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ORIGINAL ARTICLE

Impact of cardiac resynchronisation therapy on physical ability and quality of life in patients with chronic heart failure

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Abstract

Background: Chronic heart failure (CHF) is a serious public health problem associated with high rates of morbidity and mortality. Cardiac resynchronisation therapy (CRT) is a well established treatment for selected patients who do not respond to optimal drug treatment of CHF.

Aim: To assess the impact of CRT on the physical ability and quality of life (QoL) of patients with CHF.

Methods: The study group consisted of 60 patients (mean age: 66.3 ± 8.7 years, 57 males and three females) with CHF classified as NYHA class III or IV (despite optimal pharmacotherapy for more than three months), a left ventricular end-diastolic diameter ≥ 55 mm, ejection fraction (LVEF) ≤ 35%, and a QRS duration ≥ 130 ms. Just before CRT, and three months after the procedure, patients were assessed using echocardiography and the 6-minute walk test (6-MWT), while their QoL was assessed by the Psychological General Well-Being index (PGWB). Three months after CRT, a 10% increase in baseline values of the 6-MWT constituted a positive response — patients who improved in this manner were classified as 'responders'. Changes of at least ± 10% from baseline values of the PGWB total index were considered as improvement or worsening in QoL.

Results: During the follow-up, three men died, and so 57 patients were included in the final analysis. At the end of the study, an increase in the walking distance during the 6-MWT (298.0 ± 107.4 m *vs* 373.1 ± 127.2 m; $p < 0.001$) was observed. After three months, 38 (66.7%) patients were classified as 'responders' while 19 (33.3%) subjects were classified as 'non-responders' to CRT. Concurrently, after CRT we observed an improvement in QoL in 34 (59.6%) patients, while 23 (41.4%) patients showed no such effect. Patients who demonstrated an increased QoL at three months after CRT were characterised by lower baseline values of the total PGWB index as well as its dimensions (with the exception of the 'general health' dimension). Improvement in QoL after CRT was observed only in the 'responders' group ($p < 0.01$).

Conclusions: The implementation of CRT leads to a reduction of heart failure related symptoms and an increase in physical ability in roughly two thirds of patients. Improvement in QoL after CRT pertains only to patients who demonstrate simultaneously an improvement in their 6-MWT. None of the other baseline clinical and echocardiographic parameters were useful in predicting better QoL and exercise capacity after CRT implementation.

Key words: chronic heart failure, cardiac resynchronisation therapy, physical ability, quality of life

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INTRODUCTION

Despite the advances in medical treatment, chronic heart failure (CHF) continues to be a serious public health problem, with high morbidity and mortality rates [1]. Most HF patients have severe persistent symptoms and a poor quality of life (QoL) [2]. Cardiac resynchronisation therapy (CRT) is a well established treatment in selected patients with HF who are non-responding to standard and optimal drug treatment [3]. Several clinical trials of CRT in drug-refractory HF have revealed that we can expect reduced mortality, and improvements

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in clinical symptoms, exercise capacity and QoL. On the other hand, about 30% of HF patients who receive CRT do not respond to this treatment [3, 4].

In symptomatic CHF patients, the health-related QoL is significantly lower than in patients with hypertension or coronary heart disease [2]. Heart failure-specific QoL questionnaires, like the Minnesota Living with Heart Failure Questionnaire (MLHFQ), reflect self-reports of the extent to which HF symptoms limit individuals from living as they would like to. Improvements in the MLHFQ scales (mainly in its physical dimension) have been observed in some patients from one month to one year following CRT [5]. It must be stressed that, although widely used to assess HF patients, the MLHFQ survey may have some limitations such as lack of responsiveness to clinical change [6]. Relatively little is known about the impact of CRT on different domains of more general health-related QoL. Wider knowledge of QoL is important, because patients with HF experience a decline in multiple aspects of their life, not just physical functioning [7]. Moreover, patients with different clinical characteristics may experience differential changes in QoL following CRT. Thus, we conducted the study to better understand benefits in symptom relief, exercise performance and comprehensive QoL in CHF patients treated with CRT.

METHODS

Study group

The study was an open-label study comparing 60 consecutive patients (57 males and three females) with CHF admitted to hospital with indication for CRT: a left ventricular ejection fraction (LVEF) ≤ 35%, a left ventricular end-diastolic diameter (LVEDD) ≥ 55 mm, a QRS duration ≥ 130 ms and NYHA class III and IV despite the use of optimal treatment of three months' duration, including loop diuretics [1]. Patients who were not in sinus rhythm were excluded. The protocol was approved by the relevant local Ethics Committee (no. KBET/ /37/B/2005), and patients provided written informed consent. The patients' clinical characteristics are shown in Table 1.

Table 1. Demographic and clinical characteristics of the study group

Study group	N = 60
Gender: men	57 (95.0%)
Age [years]	66.3 ± 8.7
Body mass index [kg/m^2]	26.0 ± 4.2
Arterial hypertension	36 (60.0%)
Dyslipidaemia	54 (90.0%)
Type 2 diabetes	25 (41.7%)
Present smoking	9 (15.0%)
Ischaemic heart disease	43 (71.7%)
MI in the past	38 (63.3%)
PTCA/by-pass operation in the past	12 (20%)/9 (15%)
NYHA III	56 (93.3%)
NYHA IV	4 (6.4%)
Prior hospitalisation due to CHF	55 (91.7%)
QRS complex width [ms]	184.2 ± 28.3
LVEDD [mm]	73.3 ± 8.9
LVEF [%]	21.7 ± 4.81
eGFR MDRD [mL/min/1.73 m^2]	67.7 ± 28.1
ACE-I or ARB	51 (85.0%)
Beta-adrenolytics	58 (96.7%)
Loop diuretics	53 (88.3%)
Potassium-sparing diuretics	40 (66.7%)
Digitalis glycosides	13 (21.7%)
Amiodarone	19 (31.7%)
Previously implanted pacemaker	14 (23.2%)
VVI/DDD/ICD	2/9/3
CRT-P/CRT-D	39 (65%) /21 (35%)

MI — myocardial infarction; PTCA — percutaneous transluminal coronary angioplasty; CHF — chronic heart failure; LVEDD — left ventricular end-diastolic diameter; LVEF — left ventricular ejection fraction; eFGR — estimated glomerular filtration rate; ACE-I — angiotensin converting enzyme inhibitors; ARB — angiotensin receptor blockers

The study patients were aged 45–86 (average 66.3 ± 8.7) years, and at baseline 56 (93.3%) patients were classified in NYHA class III, and four (6.4%) in NYHA class IV. Before the completion of the tests envisaged for three months after CRT implementation, three men died (5%): one due to a cerebrovascular incident, one in the course of myocardial infarction, and the third suddenly for an unknown reason (they were all in NYHA class III). Therefore, the results presented refer to 57 patients, who were subjected to full clinical assessment and tests after three months following the CRT.

The majority of the patients were men (95%), with LVEF 21.9 ± 3.5%. Before the implantation of the resynchronisation device, 14 (23.3%) patients had an implanted pacemaker (VVI or DDD) or an implantable cardioverter-defibrillator (ICD) (Table 1). In all such patients, upgrade of the previous device to CRT was performed. In the remaining patients, CRT system was implanted using the CRT-P (pacemaker) — 28 (46.7%) patients, or CRT-D (pacemaker + ICD) device — 18 (30.0%) patients.

Analysis of our data indicates that after CRT the optimal position of left ventricular lead was in 52 (86.7%) and suboptimal in eight (13.3%) patients. There were five patients with suboptimal position of the lead in the 'responders' group (13.2% of the 38 patients) and three in the 'non-responders' group (15.8% of the 19 patients) (not significant difference). During the follow-up, biventricular pacing was observed in five patients; it ranged between 74–86%, and in the rest of patients it was in the range of 95–100%. Of the abovementioned five patients, three were in the 'non-responders' group and two in the 'responders' group (not significant difference).

Study methods

All examinations and assessments were performed just before and three months after CRT implementation. They included: an echocardiography (GE Vivid 7), six-minute walking test (6-MWT) and the QoL self-assessment by the Polish version of the Psychological General Well-Being index (PGWB).

During the echocardiography, LVEF and LVEDD were assessed.

For physical ability assessment, the patients underwent the 6-MWT according to the predefined protocol [8]. The criterion of clinically significant response to the CRT was an increase in walking distance in the 6-MWT of at least 10% compared to the baseline value [9]. Patients fulfilling this criterion were referred to as 'responders'.

The PGWB index [10] is a questionnaire for assessing the general QoL, applied in international and Polish clinical trials involving patients with hypertension [11] and HF [12]. The PGWB contains elements of general QoL assessment considering psychological health and well-being. It comprises 22 questions answered by the patient selecting one of six answers allocated to each question, which give a score on a scale of one to six points. Total index to be scored in the PGWB amounts to 132 points, while the lowest amount of points is 22, which indicate the highest and the lowest QoL, respectively. The questionnaire also allows for the determination of six dimensions: anxiety, depressive mood, well-being, self-control, general health, and vitality. 'Anxiety' and 'depressive mood' are reversed scales, meaning that a higher score in these scales corresponds to a lower level of anxiety or depression.

It is well established on the basis of test theory that the magnitude of improvement, which is considered to be clinically meaningful, should reach more than 0.25 SD [13]. In the presented study, a stricter criterion for improvement or deterioration of the QoL was adopted, namely ± 10% difference between the baseline and final values of the PGWB total index. On this basis, patients were divided into three groups: the group where the QoL improved — difference between baseline and final values of the PGWB total index (ΔPGBW) was ≥ 10%, the group where the QoL did not change (ΔPGBW: –9% to +9%), and the group where the QoL deteriorated (ΔPGBW ≤ 10%).

Statistical analysis

Database and all analyses were conducted using the Statistica software version 8 (Statsoft Inc., Tulsa, OK, USA). Categorised variables were presented in the form of the number and percentage of patients in the groups. Continuous variables were presented as the average and standard deviation. For comparison of such variables, t-Student test or the paired Mann-Whitney U test were applied. Averages for related variables (baseline and after three months) were compared using the paired Wilcoxon test. Statistical significance was defined as $p < 0.05$ (two-sided).

RESULTS

Three months following CRT, five patients were classified as NYHA class I, 38 as class II, 11 as class III, and three as class IV. Overall improvement in the HF symptoms by one NYHA class reduction was observed in 38 (66.6%) patients, and by two NYHA class reductions in nine (15.8%) patients ($p < 0.05$). In seven (12.3%) patients, no change in class of HF symptoms was observed, while in three (5.3%) patients the symptoms intensified.

After three months, in the group of 57 patients, an increase in LVEF (21.7 ± 4.8% *vs* 26.1 ± 4.8%, $p < 0.01$) and a decrease in end-diastolic dimension (73.3 ± 8.9 mm *vs* 71.5 ± 9.8 mm, $p < 0.05$) were observed, but no differences in LVEF ($p = 0.67$) and LVEDD ($p = 0.38$) between 'responders' and 'non-responders' were found at this point of follow-up.

At the end of the study, a significant elongation of the walking distance was determined in 6-MWT (298.0 ± 107.4 m *vs* 373.1 ± 127.2 m, $p < 0.001$). While adopting as a response criterion to CRT the increase in the walking distance in 6-MWT ≥ 10%, it was found that 38 (66.7%) patients met this condition ('responders'), while 19 (33.3%) did not ('non-responders'). At baseline, the group of 'responders' was significantly younger than the group of 'non-responders' ($p < 0.01$). The remaining demographic and clinical parameters observed at baseline did not differentiate those groups (Table 2).

Three months following CRT implementation, no differences were observed between the group of 'responders' and 'non-responders' as regards LVEF, QRS complex width or percentage of patients classified in the specific NYHA class (Table 3).

Three months following CRT — in the entire group of 57 patients — an improvement in QoL was determined, both in the total index of the PGWB questionnaire (82.7 ± 18.0 *vs* 98.4 ± 16.1 points, $p < 0.001$), as well as in its six dimensions (Table 4).

During further analysis, it was determined that according to the adopted criteria for improvement or deterioration of QoL after CRT, QoL improved in 34 (59.6%) patients and did not change in 20 (35.1%), while in three (5.3%) patients it deteriorated. The last two groups were merged into one — the group without improvement in QoL (23 patients, 41.4%). The group with improved QoL (ΔPGBW total index ≥ 10% baseline values) was characterised by lower initial total PGWB index and lower values in all dimensions of the PGWB (except for the 'general health' dimension), than the group where QoL did not change (Table 5).

In the group of 'responders', a significant improvement of QoL after CRT was observed both in the total index of the PGWB (76.4 *vs* 101.0 points, $p < 0.001$) and in all its subscales (Fig. 1).

In turn, in the group of 'non-responders', neither changes to the PGWB total index (92.6 *vs* 94.5 points, p = NS)

Table 2. Comparison of baseline demographic and clinical characteristics of 'responders' (increase in walking distance in 6-MWT after three months ≥ 10%) and 'non-responders'

	Responders (n = 38)	Non-responders (n = 19)	P
Gender: men	36 (94.7%)	18 (94.7%)	1.0
Age [years]	63.8 ± 8.5	71.5 ± 6.6	0.002
Body mass index [kg/m^2]	25.7 ± 4.6	25.9 ± 3.0	0.54
Arterial hypertension	28 (73.7%)	11 (57.9%)	0.22
Dyslipidaemia	27 (71.1%)	17 (89.5%)	0.11
Type 2 diabetes	14 (36.8%)	9 (47.4%)	0.42
Smoking	6 (16.0%)	3 (16.0%)	1.0
Ischaemic heart disease	25 (65.8%)	16 (84.2%)	0.13
MI	22 (57.9%)	15 (78.9%)	0.09
Prior hospitalisation due to CHF	32 (84.2%)	18 (94.7%)	0.29
QRS complex width [ms]	179 ± 26.6	194 ± 29.6	0.06
eGFR MDRD [mL/min/1.73 m^2]	86.9 ± 98.0	57.1 ± 24.7	0.19
LVEF [%]	22.1 ± 4.9	20.9 ± 4.6	0.47
LVEDD [mm]	73.6 ± 9.2	72.7 ± 8.6	0.77
NYHA III	36 (94.7%)	17 (89.5%)	0.44
NYHA IV	2 (5.3%)	2 (10.5%)	0.43
ACE-I/ARB	32 (84.2%)	17 (89.5%)	0.59
Beta-adrenolytics	36 (94.7%)	19 (100.0%)	0.31
Loop diuretic	33 (86.8%)	17 (89.5%)	0.78
Potassium sparing diuretic	27 (71.1%)	12 (63.2%)	0.55
Digitalis glycosides	8 (21.1%)	5 (26.3%)	0.66
Amiodarone	13 (34.2%)	5 (26.3%)	0.55

Abbreviations as in Table 1

Table 3. Comparison of selected clinical parameters in the group of 'responders' and 'non-responders' three months following cardiac resynchronisation therapy (n = 57)

	Responders (n = 38)	Non-responders (n = 19)	P
QRS complex width [ms]	150 ± 18.1	158 ± 21	0.11
LVEF [%]	26.6 ± 4.5	24.9 ± 5.4	0.20
LVEDD [mm]	72.0 ± 10.6	70.6 ± 8.4	0.52
NYHA I	3 (7.9%)	2 (10.5%)	0.75
NYHA II	28 (73.7%)	10 (52.6%)	0.12
NYHA III	7 (18.4%)	4 (21.1%)	0.78
NYHA IV	0 (0%)	3 (15.8%)	–

Abbreviations as in Table 1

nor changes to subscales were observed, except for improvement ($p < 0.01$) in the 'general health' subscale (Fig. 2).

DISCUSSION

Data obtained within large clinical trials such as CARE-HF, MIRACLE, and PATH-CHF, performed 6–12 months following CRT implementation, points to a decrease in HF symptoms (reduction in NYHA class by 0.5–0.8 point) and an improvement of physical ability assessed in the 6-MWT (on average by approx. 20%) [14–16]. The purpose of the present paper was also to assess the impact of resynchronisation therapy on the physical ability and the QoL in patients with advanced HF. The application of CRT in our patients classified as NYHA class III or IV caused a significant decrease in complaints related to CHF and an increase in the distance covered during six-minute walking on average by 75 m, namely about 25% of the baseline values. Increased walking distance after CRT was observed in roughly two thirds of patients (responders), which conforms

Table 4. Quality of life measured by the Psychological General Well-Being index (PGWB) questionnaire at baseline and three months after resynchronisation therapy in the study group (n = 57)

PGWB test	Baseline, points (SD)	Three months following CRT, points (SD)	P
Total index	82.7 ± 18.0	98.4 ± 16.1	0.001
Anxiety*	20.3 ± 5.1	23.5 ± 3.8	0.001
Depressive mood*	13.3 ± 3.3	15.4 ± 2.4	0.001
Well-being	12.7 ± 3.4	15.3 ± 3.2	0.001
Self-control	13.2 ± 3.1	15.2 ± 2.2	0.001
General health	10.2 ± 3.0	13.3 ± 2.8	0.001
Vitality	12.9 ± 3.9	15.8 ± 4.3	0.001

*Reverse scales of the PGWB test — higher values correspond to lower intensity of the trait

Table 5. Comparison of baseline quality of life (QoL) in patients with and without improvement in the Psychological General Well-Being index (PGWB) three months after cardiac resynchronisation therapy

PGWB (points)	Improvement in HRQoL, n = 34 (ΔPGBW ≥ 10%)	No improvement in HRQoL, n = 23 (ΔPGWB: ≤ +9%)	P
Total index	76.4 ± 17.5	92.6 ± 15.1	0.003
Anxiety*	18.5 ± 5.1	22.7 ± 3.9	0.006
Depressive mood*	12.2 ± 3.3	15.1 ± 2.5	0.001
Well-being	11.9 ± 3.6	14.1 ± 2.9	0.038
Self-control	12.2 ± 3.4	14.8 ± 1.9	0.004
General health	9.7 ± 2.9	11.3 ± 3.2	0.095
Vitality	11.9 ± 3.4	14.6 ± 4.4	0.009

*Reverse scales of the PGWB test — higher values correspond to lower intensity of the trait

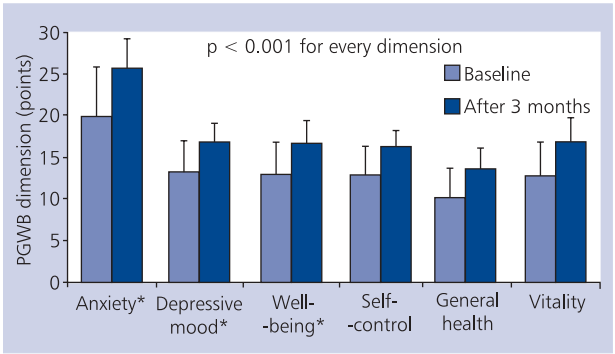

Figure 1. Quality of life in 'responders' (n = 38), at baseline and three months after cardiac resynchronisation therapy; *reverse scales of the Psychological General Well-Being index (PGWB) test — higher values correspond to lower intensity of the trait

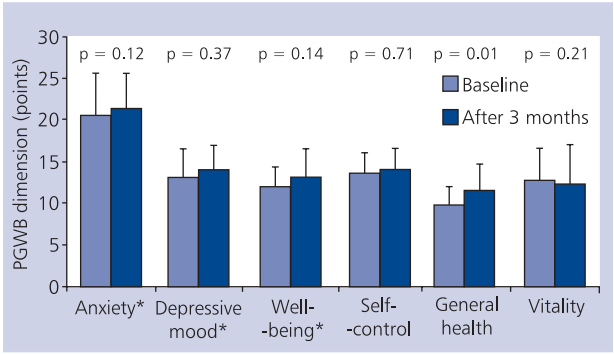

Figure 2. Quality of life in 'non-responders' (n = 19), at baseline and three months after cardiac resynchronisation therapy; *reverse scales of the Psychological General Well-Being index (PGWB) test — higher values correspond to lower intensity of the trait

to the data from other authors describing the percentage of patients with CHF responding to the resynchronisation therapy. In another Polish study involving 28 patients with advanced HF, Faran et al. [17], observed — starting from month 3 after CRT — a decrease in the percentage of patients remaining in NYHA class III and IV and elongation of the distance covered during the 6-MWT, while from the sixth month there was an improvement in the QoL (using a test based on MLHFQ). The improvement in all aforementioned indices occurred until two years of observation.

Chronic heart failure has a strong negative impact on the patients' QoL, mainly due to symptoms limiting many spheres of living and functioning in the family and society [2]. In our study, a significant improvement in QoL (assessed by a generic questionnaire, the PGWB index) was observed as soon as three months following the implementation of the resynchronisation system, which referred to approximately 60% of patients. Significantly, QoL improved only in the group of 'responders' (increase in the walking distance in 6-MWT > 10% of the baseline values), while no changes were observed to QoL in the group of 'non-responders'.

This observation means that: firstly, the improvement in QoL after CRT is not related to the placebo effect, as some researchers have believed, but strictly depends on the achieved improvement in physical ability. Evidence that CRT does not 'automatically' improve the subjective perception of being more healthy has come from randomised studies where after CRT implementation the device was randomly switched off in some patients, while in some it remained switched on. After the observation period, an improvement in the physical ability and QoL was determined just among the patients with CRT switched on [13]. Secondly, patients with advanced HF perceive an improvement in QoL after CRT if their physical ability improves (this is also a signal of patients' expectations after this form of treatment, which determines their well-being to the greatest extent). Thirdly, it seems that 6-MWT may be the best measure of QoL in patients with CHF, a short and simple method to use in ambulatory conditions. The performance of 6-MWT after CRT is recommended, because the improvement in the walking distance strongly correlates with the improvement in general well-being.

However better QoL was accompanied by elongation of the walking distance in 6-MWT, yet not with the improvement in the systolic function of the left ventricle, which was identical at the end of the study in the group of 'responders' and 'non-responders'. Also, none of the other clinical and echocardiographic parameters was a predictor of the improvement in QoL and better physical ability after CRT. Similar results have recently been obtained in the PROSPECT study [18].

On the other hand, factors that might relate to improvement in QoL following CRT remain unidentified. In one study that focused on HF-specific QoL, Krahn et al. [19] assessed several patient characteristics to explain why some patients undergoing CRT demonstrated improvement in their HF symptoms while others did not. The authors examined age, sex, HF aetiology, QRS width, ejection fraction, and HF severity (i.e. NYHA classification). No associations were found between QoL and these factors. Despite this negative finding, it is possible that there are factors that relate to improvement in other domains of QoL. For example, certain patients may be more likely to perceive improvements in their general physical health, social functioning, or emotional functioning following CRT than other patients. In the study by Faran et al. [17], the only factor predicting improvement after CRT was functional status evaluated according to NYHA classification, i.e. patients with more advanced CHF symptoms at baseline responded better to CRT. In our study, a similar association was found: patients who responded to CRT had lower QoL at baseline than non-responders. This means that from the patient's point of view, CRT may be especially useful in those with both more advanced CHF symptoms (greater physical limitation) and lowest QoL level.

In another Polish study, performed by Wójcicka et al. [20] in 26 patients with CHF subjected to resynchronisation therapy, QoL was assessed using the Nottingham Health Profile (NHP) questionnaire initially and after 15 months. It was found that after CRT an improvement in some scales of the NHP was recorded: regarding physical functioning, 'energy' and 'physical mobility' and in the 'emotional reactions' scale. In this study, a higher QoL level in various NHP dimensions was recorded by 34–65% of patients, but the authors did not state what criterion for QoL improvement was adopted by them as clinically significant.

Despite using a different questionnaire to assess the QoL, our results are similar to the data on QoL changes after CRT presented by other authors. In the RHYTHM II ICD [21], and CARE-HF [22] studies, a better-known questionnaire called the MLHFQ was applied. Unlike the MLHFQ, the PGWB serves to assess the so-called generic QoL, which is wider than a disease-specific QoL, e.g. determined only by symptoms of HF. PGWB therefore allows for a more comprehensive assessment of the psychophysical state of patients, particularly after considering its total index and six dimensions.

Limitations of the study

The main limitation of the study is the rather small number of patients enrolled. Another limitation could be the short observation period. It is unknown how long the described favourable changes to physical ability and the patients' QoL observed after CRT will persist. Although the results of some authors indicate gradual improvement in the QoL even up to two years after CRT [17], others [19] have reported its high fluctuations (improvement and deterioration over the course of several months) in the first year after CRT. The presented study involved principally men (95% of the patients), therefore the results obtained must only be referred to men.

CONCLUSIONS

1. The application of CRT in the management of advanced HF leads to a reduction in the symptoms of disease and to an improvement in physical ability in about two in every three patients.
2. An increase in QoL after CRT refers only to the patients who recorded improvement in physical ability measured in the 6-MWT.
3. None of the other baseline clinical and echocardiographic parameters was a predictor of better QoL or physical ability after CRT.

Conflict of interest: *none declared*

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Wpływ terapii resynchronizującej na wydolność fizyczną i jakość życia chorych z przewlekłą niewydolnością serca

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Streszczenie

Wstęp: Przewlekła niewydolność serca (CHF) jest poważnym problemem społecznym związanym z dużą zachorowalnością i śmiertelnością. Terapia resynchronizująca (CRT) to metoda leczenia wybranej grupy pacjentów z CHF, którzy nie odpowiadają na optymalną farmakoterapię CHF.

Cel: Celem pracy była ocena wpływu CRT na wydolność fizyczną i jakość życia (QoL) chorych z CHF.

Metody: Do badania włączono 60 pacjentów (średni wiek: 66,3 ± 8,7 roku, 57 mężczyzn i 3 kobiety) z CHF w III lub IV klasie wg NYHA (mimo stosowania optymalnej farmakoterapii przez ponad 3 miesiące), z wymiarem końcowo-rozkurczowym lewej komory ≥ 55 mm, frakcją wyrzutową ≤ 35% i czasem trwania zespołu QRS ≥ 130 ms. Wyjściowo i 3 miesiące po zastosowaniu CRT u pacjentów wykonano badanie echokardiograficzne, 6-minutowy test marszu (6-MWT) oraz oceniono QoL za pomocą standaryzowanego kwestionariusza: Psychologicznego Wskaźnika Dobrego Samopoczucia (PGWB). Jako kryterium odpowiedzi na CRT przyjęto wzrost ≥ 10% wyjściowego dystansu marszu w 6-MWT w ocenie po 3 miesiącach. Chorych tych określono jako *„responders"*. Zmiana wyjściowej wartości wskaźnika ogólnego PGWB o ± 10% po 3 miesiącach oznaczała poprawę lub pogorszenie QoL.

Wyniki: Podczas 3-miesięcznej obserwacji zmarło 3 mężczyzn, dlatego końcowej analizie poddano 57 chorych. W ocenie po 3 miesiącach od zastosowania CRT zaobserwowano wzrost dystansu marszu w 6-MWT (298,0 ± 107,4 m *v.* 373,1 ± ± 127,2 m; $p < 0,001$). Według przyjętego kryterium odsetek chorych odpowiadających na CRT wynosił 66,7% (38 chorych), a 19 (33,3%) osób zakwalifikowano jako *„non-responders"*. W ocenie końcowej 3 miesiące po CRT zanotowano poprawę QoL u 34 (59,6%) i brak poprawy u 23 (41.4%) chorych. Pacjenci, u których stwierdzono poprawę w zakresie QoL, charakteryzowali się wyjściowo niższym wskaźnikiem ogólnym PGWB i niższymi wartościami jego podskal (z wyjątkiem skali „Zdrowie ogólne"). Poprawa QoL po zastosowaniu CRT dotyczyła jedynie grupy *„responders"* ($p < 0,01$).

Wnioski: Terapia resynchronizująca prowadzi do redukcji objawów niewydolności serca i poprawy wydolności fizycznej u ok. 2/3 badanych. Poprawa QoL po CRT dotyczy jedynie chorych, którzy wykazują jednocześnie poprawę w zakresie 6-MWT. Żadne z pozostałych wyjściowo ocenianych parametrów klinicznych i echokardiograficznych nie były użyteczne w przewidywaniu poprawy, zarówno QoL, jak i wydolności fizycznej po CRT.

Słowa kluczowe: przewlekła niewydolność serca, terapia resynchronizująca, wydolność fizyczna, jakość życia

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