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Recovery of mental health parameters after ablation in patients with premature ventricular complex induced cardiomyopathy

K.B. BILGEN[1], K. ÖZLEM[2]

[1]Psychiatry Clinic, Bursa, Turkey
[2]University of Health Sciences, Bursa Research and Education Hospital, Cardiology Clinic, Bursa, Turkey

Abstract. – OBJECTIVE: The diagnosis of premature ventricular complex-induced cardiomyopathy (PVC-CMP) is based on the presence of common PVCs associated with cardiomyopathy without a reasonable etiology for the cardiomyopathy. The treatment strategies for PVCs include radiofrequency catheter ablation (RFCA) and drug therapy. In addition to physiological symptoms, PVCs also cause psychological symptoms. Impaired quality of life and sleep quality parameters have been observed in these patients. The aim of the study was to investigate the effects of RFCA treatment on cardiac function and psychiatric health parameters.

PATIENTS AND METHODS: A total of 60 consecutive patients undergoing catheter ablation for cardiomyopathy-associated idiopathic PVCs were included in this study. Each patient underwent a three-lead ECG recording over a 24-hour period during normal daily ambulatory activities at a screening visit before and 3 months after RFCA. The Beck Depression Inventory Index (BDI-I), Beck Anxiety Inventory Index (BAI-I), and Global Pittsburgh Sleep Quality Index (GPSQI) were assessed before and after RFCA.

RESULTS: PVC frequency decreased from 21.99±6.10 to 1.2% after RFCA. Left ventricular ejection fraction (LVEF) increased from 0.41±0.05 to 0.50±0.06 after RFCA (p<0.001). GPSQI (4.90±1.99 to 3.80±1.75, p<0.001), BDI-I (14.12±7.05 to 8.67±5.13, p<0.001), BAI-I (15.12±6.89 to 9.40±5.11, p<0.001) values decreased after RFCA. We found a moderate negative correlation between GPSQI, BDI-I, BAI-I and LVEF (rs=-0.56; p <0.001, rs=-0.55; p<0.001 and rs=-0.62; p<0.001).

CONCLUSIONS: In addition to the recovery of systolic and diastolic cardiac functions, mental and psychiatric health parameters also showed great improvement.

Key Words:
Premature ventricular complexes, Cardiomyopathy, Radiofrequency catheter ablation, Beck Depression Inventory Index, Global Pittsburgh sleep quality index.

Introduction

Premature ventricular complexes (PVCs) are extremely common in the general population. The prevalence of PVCs is 1-4% of the general population on a standard 12-lead electrocardiogram, but may reach 40-75% of individuals undergoing Holter monitoring[1]. The incidence of PVCs increases with age, male sex, black race, hypertension, hypokalemia, evidence of other heart disease, higher heart rate, and lower education level[2]. PVCs are diagnosed during medical examinations as an incidental finding or when looking for the cause of symptoms. Symptoms may present as palpitations, discomfort in the chest or neck, a strong heartbeat sensation, a feeling of cardiac arrest, presyncope, dyspnea, and fatigue. Increased contractile force of the postextrasystolic beat or a pause after the premature complex are the main explanations for the symptoms.

The three main mechanisms responsible for the development of PVCs are triggered activity, automaticity, and reentry. The diagnosis of premature ventricular complex-induced cardiomyopathy (PVC-CMP) is based on the presence of frequent PVCs associated with cardiomyopathy without a reasonable etiology for the cardiomyopathy. In some cases, it may be difficult to determine whether the cardiomyopathy is due to PVCs or some other etiologic component. Recovery of cardiomyopathy after treatment of PVCs may confirm the diagnosis PVC-CMP.

Most patients with PVC-CMP have very frequent PVCs; however, PVC burden alone does not predict the development of PVC-CMP. Longer duration of PVC exposure, asymptomatic disease, male sex, greater width of PVC QRS, epicardial origin of PVCs, and lack of diurnal variation in

Corresponding Author: Karakurt Özlem, MD; e-mail: ozlemkarakurt55@yahoo.com

PVC frequency are other factors contributing to PVC-CMP. Patients without symptoms may be exposed to frequent PVCs for a prolonged period before being diagnosed. PVC QRS Width greater than 150 ms is one of the best predictors of PVC-CMP. PVC frequency greater than 24% of all daily beats has high sensitivity and specificity (79% and 78%, respectively) to predict the risk of occurrence of PVC-CMP[3].

The treatment strategies for PVCs are radiofrequency catheter ablation (RFCA) and drug treatment. Relief of symptoms and prevention of PVC-CMP development are the main goals of therapy. Success rates for PVC ablation depend on the origin of the PVCs and range from 65% to 90% with a recurrence rate of 10%[4-6].

Even if ablation is successful, PVC-CMP may not recover completely. Ejection fraction normalized on average 5±6 months after ablation. In the majority of patients (68%) with PVC-CMP, LV function recovered within 4 months[7]. In addition to physiological symptoms, PVCs also cause psychological symptoms. Pytkowski et al[8] and Huang et al[9] demonstrated that the quality of life (QoL) of patients with PVCs was lower than that of the general population when measured at baseline. Even more surprising was that mental health status was more impaired than physical health. In this study population with structurally normal hearts, a significant improvement in quality of life was observed three months after RFCA in PVC patients. Both physical and mental health improved significantly. Coskun et al[10] demonstrated that sleep quality is impaired in patients with symptomatic PVCs, and treating patients with symptomatic PVCs with RFCA significantly improves sleep quality.

To our knowledge, our study is the first to examine the impact of RFCA on quality of life and mental health status in patients with PVC-CMP.

Patients and Methods

Study Population

A total of 60 consecutive patients who underwent catheter ablation for cardiomyopathy-associated idiopathic PVCs between October 2015 and April 2019 were included in this study. The inclusion criteria were as follows: (1) patients with frequent PVCs characterised by a total PVC count of > 10.000 beats during 24-hour Holter electrocardiographic monitoring, (2) patients with an LVEF of < 50%, (3) patients resistant to antiarrhythmic drugs, beta-blockers, or non-dihydropyridine calcium channel blockers (for at least 6 months), (4) patients aged > 18 years, (5) the ablation procedure was considered successful if > 80% decrease in PVCs with the same morphology was seen during 24-hour ECG Holter monitoring at the 3-month follow-up. The exclusion criteria for this study were as follows: (1) ischemic cardiomyopathy, valvular heart disease, left ventricular hypertrophy, and other cardiomyopathies, (2) subjects referred for treatment with antiarrhythmic drugs, (3) sleep apnea syndrome, (4) chronic obstructive pulmonary disease, and (5) known psychiatric disorders. Demographic, clinical, and laboratory characteristics of study patients were obtained from patient records. Electrocardiography or 24-hour ECG Holter recording data were also obtained from the entire study population. Patients were informed about the study, and written informed consent was obtained. The study protocol was approved by the Local Ethics Committee of the University of Health Sciences, Bursa Research and Education Hospital.

Echocardiography

Two-dimensional transthoracic echocardiography and Doppler examination (Philips i33, Eindhoven, The Netherlands) were performed in all patients in the left lateral decubitus position from multiple windows. Echocardiography was performed before the ablation procedure and three months after the ablation procedure. Left ventricular volume (LV) and ejection fraction were determined by the modified biplane Simpson method. LV Diastolic and systolic functions and left atrial functions (LA) were measured. Premature cardiomyopathy with ventricular complex was defined as left ventricular dysfunction with LVEF less than 50%. Left ventricular diastolic function (LVDD) was assessed by pulsed Doppler analysis of diastolic mitral inflow and tissue Doppler imaging of the left ventricular wall at the basal segments of the lateral and septal walls. Conventional Doppler parameters were assessed, calculated, and recorded along with LVDD grading according to the latest guidelines. Systolic velocity (Sa), early diastolic velocity (Ea), and late diastolic velocity (Aa) were recorded. In the TDI images, the duration of Sa was measured as the ejection time (ET), the time between the end of Sa and the beginning of Ea was measured as the isovolumetric relaxation time (IRT), and the time between the end of Aa and the beginning of Sa was measured as the isovolumetric contraction

time (ICT); a time is the sum of IRT, ICT, and ET, b time is equal to ET. Left ventricular Tei index (MPI) was calculated as (a-b)/b).

24-Hour ECG Holter Monitoring

In each patient, a three-lead ECG was recorded over a 24-hour period during normal daily ambulatory activities at a screening visit before and 3 months after RFCA. The SpiderView (ELA Medical, Sorin Group) multichannel system recorder was used to acquire the ECG data. Electrodes were placed at five different positions for the standard EASI lead system. This allowed us to acquire 12-lead ECG data comparable to those obtained with standard electrocardiography. Patients were asked to perform their normal daily activities during monitoring. All patients kept a detailed diary in which they recorded the time of each symptom onset. Patients were instructed to activate the event button when palpitations or presyncope occurred so that the ECG playback would automatically display the electrocardiogram at that time.

Measuring Mental Health Parameters

The Beck Depression Inventory Index (BDI-I) was developed in 1961 to measure the behavioral manifestations of depression in adolescents and adults. In 1978, the entire scale was revised and the overlaps defining severity were eliminated. Patients were asked to mark their status. The scale consists of 21 items. Two items relate to emotions, eleven items to cognitions, two items to behaviors, five items to somatic symptoms, and one item to interpersonal symptoms. This questionnaire, consisting of 21 questions, was used in the evaluation of the BDI. Patients were asked to select the most appropriate of these questions for their situation. Scores ranging from 0 to 63 were obtained by assigning 0, 1, 2, 3 points to each question. As violence, it is interpreted as 0-9=Minimal, 10-16=Mild, 17-29=Moderate, 30-63=Severe[11,12].

The Beck Anxiety Inventory Index (BAI -I) is a self-assessment scale developed by Beck et al[13] to determine the frequency of anxiety symptoms in individuals. It is a Likert scale consisting of 21 items and can be scored between 0-3. Its validity and reliability in Turkey was demonstrated by Ulusoy et al[14].

Pittsburgh Sleep Quality Index

The PUQI was developed by Buysse et al[15] and translated into Turkish by Ağargün et al[16]. The PUQI is a 19-item self-report scale that assesses sleep quality and disturbances in the past month. It consists of 24 questions. 19 questions are self-report, and 5 questions are questions to be answered by the spouse or roommate. The 18 scored questions of the scale consist of 7 components.

Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime D dysfunction. Each component is scored 0-3 points. The total score of the 7 components gives the overall scale score. The total score ranges from 0 to 21. A total score of more than 5 indicates “poor sleep quality”.

Electrophysiologic study and radiofrequency catheter ablation procedures

All antiarrhythmic drugs were discontinued one week before the procedure. A decapolar mapping catheter (6F, 110 cm, Inquiry™, St. Jude Medical, St. Paul, MN, USA) was inserted through the right femoral vein and placed in the coronary sinus under fluoroscopic guidance. A standard transvenous 6F quadripolar catheter (6F, 110 cm, Marinr® SC Series, Medtronic, Minneapolis, MN, USA) was placed at the right ventricular apex. Endocardial signals and surface electrocardiography data were recorded with the EP Tracer device (Medtronic, Inc, Minneapolis, MN, USA). A 3D electroanatomic map was obtained using the CARTO 3 D Mapping System (Biosense-Webster, CA, USA), NAVX (St. Jude Medical, MN, USA), or non-contact mapping (Ensite Array, St Jude Medical, MN, USA). Ablation was performed with an irrigated tip catheter with a contact sensor (Thermo-cool-SmartTouch, Biosense-Webster, Inc., CA, USA), an open irrigated tip catheter without a contact sensor (3.5 mm tip Thermocool or Thermocool SF, Biosense-Webster), and a FlexAbility catheter (Endosense/Abbott, St Paul, MN, USA). Activation mapping or pace mapping was performed to identify potential ablation sites. If no PVCs or only rare PVCs were detected, intravenous isoproterenol was administered to facilitate PVC detection. Acute procedural success was defined as the absence of spontaneous or inducible PVCs measured by isoproterenol infusion during a 30-minute observation period after the last ablation lesion and the absence of predominant PVCs in the 24-hour period after ablation.

Follow-Up

In patients with Premature Ventricular Complex Induced Cardiomyopathy, electrocardiography, 24-hour Holter recording and 2D transthoracic echocardiography (2D-TTE), NT-Pro-BNP levels, and global PSQI, BDI, and BAI scores were measured again after a follow-up period of 3 months after catheter ablation. A reduction of PVCs by at least 80% with the same morphology on 24-hour Holter recording was defined as successful ablation at 6-month follow-up. After the ablation procedure, medications other than antiarrhythmic drugs were continued.

Statistical Analysis

All statistical analyses were performed with the SPSS 23.0 for Windows software package, version 23.0 (IBM Corp., Armonk, NY, USA). Whether the distribution of continuous variables was normal or not was assessed with the Kolmogorov-Smirnov test. Continuous variables were expressed as mean (SD) or median (interquartile range). Categorical variables were expressed as numbers and percentages. The relationship between the PSQI and the BDI, BAI score, and the other continuous variables in PVC patients was determined by correlation analysis, and the Spearman correlation coefficient was reported. Multivariate linear regression analysis was performed to identify the independent predictors of the global PSQI score by including the parameters that were correlated with the global PSQI score in the bivariate correlation analysis. Paired-samples *t*-test and Wilcoxon signed rank test were used to compare variables in the preablation and postablation periods. A $p<0.05$ was considered statistically significant.

Results

Sixty consecutive patients (33 male and 27 female) were included in the study. The demographic, clinical, and laboratory characteristics of the study population are summarized in Table I. PVC frequency before RFCA was 21.99±6.10 on 24-hour ECG Holter monitoring (% of total beats), and after RFCA, PVC frequency decreased to 1.2%. PVCs originated mainly from the right ventricular outflow tract and aortic valve cusps (41.6% and 33.3%, respectively). The mean duration of the procedure was 91 ± 21 minutes. The rate of major complications remained below 3% (Table II).

Table I. Patient characteristics.

Characteristic	Value (n = 60)
Age (years)	43.72 ± 11.92 (19-66)
Gender (Female/Male)	27/33
Marital Status	
*Married (number/%)	52 (86.70%)
*Single (number/%)	5 (8.30%)
*Divorced (number/%)	1 (1.70%)
*Widowed (number/%)	2 (3.30%)
Level of Income	
*Low (number/%)	31 (51.70%)
*Medium (number/%)	24 (40%)
*High (number/%)	5 (8.30%)
Level of education (years)	8.10 ± 3.23
Body Mass Index (kg/m^2)	26.47 ± 4.13
Systolic Blood Pressure (mmHg)	123.43 ± 12.63
Diastolic Blood Pressure (mmHg)	77.10 ± 7.76
Blood glucose (mg/dl)	92.42 ± 20.87
White Blood Cell count (10^3/ml)	7627 ± 1399.57
Hemoglobin level (Gr/dl)	14.19 ± 1.37
Hemoglobin A1c level	6.19 ± 0.72
GFR (ml/minute)	79 ± 15.87
Total cholesterol level (mg/dl)	184.60 ± 34.15
LDL level (mg/dl)	109.99 ± 33.82
HDL level (mg/dl)	44.35 ± 10.83
TG level (mg/dl)	156.02 ± 63.46
BNP level	135.97 ± 73.07
Current smoking status	16 (26.70%)
DM (number/%)	8 (13.30%)
HT (number/%)	15 (25%)
HL (number/%)	15(25%)
PVC frequency in 24-hour ECG holter monitoring (% of total beats)	21.99 ± 6.10

Data reported as mean ± ST Deviation (min:max), median (interquartile range) and n(%). GFR: Glomerular filtration rate, LDL: Low density lipoprotein, HDL: High density lipoprotein, TG: Triglycerides, BNP: Brain natriuretic peptide, DM: Diabetes mellitus, HT: Hypertension, HL: Hyperlipidemia.

Table II. Procedural characteristics of the study patients.

	Number of patients
Site of origin	
Right ventricle outflow tract	25 (41.6%)
Aortic valve cusps	20 (33.3%)
Aortomitral continuity	3 (5%)
Epicardial summit	6 (10%)
Mitral/tricuspid annulus	4 (6.6%)
Multiple sites	2 (3.3%)
Procedural time (min)	91 ± 21
Fluoroscopy time (min)	12 ± 5
Radiofrequency energy application time (s)	205 ± 89
Complications	
Severe bleeding	1 (1.6%)
Pericardial effusion	1 (1.6%)

Table III. Changes in PSQI and BDI/BAI scores following radiofrequency catheter ablation (RFCA).

Parameters	Pre-ablation	Post-ablation	*p*-value
BDI-I	(14.12 ± 7.05)	(8.67 ± 5.13)	< 0.001
BAI-I	(15.12 ± 6.89)	(9.40 ± 5.11)	< 0.001
GPSQI	(4.90 ± 1.99)	(3.80 ± 1.75)	< 0.001
SSQ	(0.73 ± 0.66)	(0.60 ± 0.53)	0.005
SL	(0.70 ± 0.62)	(0.53 ± 0.57)	0.002
SD	(0.72 ± 0.61)	(0.47 ± 0.50)	< 0.001
HSE	(0.72 ± 0.61)	(0.53 ± 0.50)	0.001
USM	(0.70 ± 0.62)	(0.48 ± 0.54)	< 0.001
SDIS	(0.67 ± 0.60)	(0.57 ± 0.56)	0.014
DD	(0.67 ± 0.63)	(0.62 ± 0.58)	0.083

Data reported as median (interquartile range) and mean ± ST Deviation. BDI-I: Beck Depression Inventory, BAI-I: Beck Anxiety Inventory, GPSQI: Global Pittsburgh sleep quality index, SSQ: Subjective sleep quality, SL: Sleep latency, SD: Sleep Duration, HSE: Habitual sleep efficiency, USM: Use of sleep medications, SDIS: Sleep disturbances, DD: Daytime Dysfunction.

Almost all mental and psychiatric health parameters showed great improvement after RFCA. The BDI-I decreased from 14.12±7.05 to 8.67±5.13 (p<0.001), the BAI-I from 15.12±6.89 to 9.40±5.11 (p<0.001), the Global Pittsburgh Sleep Quality Index (GPSQI) from 4.90±1.99 to 3.80±1.75 (p<0.001), the sleep latency (SL) from 0.70±0.62 to 0.53±0.57 (p=0.002). These results show that patients' anxiety and depression parameters recover after RFCA. Sleep quality and duration also increases after RFCA (Table III).

Correlation analysis of mental and psychiatric health parameters (GPSQI, BDI-I, BAI-I) and clinical variables revealed a weak positive correlation between GPSQI and BDI-I and BSI-I. The correlation coefficient (rs) was 0.37 for the relationship between GPSQI and BDI-I (p=0.004) and rs was 0.39 (p=0.002) for the relationship between GPSQI and BAI-I (p=0.002). We also found a moderate negative correlation between GPSQI, BDI-I, BAI-I and LVEF (rs=-0.56; p<0.001, rs=-0.55; p<0.001 and rs=-0.62; p<0.001) (Table IV). As the LVEF increases, these mental and psychiatric health parameters also recover. Multiple linear regression analysis of GPSQI demonstrated a strong negative relationship between GPSQI and LVEF (Table V). These results show that patients' anxiety and depression parameters recover after RFCA. Sleep quality and duration also increase after RFCA.

Changes in echocardiographic parameters after RFCA are summarized in Table VI. Statistically significant increases were observed in LVEF and E wave. There is a remarkable improvement in the LVEF value after ablation compared with the values before ablation

Table IV. Relationship among GPSQI, BDI, BAI score and the other continuous variables in the PVC patients.

Variables		GPSQI	BDI-I	BAI-I
BDI-I	r_s	0.37	1	-
	p-value	0.004	-	-
BAI-I	r_s	0.39	0.25	1
	p-value	0.002	0.052	-
LVEF	r_s	-0.56	-0.55	-0.62
	p-value	< 0.001	< 0.001	< 0.001
VES Frequency	r_s	-0.15	0.03	-0.15
	p-value	0.240	0.845	0.242
Age	r_s	0.06	0.24	0.17
	p-value	0.631	0.068	0.206
Body Mass Index	r_s	0.13	-0.01	-0.09
	p-value	0.329	0.919	0.519
BNP	r_s	-0.02	-0.09	-0.03
	p-value	0.895	0.502	0.812

r_s: Spearman correlation coefficient. GPSQI: Global Pittsburgh sleep quality index, BDI-I: Beck Depression Inventory Index, BAI-I: Beck Anxiety Inventory Index, LVEF: Left ventricular ejection fraction, BNP: Brain natriuretic peptide.

Table V. Multivariate Linear Regression analysis of GPSQI.

	β	*p*-value
Constant	10.26	0.008
BAI-I	0.02	0.584
BDI-I	0.03	0.457
LVEF	-14.27	0.041

(0.50±0.06 *vs.* 0.41±0.05, $p<0.001$). There was also a significant decrease in LVEDD and LVESD in the postablation period (53.96±5.27 *vs.* 51.51±4.06, $p<0.001$ for LVEDD and 41.31±6.10 *vs.* 37.27±4.35, $p<0.001$ for LVESD). After RFCA, a statistically statistically significant decrease in the parameters EDT, IVRT, IVCT was observed. The values of E/E' and Tei index decreased after RCFA (11.20±4.45 *vs.* 9.72±2.14, $p=0.006$ and 0.65±0.09 *vs.* 0.59±0.09, $p<0.001$, respectively, consecutively). These results indicate that not only LV systolic functions but also LV diastolic functions show improvement after RFCA. Pro-BNP values decreased after RFCA, supporting the idea that LV systolic and diastolic functions recovered (135.97±73.07 *vs.* 102.33±42.86, respectively) (Figure 1). When all these results are combined, we see that the mental and psychiatric health status of patients improves after RFCA.

Discussion

In recent years, PVCs were thought to have a benign clinical course in the absence of underlying structural heart disease. The main goal of treatment in these patients was to improve symptoms[17]. However, it has been recognized that in some patients frequent PVCs cause deterioration of ventricular function or ventricular dilatation. PVC-CMP diagnosis is based on the presence of frequent PVCs associated with cardiomyopathy without a reasonable etiology for the cardiomyopathy. The recovery of cardiomyopathy after treatment of the PVCs may confirm the diagnosis PVC-CMP PVC-CMP and can be defined as normalization or ≥10% to 15% improvement in LVEF after treatment of the PVCs. The main mechanism for the development of PVC-CMP is LV dyssynchrony.

Most patients with PVC-CMP have very frequent PVCs; however, PVC burden alone does not predict the development of PVC-CMP. Prolonged duration of PVC exposure, asymptomatic disease, male sex, increased width of PVC QRS, epicardial origin of PVCs, and lack of diurnal variation in PVC frequency are other factors contributing to PVC CMP[18,19]. Patients without symptoms may be exposed to frequent PVCs for a prolonged period before being diagnosed. PVC QRS Width greater than 150 ms is one of the best predictors of PVC-CMP. PVC frequency greater than 24% of all daily beats has high sensitivity and specificity (79% and 78%, respectively) to predict the risk of occurrence of PVC-CMP[3].

Drug treatment with beta-blockers and calcium channel blockers to suppress frequent PVCs has limited efficacy, with a reported efficacy of about 10% to 24%[20].

The main goal of RFCA therapy is not only to relieve the patient's symptoms but also to prevent PVC-CMP. In a recent study, 67% of patients with PVC-CMP who underwent RFCA experienced at least 10% improvement in EF, 18% experienced between 0% and 10% improvement, and 15% experienced no improvement in EF[5].

Table VI. Changes in left ventricular echocardiographic parameters before and following radiofrequency catheter ablation.

	Pre-ablation	Post-ablation	*p*-value
LVEF	0.41 ± 0.05	0.50 ± 0.06	< 0.001
LVEDD	53.96 ± 5.27	51.51 ± 4.06	< 0.001
LVESD	41.31 ± 6.10	37.27 ± 4.35	< 0.001
E wave	0.89 ± 0.19	0.95 ± 0.11	0.007
A wave	0.84± 0.16	0.86 ± 0.14	0.803
EDT	209.62 ± 23.89	202.15 ± 14.59	0.006
IVRT	66.68 ± 9.62	60.78 ± 6.09	< 0.001
IVCT	59.50 ±8.19	57.20 ± 6.16	0.030
E/E'	11.20 ± 4.45	9.72 ± 2.14	0.006
Tei Index	0.65 ± 0.09	0.59 ± 0.09	< 0.001

Data reported as mean±ST deviation (min:max). LVEF: Left ventricular ejection fraction, LVEDD: Left ventricle end-diastolic diameter, LVESD: Left ventricle end-systolic diameter, E: E-wave, A: A-wave, EDT: E-wave deceleration time, IVRT: Isovolumetric relaxation time, IVCT: Isovolumetric contraction time.

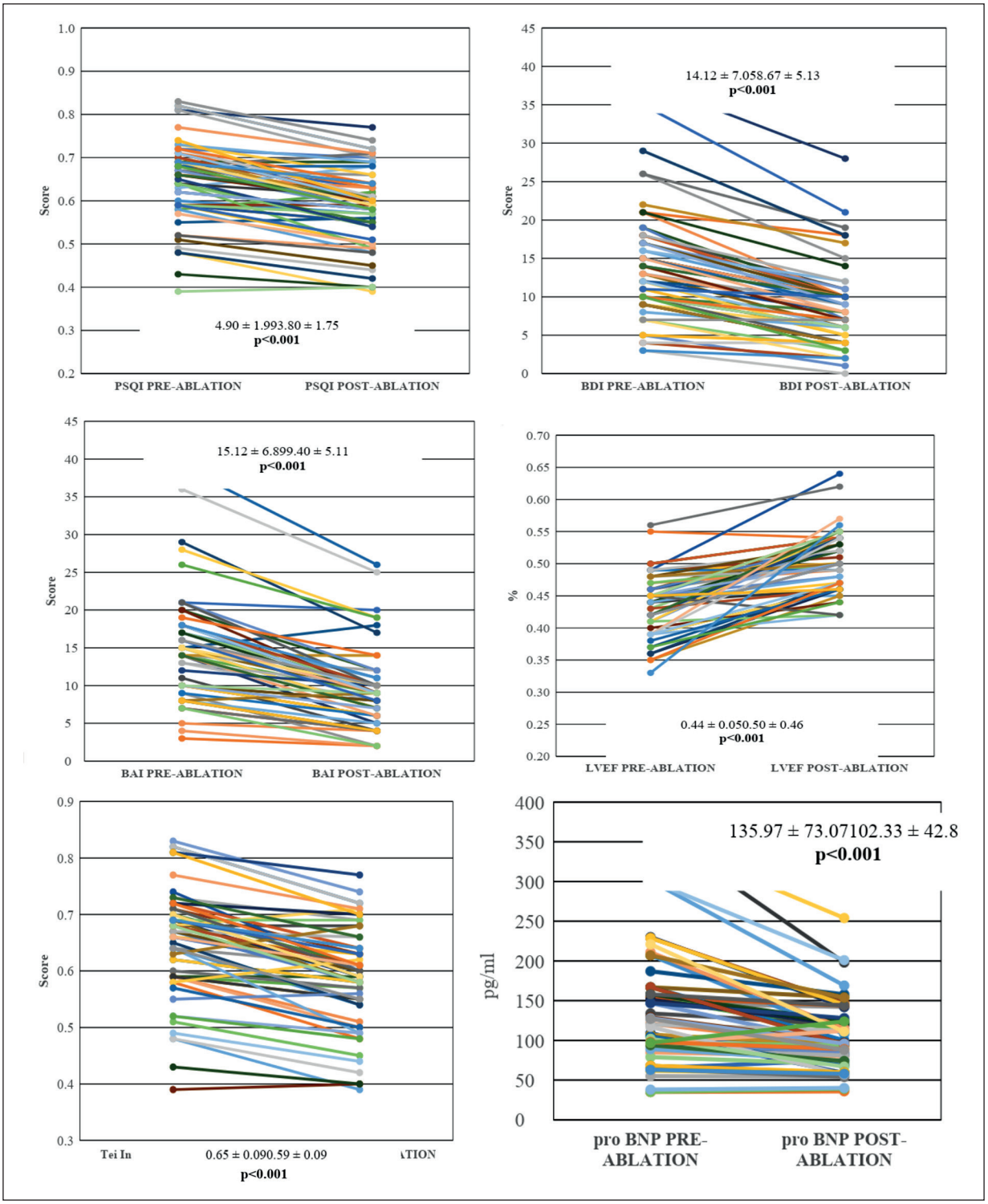

Figure 1. GPSQI, BAI, BDI, LV EF, Tei Index, Pro-BNP levels before and after RFCA.

After PVC-CMP developed, the quality of life of these patients also deteriorated. Huang et al[9] and Krittayaphong et al[21] demonstrated that the quality of life of patients with structurally normal hearts improved significantly after RFCA of PVCs. Coskun et al[20] showed that sleep quality was impaired in patients with symptomatic PVCs, and treatment of patients with symptomatic PVCs

with RFCA significantly improved sleep quality.

The main results of this study show that RFCA not only reduces the number of PVCs during 24-hour ECG monitoring but also improves the quality of mental and physical health. The present study describes the echocardiographic and psychiatric recovery patterns of patients with low LVEF and frequent PVCs who were submitted for ablation. Diastolic and systolic parameters of LV function, pro-BNP improved after RFCA. LV Dimensions decreased after RFCA. The remodelling of LV after RFCA resulted in increased LVEF after RFCA. E-wave velocity of the mitral valve also increased. Tei index evaluation showed that RFCA triggered recovery of global LV functions, including systolic and diastolic functions. The decrease in E/E' supported the pattern of improvement in diastolic LV functions after RFCA.

In addition to recovery of cardiac functions, mental and psychiatric health parameters also showed great improvement. GPSQI, BAI-I, BDI-I scores decreased after RFCA, proving that not only cardiac functions but also psychiatric functions recover. The recovery of anxiety, depression and sleep quality after RFCA increases the quality of life of these patients. The correlation of these scores with LV EF shows that as cardiac function improves, so does worsened sleep and mood. These results encourage clinicians to immediately opt for RFCA in PVC-CMP patients.

Limitations of the study

This study is a single center study. The relatively small number of patients is one of the limitations of the study.

Conclusions

In light of the study, we conclude that patients with high PVC burden should receive RFCA treatment as soon as possible. Successful ablation improves not only LV functions but also patients' anxiety, depression, and sepsis status.

Conflict of Interest

The Authors declare that they have no conflict of interests.

Informed Consent Statement

All patients who participated in this study gave informed consent. Institutional Review Board approval was obtained from our hospital for this study. Informed consent was obtained from all participants in the study.

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Authors' Contribution

Bilgen Biçer Kanat (ORCID ID: 0000-0003-0920-0191) and Özlem Karakurt (ORCID ID:0000-0002-2099-8678) conducted the research, wrote the main text of the manuscript, and prepared the figures and tables. Both authors reviewed the manuscript, designed the study, and conducted additional analyses.

Compliance with Ethical Standards

The study protocol was approved by the Ethics Committee of the University of Health Sciences, Bursa Research and Education Hospital, Department of Cardiology, Turkey, and informed consent was obtained from each patient.

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