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Quality of Life in Patients with Chronic Heart Failure, After Cardiac Resynchronization Therapy

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Abstract: To assess changes in quality of life (QOL) in patients with chronic heart failure (CHF), who received cardiac resynchronisation therapy (CRT) one year after surgery.
Materials and methods. The study enrolled 82 patients (68 men and 14 women) aged 30 to 74 years (mean age 55.8±9.2 years) who underwent biventricular pacemaker implantation for SRT. Depending on the EchoCG response to SRT, patients were divided into two groups: 56 people with positive response (responders) and 26 persons with insufficient response (nonresponders). The SF-36 questionnaire was used to assess patients' QOL. The results Questionnaire results were presented as scores on 8 scales: "physical functioning (PF)", "physical role functioning (RP)", "pain scale (BP)", "general health status (GH)", "vitality scale (VT)", "social functioning scale (SF)", "emotional role functioning (RE)", "psychological health (MH)". Vital signs were assessed before SRT and again one year after surgery.
Results. One year after HRT treatment, a statistically significant increase of QOL index was observed in patients with CHF PF (before SRT 46.3±26.2, after SRT 53.1±27.7, p=0.023). There was a tendency to increase of Vital signs: VT (before SRT 47.1±20.1, after SRT 51.8±20.1, p=0.081), SF (before SRT 61.58±25.06, after SRT 67.07±24.57, p=0.088). In the respondent group one year after SRT, there was a statistically significant increase in CSH: PF (from 45.2±26.0 to SRT 57.1±26.4, p=0.001), VT (from 46.5±20.8 to 54.4±19.7, p=0.010), SF (from 60.9±26.4 to SRT 70.8±20.8, p=0.012). There was a tendency for an increase in the CV indices: BP (from 57.5±25.1 to 64.8±23.8, p=0.079), GH (from 45.3±16.4 to 49.1±18.0, p=0.079), MH (from 57.7±18.9 to 62.5±17.7, p=0.081). In the nonsponder group, there was a decreasing trend in the RE (from 46.2±45.3 to 26.9±41.1 p=0.069).
Conclusion. In patients with CHF, there was a statistically significant increase in the index of QOL: "physical functioning (PF)" at one year after CRT. In responders within one year after CRT there was a statistically significant increase in QOL: "physical functioning (PF)". There was a statistically significant improvement in QOL scores after SRT, while nonresponders did not change QOL scores. did not change.

Keywords: quality of life; SF-36; chronic heart failure; cardiac resynchronisation therapy

Introduction

Quality of life (QOL) refers to the characteristics of physical, psychological, emotional and social functioning based on their subjective perception. It is known that QOL deteriorates with different CVDs. In stable CHD with angina FK aggravation, physical functioning is impaired to a greater extent. These studies showed that after a MI, there is a significant decrease in physical functioning scores compared to the general population. After MI, QOL also decreases at the expense of the mental and emotional components, which is due to the development of postinfarction depression. Patients with arterial hypertension (AH) have also shown a decrease in QOL compared with normotensive individuals.The outcome of many CVDs is CHF. Not only clinical status, haemodynamics, neurohormonal status, echocardiograms, but also QOL parameters, namely functional performance and psychological status, deteriorate with CHF. According to the European Society of Cardiology, the main goals of CVD treatment are improvement of clinical status, functional capacity, reduction of mortality and hospital admissions, and improvement of QOL. National guidelines on diagnosis and treatment of CHF draw attention to the fact that treatment should improve or at least not worsen QOL, as this aspect determines the adherence of patients with CHF to the procedures, without which it is impossible to count on successful treatment. Cardiac resynchronisation therapy (CRT) is a modern treatment for CHF. CRT is indicated in patients with CHF II-IV class according to NYHA, low LV LV EF

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≤35%, wide QRS complex ≥150 ms, left bundle branch block. At the same time, there is data that after SRT in the short-term period, QOL indicators do not change. Thus, a study to assess the dynamics of QOL in patients after SRT is highly relevant.

Purpose of the Study: The aim of our study was to assess changes in QOL in patients with CHF who received HRT one year after surgery.

Materials And Methods

Patients after SRT at the Samarkand Cardiology Research Centre were included in the study. A total of 41 patients (34men and 7 women) aged 30 to 74 years (mean age 55.8±9.2 years), who completed the SF-36 questionnaire.

All patients underwent a comprehensive clinical and instrumental examination, including medical history, office BP and BMI. All patients underwent ECG examination, biochemical examination, including determination of serum lipid profile, screening for Beck depression, as well as coronary angiography.

All patients underwent transthoracic EchoCG examination using Siemens ultrasound machine. Aortic root diameter, left atrial diameter, RV size, LV end-diastolic and end-systolic volumes, interventricular septum thickness, LV posterior wall thickness, LV myocardial mass and LV EF were assessed. Linear EchoCG values and LV myocardial mass were indexed to body surface area.

According to the dynamics of LV end-systolic volume (ESV), patients were divided into 2 groups: 28 patients with a decrease in LV CSV of 15% or more (responders) and 13 patients with a decrease in LV CSV of less than 15% (nonresponders).

The SF-36 questionnaire was used to assess patients' QOL. Results were presented as scores on 8 scales: physical functioning (PF), role-based physical functioning (RP), pain scale (BP), general health (GH), vitality scale (VT), social functioning scale (SF), role-based emotional functioning (RE), and psychological health (PH). Scores on each scale ranged from 0 to 100, where 100 represented complete health. A higher score indicated a higher level of MH. The SF-36 questionnaire was translated into Uzbek and validated. The Uzbek-language version of the SF-36 has a high level of reliability, with a Cronbach's α score of greater than 0.7 for most scales: PF 0.9, RP 0.8, BP 0.8, GH 0.6, VT 0.8, SF 0.6, RE 0.7, MH 0.8. The study was approved by a local ethics committee and patients were included in the study after signing informed consent.

Table 1. Comparative clinical and instrumental characteristics of patients

Indicators		**Total group (n=41)**	**Responders (n=28)**	**Non-responders (n=13)**	**p**
Gender, n (%)	Men	34(82.9)	43 (76.8)	25 (96.2)	0,029
	Women	7 (17.1)	13 (23.2)	1 (3.8)	
Age, years		55.8±9.2	56.4±8.5	54.6±10.6	0.765
CHD, n (%)		53 (64.6)	35 (62.5)	18 (69.2)	0.920
MI in anamnesis, n (%)		26 (31.7)	14 (25.0)	12 (46.2)	0.057
Smoking, n (%))		18 (22.0	10 (17.9)	8 (30.8)	0.169
BMI, kg/m²		30.8±7.0	30.7±7.3	31.0±6.4	0.836
AH, n (%)		65 (79.3)	44 (78.6)	21 (80.8)	0.719
DM, n (%)		14 (17.1)	9 (16.1)	5 (19.2)	0.743
Hypercholesterolemia, n (%)		46 (56.1)	32 (57.1)	14 (53.8)	0.750
CCF NYHA, n (%)	I-II	35 (42,7)	25 (44,6)	10 (38,5)	0,568
	III-IV	47 (57,3)	31 (55,4)	16 (61,5)	
Number	1	22 (26,8)	13 (23,2)	9 (34,6)	

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Date of Publication:30-11-2022

of coronary arteries affected, n (%)	2	2 (2,4)	1 (1,8)	1 (3,8)	0,621
	3	6 (7,3)	4 (7,1)	2 (7,7)	
History of PCI, n (%)		14 (17.1)	9 (16.1)	5 (19.2)	0.718
Depression, n (%)	No symptoms	34 (40,8)	25 (43,7)	9 (34,6)	0,482
	Mild	27 (33,3)	19 (34,5)	8 (30,8)	
	Severe	21 (25,9)	12 (21,8)	9 (34,6)	

M±SD, mean ± standard deviation; NYHA, New York Heart Association;
PCI - percutaneous coronary intervention. Hypercholesterolemia was defined as a cholesterol level greater than or equal to 4.5 mmol/L.
Two independent groups (responders and nonresponders) were compared for clinical and instrumental, EchoCG and QOL before and after biventricular pacemaker implantation for SRT. Mann-Whitney test was used to compare quantitative values in two independent groups. The significance of differences between sample fractions of the population in the two independent groups was assessed using Pearson's $\chi 2$. Fisher's exact test was used in cases where a small number of observations (less than 5) was observed in the group. Comparative assessment of QOL was performed before SRT and again one year after surgery. Wilcoxon criterion was used for statistical analysis to compare mean values in dependent groups. The $p<0.05$ (two-sided) value was assessed as statistically significant.

Table 2. Comparative characterisation of EchoCG findings in patients

Indicators		**Total group (n=41)**	**Responders (n=28)**	**Non-responders (n=13)**	**p**
Diameter of aortic root	**mm**	34,7±3,9	34,7±4,1	34,6±3,7	1,000
	Mm/m²	17,6±2,4	17,8±2,7	17,1±1,5	0,461
Diameter of LA	**mm**	50,5±6,3	50,4±5,6	50,8±7,8	0,869
	Mm/m²	25,6±3,7	25,9±4,0	25,1±3,0	0,553
Final diastolic volume	**mm**	230,9±59,3	221,2±53,5	251,8,9±66,7	0,029
	Mm/m²	117,0±30,7	113,7±29,9	124,3±31,7	0,078
Final sistolic volume	**mm**	159,6±47,2	153,4±42,6	173,0±54,4	0,094
	Mm/m²	80,9±24,3	78,9±23,6	85,3±25,7	0,169
Diameter of RV	**mm**	30,2±4,8	29,6±4,7	31,4±5,0	0,104
	Mm/m²	15,3±2,6	15,2±2,8	15,5±2,2	0,224
Thickness LV posterior wall thickness	**mm**	10,6±1,5	10,6±1,5	10,6±1,5	0,881
	Mm/m²	5,4±1,1	5,5±1,3	5,2±0,8	0,897
Thickness of the interventricular septum	**mm**	10,9±1,6	10,9±1,5	11,0±1,8	0,780
	Mm/m²	5,5±0,9	5,5±0,9	5,4±0,9	0,834
LV myocardial mass	**gr**	336,2±77,1	323,9±69,6	362,6±86,7	0,065
	gr/m²	170,2±40,4	166,6±41,5	178,2±37,5	0,125
LV EF	**%**	31,4±5,6	31,1±5,6	31,9±5,7	0,920

M±SD - mean ± standard deviation; LA - left atrium; FDV- Final diastolic volume; FSV- Final sistolic volume;

ISSN NO: 2770-2936
Date of Publication:30-11-2022

Results

The clinical and instrumental characteristics of the patient group as a whole, responders and nonresponders are shown in Table 1. The patients were predominantly male. Most patients had AH and CHD. Approximately one third of the patients had a history of MI. One in five patients included in the study was an active smoker. More than half of the patients had symptoms of depression. There were statistically significantly more women in the responders' group. There was a tendency for a higher incidence of MI in the nonresponders group. There were no statistically significant differences between the groups in other clinical and instrumental parameters. All patients received optimal CHF drug therapy before CRT and continued after discharge from hospital.

The EchoCG data are shown in Table 2. In the responders' group, LV EF was statistically significantly lower. At the same time, there was no statistically significant difference between the groups in this index after indexing to body surface area. For other EchoCG indices, there were no statistically significant differences between the groups (Table 2).

The respondent group showed a statistically significant increase in the "physical functioning", "vitality scale", and "social functioning scale" scores one year after SRT. There was a tendency for an increase in the "pain scale", "general health", and "psychological health" indicators. There was no significant change in the non-sponsored group, while there was a statistical trend towards a decrease in the "emotional functioning role" QOL indicator.

Discussion

In our study, there were statistically significantly more women in the respondent group. Other studies have also demonstrated greater efficacy of SRT in the female population. Some authors attribute this to a greater reduction in neurohormonal activation, immune inflammation and myocardial fibrosis in women women. In our study, the baseline LV CER in the respondent group was statistically significantly lower, which can be explained by the higher number of women in this group compared to the nonrespondent group. This is also confirmed by the absence of a statistically significant difference between the groups in terms of this index This is also confirmed by the lack of statistically significant difference between the groups in terms of the index to body surface area. In an analysis of data from five randomised clinical trials, the authors found that QOL was statistically significantly higher in patients with class III-IV CHF after CRT compared with optimal drug therapy. Other studies have also shown a significant improvement in QOL after HRT. When assessing the dynamics of these HR parameters in general group of patients during one year, we found statistically significant improvement only in HR parameter of physical functioning. But after analyzing the dynamics of QW in the respondent group, we found statistically significant increases in both the "physical functioning" and and "vitality scale". This can be explained that SRT as a treatment is aimed at relief of dyssynchrony, improvement of LV systolic function LV and thereby to improve physical health indicators. In our study, we found only a tendency for the 'social functioning' parameter to increase after SRT in the overall patient group. However, after analysing the dynamics of QOL in the respondent group, we found a significant increase in this QOL parameter. These data can be explained by the fact that with improvement of general physical condition and reduction of CHF symptoms, there is also an increase in the level of social activity, communication, time spent with friends, family, and in the team. The QOL score "pain scale" did not change statistically significantly, apparently because HRT is not a treatment for pain syndrome in CHD and therefore does not reduce angina attacks in angina pectoris. The index of QOL, "general health status", has not changed, as SRT generally leads to improvement of physical condition, but does not relieve the symptoms of CHF completely, and thus patients do not feel completely healthy. It should be noted that more than half of the patients in our study had symptoms of depression. This fact may also reflect the reason why such parameters of QOL as "role emotional functioning" and "psychological health" did not change statistically significantly after SRT. The analysis of QW dynamics in the respondent group also revealed no statistically significant improvements in the "pain scale," "general health," and "psychological health" dimensions of QW. Some authors note that the physical component of QOL improves to a greater extent after SRT, while the mental component of QOL is associated with the response to SRT to a lesser extent. In our study, when comparing QOL parameters between groups, responders compared to nonresponders after one year showed a tendency for improvement in QOL parameters. In an intra-group comparison, we found

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that responders significantly tended to increase most of the QOL parameters after one year, while nonresponders did not change QOL parameters and even tended to decrease the "emotional functioning" index.

Thus, the results of our study showed that SRT improves patients' QoL to a greater extent by improving physical health, and to a lesser extent by affecting mental health. The association of positive QOL dynamics with the EchoCG response to SRT was also revealed.

Conclusion

The patients with CHF show a statistically significant increase in QOL: 'physical functioning' at one year after CRT. The responders have a statistically significant improvement in QOL at one year after HRT, while nonresponders have no change in QOL.

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