życia, stan psychiczny

Streszczenie

Cele: Ocena bezpośrednich i odległych efektów stacjonarnej rehabilitacji po leczonym interwencyjnie (PCI) ostrym zespole wieńcowym (OZW) i jej przedłużenia o 3-miesięczny okres nadzorowanego treningu w warunkach ambulatoryjnych w zakresie wydolności fizycznej, elementów stanu psychicznego i jakości życia.

Materiał i metody: Badania wykonano w grupie 44 pacjentów (32 mężczyzn i 12 kobiet) w wieku $56,9 \pm 9,62$ lat w okresie 2-3 tygodni po OZW leczonym za pomocą PCI. Wszyscy pacjenci uczestniczyli w rehabilitacji stacjonarnej, a 14 wyraziło chęć udziału w dalszej 3-miesięcznej rehabilitacji w formie ambulatoryjnej. U wszystkich pacjentów przed rozpoczęciem rehabilitacji wykonano badanie wysiłkowe na bieżni, za pomocą kwestionariusza SOPER oceniono lęk, podstawowy nastrój i napięcie psychiczne, a poczucie stanu zdrowia za pomocą skali VAS, będącą składową kwestionariusza EuroQol 5D. Zestaw badań powtórzono po zakończeniu fazy stacjonarnej, po 3 miesiącach i po roku.

Wyniki: Pacjenci poddani rehabilitacji przedłużonej o 3-miesięczną fazę ambulatoryjną, na każdym etapie badań wykazali większy przyrost tolerancji wysiłku w porównaniu z grupą, która przeżyła jedynie 3-tygodniową rehabilitację stacjonarną. Pacjenci, z wydłużoną rehabilitacją stopniowo poprawiali ocenę swojego stanu zdrowia i po roku utrzymali ją na poziomie jak po zakończeniu rehabilitacji stacjonarnej. U pacjentów, którzy nie wyrazili chęci na kontynuowanie zorganizowanej formy ćwiczeń w warunkach ambulatoryjnych, odczuwalna istotna poprawa stanu zdrowia po zakończeniu rehabilitacji stacjonarnej nie ma trwałego charakteru. Po roku niezależnie od wybranego programu rehabilitacji obserwowano poprawę stanu psychicznego, wyrażającą się podwyższeniem nastroju, natomiast w sposób istotny nie zmienił się poziom lęku.

Wnioski: 1. Wydłużona, połączona stacjonarna i ambulatoryjna rehabilitacja chorych po leczonym interwencyjnie OZW daje lepszy odległy efekt w zakresie poprawy wydolności fizycznej i samooceny stanu zdrowia, niż 3-tygodniowa rehabilitacja stacjonarna. 2. Wydłużenie rehabilitacji nie ma wpływu na uzyskiwanie por rehabilitacyjnych zmian w poziomie nastroju i lęku.

Introduction

In the era of cardiological intervention, which has resulted in a significant reduction in hospital fatalities in acute coronary syndrome, as well as the quick mobilisation of patients and the shortening of hospitalisation itself¹, it prompts to verify the views on the management of the second and third stage of rehabilitation.

In particular, the considerations require the remote effectiveness of the second phase of rehabilitation conducted in a stationary form, which until recently has been the preferred form of rehabilitation in certain European countries including Poland. It is also necessary to evaluate the earlier and remote effects of extending stationary rehabilitation by a three-month period of the third stage conducted in an ambulatory form.

In the multi-centre research conducted in recent years by Jegier et al.² there has not been evaluated the remote effects of programmes of stationary and ambulatory rehabilitation, though it has been shown that the earlier effects of both forms in the scope of the influence on the level of tolerated load in exercise testing as well as on the quality of life are similar. Despite this, as with results from other recently published studies, the

majority of patients following acute coronary syndrome who have been offered one of the two above mentioned forms of rehabilitation, choose stationary rehabilitation³. The above factors have become the basis for the conducting the research which is partly analysed in the present work.

The aim of the work was the evaluation of the direct and remote effects of earlier stationary rehabilitation in patients following interventional treatment of acute coronary syndrome and its extension by a three-month period of supervised training in ambulatory conditions. The research was concerned with physical fitness, the psychological effects of rehabilitation as well as a sense of quality of life.

Materials and methods

The study was conducted in a group of 44 patients, 32 men and 12 woman of 56.9 ± 9.62 years of age (average \pm SD) admitted to a cardiac rehabilitation department in the course of 2-3 weeks following interventional treatment of acute coronary syndrome (ACS). Patients were included in the tests only if they had given written consent and had fulfilled the criteria presented in Table 1.

All patients participated in a three-week programme of rehabilitation in

stationary conditions and all were proposed an extension of rehabilitation treatment of up to three months in ambulatory conditions, of whom 14 patients decided to continue (31.8%).

The programme of cardiological rehabilitation in the stationary phase consisted of general fitness exercises – 30 minutes a day, exercise training on a cycloergometer **with** regulated intensity at a level of 50% of the pulse reserve (HRR) which was defined on the basis of the exertion exercise – 15-20 minutes daily, walking exercise – 3 kms daily. The training exercises were conducted for 5 days a week for three weeks. Pharmacological treatment was applied in accordance with the current recommendations of the European Cardiology Association. All patients were provided with psychological care within the framework of which they participated in group programmes that dealt with methods of coping with stress and the skills to act in a new health and life situation resulting from suffering a heart attack. In some cases, in patients with greater problems in adapting to the new situation, individual therapy was applied. Various educational meetings took place within the framework of the rehabilitation programme with the aim of motivating a patient to change his life style, and in particular

Table 1

The criteria for Test Qualification
<ul style="list-style-type: none"> • 2-3 week prior invasive treatment of acute coronary syndrome • Full psychic contact with the patient • The absence of symptoms of heart failure (>NYHA II), unstable angina pectoris or uncontrolled arrhythmia • The absence of other coexisting illnesses not enabling exercise tests on the track to be performed

to increase physical activity, to stop smoking tobacco, to modify bad habits, and observe the necessity to use prescribed pharmacotherapy. Those under observation attended 5 meetings including three conducted by a doctor (knowledge of the disease considering in particular the risk and pharmacotherapy factors, breaking the habit of tobacco smoking, the principles of increased physical activity), one with a psychologist (advice on coping with stress), and one with a dietitian.

In the group of patients who followed the stationary programme and who decided to extend the period of rehabilitation by an ambulatory form, the training exercises were continued for up to three months, taking place three times a week. On the basis of the results of the exercise test con-

ducted after the end of the stationary phase the intensity of the training programme was established at a level of 60% HRR, while the type and duration of the training session were very same as in the stationary phase.

An exertion test was conducted on a track for all patients before the beginning of the rehabilitation programme according to a modified Bruce protocol which was continued until a sense of fatigue was achieved at a level of 15 points on the Borg scale or until the appearance of concerns that indicated the end of the test⁴. Applying the Scale for the Evaluation of the Psychological Effects of Rehabilitation (SOPER) certain psychic values were evaluated such as mood, fear and psychic tension⁵, as well as utilising the VAS analogue scale - that is a component

of the EuroQol 5D questionnaire of the evaluation of the state of health and quality of life - the sense of health was evaluated⁶. The whole set of tests were repeated after the completion of the stationary phase, after 3 months and after a year.

The results of the tests were presented by means of the arithmetical average and standard deviation. The Wilcoxon statistical test was used to analyse the changes between the subsequent periods of testing in the area of the same group and the Mann-Whitney test for the comparison of the results between groups. The value $p < 0.05$ was taken as statistically significant.

The tests were conducted with the agreement of the local bioethics commission.

Results

The results of the tests are presented in Tables 2, 3 and 4.

In both test groups (group 1 – patients participating only in stationary rehabilitation, group 2 – patients participating in stationary and ambulatory rehabilitation) a statistically characteristic improvement in toleration to exercise following rehabilitation was confirmed which was maintained for

Table 2

The Results of the Evaluation of Physical Fitness. The Results are presented as an average ±SD							
	Test I (initial)	Test II (after stationary rehab)	Test III (after 3 months)	Test IV (after a year)	Group 1	Group 2	Gp 1 vs Gp 2
ET (MET)					$p=0.0004$ I vs II	$p=0.001$ I vs II	
Group 1	7.03 ±2.78	7.89 ±3.04	7.95 ±3.11	7.67 ±3.30	$p=0.004$ I vs III	$p=0.001$ I vs III	NS
Group 2	6.31 ±2.28	8.78 ±2.62	9.64 ±3.43	9.09 ±2.87	$p=0.01$ I vs IV	$p=0.001$ I vs IV	

Group 1 – patients participating only in stationary rehabilitation (n=30); **Group 2** – patients participating in stationary and ambulatory rehabilitation (n=14); **PW** – exertion test

Table 3

The rise in exertion tolerance between the particular periods of testing. The results are presented as an average ±SD			
	Group 1	Group 2	Group 1 vs Group 2
ES2-ES1 (MET)	0.86 ± 1.12	2.46 ± 0.90	$p=0.00003$
ES3-ES1 (MET)	0.92 ± 1.58	3.32 ± 1.82	$p=0.0002$
ES4-ES1 (MET)	0.65 ± 1.95	2,78 ± 1.72	$p=0.0008$
ES3-ES2 (MET)	0.06 ± 1.23	0.86 ± 1.63	$p=0.15$
ES4-ES3 (MET)	-0.27 ± 1.02	-0.54 ± 1.50	$p=0.56$

Group 1 – patients participating only in stationary rehabilitation (n=30); **Group 2** – patients participating in stationary and ambulatory rehabilitation (n=14); **ES1** – initial exertion test; **ES2** – exertion test following the completion of stationary rehabilitation, **ES3** – exertion test after 3 months; **ES4** – exertion test after one year

Table 4

The results of the subjective evaluation of the state of health – the VAS scale from the EuroQol 5D questionnaire as well as some of the psychological exponents of the effects of rehabilitation: change in mood, level of fear, psychic tension – SOPER scale. The results are presented as an average ±SD

	Test I (initial)	Test II (after stationary rehab)	Test III (after 3 months)	Test IV (after a year)	Group 1	Group 2	Gr 1 vs Gr 2
VAS (%)							
Group 1	68.37 ±15.88	77.03 ±17.36	75.0 ±14.76	72.93 ±14.17	p= 0.04 I vs II p= 0.01 I vs III	p=0.03 I vs III	NS
Group 2	72.64 ±17.45	77.36 ±0.51	79.79 ±11.65	77.93 ±17.52	p= 0.04 II vs IV		
SOPER – BM (pt)							
Group 1	6.07 ±1.39	6.47 ±1.92	6.27 ±1.76	6.80 ±1.75	p=0.04 I vs IV	p=0.02 I vs II p=0.04 I vs III	p=0.01 Test I
Group 2	7.00 ±1.47	7.71 ±1.20	7.64 ±1.28	7.36 ±1.28		p=0.04 I vs IV	
SOPER - F (pt)							
Group 1	4.97 ±1.52	4.90 ±1.67	4.83 ±1.64	4.50 ±1.83	NS	NS	NS
Group 2	4.14 ±1.51	3.71 ±1.44	3.93 ±1.49	3.93 ±1.49			
SOPER –PS (pt)							
Group 1	5.37 ±1.35	4.90 ±1.60	5.17 ±1.56	4.73 ±1.39	p=0.02 I vs IV	p=0.02 I vs II	p=0.047 Test I
Group 2	4.43 ±1.16	3.86 ±1.51	4.21 ±1.12	4.29 ±1.23			p=0.036 Test III

Group 1 – patients participating only in stationary rehabilitation (n=30); **Group 2** – patients participating in stationary and ambulatory rehabilitation (n=14); **ET** – exertion test; **VAS** – analogue scale of life quality; **SOPER** – scale for the evaluation of the psychological effects of rehabilitation; **BM** – basic mood, **F** – fear, **PS** – psychic stress.

the entire period of observation (up to a year following ACS) although the patients no longer took part in organised forms of exercise. Despite the fact that the results did not show characteristic differences between the groups in the subsequent periods of testing (Table 2) in the increase of exercise tolerance (between tests I and II, I and III and I and IV), it was observed that the growth in the group continuing rehabilitation in ambulatory conditions was significantly higher than in the group which had finished supervised exercise sessions after only three weeks (Table 3).

The subjective evaluation of the state of health presented by means of the analogue VAS scale did not show significant differences between the groups at any of the stages observed, yet differences occurred in the time period for the obtainment of improvement. In the group that had been exposed exclusively to stationary rehabilitation a significant improvement in the evaluation of the state of health was observed after its completion, while in the group that expressed a willingness to continue rehabilitation in an ambulatory form a significant improvement occurred only after three months, following the end of the ambulatory programme. It should be noted that the patients of this group confirmed their state of health after 12 months to be at the same level as it had been following the completion of the ambu-

latory rehabilitation (after 3 months), while for those from the group not participating in the ambulatory rehabilitation the improvement was not lasting – the self evaluation of their state of health in the VAS scale after the elapse of 12 months was significantly lower than after the end of the stationary rehabilitation programme (Table 4). The level of fear did not significantly differ between the groups at any of the stages of conducted tests and equally did not change during the annual period of observation, however the basic mood and psychic stress observed in both groups improved. In group 2 a significant improvement was observable after 3 weeks of rehabilitation. It follows to emphasize that patients from this group were characterised by a significantly more favourable initial level of basic mood and psychic stress as well as by a lower degree of psychic stress after the elapse of 3 months (Table 4).

Discussion

In the day of interventional ACS treatment and modern pharmacotherapy the evaluation of the remote effects of stationary rehabilitation and its extension by an ambulatory phase have not been to date widely analysed. There exists only a single report in which the effects of combining a week intensive programme of stationary rehabilitation with a programme conducted in ambu-

latory conditons have been evaluated. There have not been confirmed, however, additional benefits resulting from the linking of these two forms of rehabilitation⁷. For this study, patients were recruited in the years 1999-2002 with a part of them having undergone aortic-coronary bridging. In our research it occurred that patients who had undergone the 3-week stationary rehabilitation and extended the treatment by the 3-month ambulatory phase improve immediately and constantly their initial exercise toleration level and do so to a greater degree than patients who underwent only stationary rehabilitation. Also Hambrecht et al.⁸ and Gielen et al.⁹ in their works published in 2000 and 2002, focusing mainly on the influence of rehabilitation on the function of endothelium, following the analysis of the effects of a 4-week training period conducted in hospital conditions and extended by a subsequent 5-month training period conducted in home conditions, claimed that in the training group there was observed a 12% improvement in physical fitness after a 4-week period and by around 30% after six-month period. However patients from the control group, who after receiving advice to following pharmacological treatment and who spent 6 months leading a sedentary life style, did not change their toleration for exercise in comparison with the initial level. It follows to note, however, that patients who were

qualified for these studies were not less than three months after an angioplastic operation. An analysis of the questionnaire elements by means of which a patient could define his state of health as well as through which we can determine certain psychic properties such as basic mood, fear and psychic tension/ stress showed that patients who underwent stationary rehabilitation extended to an ambulatory period improved in the course of a year their sense of quality of life to a much greater degree as well as being characterised by a better mood and less psychic stress in comparison to patients who had exercised for only three weeks. Though it has to be noted that after three weeks the sense of quality of life changed statistically significantly in the group of patients treated by stationary rehabilitation. Possibly in patients who expressed a desire to continue rehabilitation in ambulatory conditions and who were characterised by a higher initial evaluation of their own state of health, a significant improvement required a longer time period and the exercise programme appropriately longer in time. In the multi-centre work conducted by Jegier et al.² it was shown that a significant improvement in the quality of life recorded after 8 weeks from the commencement of research also by means of a visual analogue scale occurs also in the 3-week stationary rehabilitation group, as in those subjected to ambulatory treatment for 8 weeks. It follows to note, however, that no further observations were conducted on these patients and that no remote control tests were carried out.

Elements of the SOPER scale for the evaluation of the psychological effects of rehabilitation were used – this is an original Polish method developed by Tylka and Makowska⁵. The scale was successfully used to evaluate the results of home-based patient rehabilitation supervised telemedically¹⁰, but here the attitude to therapy in relation to life goals was only analysed, while the degree of fear, mood or psychic tension/ stress were not evaluated.

The analysis of the effects of extending rehabilitation presented by us have certain limitations. First and foremost a significant problem was the impossibility of carrying out a random group selection. Analogical problems were more than likely experienced by the

authors of other observations which examined the comparative effects of various forms of rehabilitation. Dalal et al.¹¹, in a comparative test of the effects of ambulatory rehabilitation and home-based rehabilitation were only able to partly divide the patients in a random way, in part the patients themselves chose the form of rehabilitation for only 40% agreed to a randomised form of selection. Of the remaining 60% of patients only 42% chose rehabilitation in ambulatory conditions, the majority chose exercises at home.

In our case a willingness to continue training exercise in ambulatory conditions was expressed by 31.8% of patients and these were those patients who had already at the start been characterised by a better mood and less psychic stress as well as a lower, although not statistically significant, level of fear. Both groups though did not differ significantly from each other in the initial level of exertion tolerance. When we analysed the results at the end of stationary rehabilitation and compared them to the initial values it occurred that ambulatory rehabilitation had been chosen by patients who to a significant degree during the stationary phase had differed themselves by their greater increase in exertion tolerance as well as an improvement in mood and psychic stress/ tension that was significant only in this group.

The above mentioned elements suggest that a group of patients following interventional treatment of ACS subjected to modern rehabilitation is extremely varied and has various needs, which result not only from the state of the circulatory system but also from the psychic state. Therefore patients after ACS should be given the choice of various forms of rehabilitation because each form brings not only early benefits but also remote ones in the area of improving the physical fitness of a patient as well as his psychic state.

Conclusions

1. Extended rehabilitation, combining stationary and ambulatory forms, after interventional treatment of ACS gives a better long-term effect in the area of improving physical fitness and patient self-evaluation of state of health than it is in the case after three-week stationary rehabilitation.

2. The extending of the period of rehabilitation has no influence on attaining the post-rehabilitation changes on the level of mood and fear.

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Address for correspondence

dr med. Izabela Przywarska
Szpital Rehabilitacyjny,
ul. Uzdrowska 2, 60-480 Poznań, Poland
phone: 061-846-82-30; fax: 061-846-43-00
e-mail: cardreh@awf.poznan.pl

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