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Relationship between depressive symptoms and quality of life in patients with coronary artery disease before and after percutaneus coronary interventions

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Summary

Introduction: Studies have shown that successful percutaneous coronary interventions (PCI) in coronary artery disease patients are associated with significant improvement in quality of life (QOL). However, this notion has been challenged by reports of some discrepancy between the cardiological outcome of PCI and QOL improvement.

Aim: to assess the relationship between depressive symptoms and the QOL in CAD patients after successful PCI.

Subjects and methods: Of 227 CAD patients, qualified for PCI, 156 with optimal PCI result were included. Patients were assessed one day prior, then 1 month, 6 months and 1 year after PCI, using the Polish version of the SF–36 questionnaire, the Beck Depression Inventory and the Hamilton Depression Rating Scale.

Results: In the entire study group QOL as measured 1 month after PTCA indicated significant improvement. This tendency persisted in subsequent examinations. The presence of depressive disorders recorded one day prior to PCI served as a basis to identify group I (n=75) – patients with depressive disorders before PCI and II (n=81) – patients without depressive symptoms. On each occasion QOL in group I was significantly poorer than in group II, both with respect to the total QOL and individual components measured by 8 subscales of the SF–36. There was a significant correlation between QOL and severity of depressive symptoms.

Conclusions: The present findings indicate that depressive disorders in patients with CAD – even after successful intervention – significantly affect the QOL. Successful intervention and restoration of coronary arteries are not the only determinants of satisfactory improvement in the QOL of cardiac patients.

coronary angioplasty / **coronary artery disease** / **depression** / **quality of life**

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INTRODUCTION

In recent years there has been a growing tendency to include patients' subjective assessment of treatment in medical results. This requires research concerning problems of quality of life (QOL), which reflects patients' subjective expe-

rience and their reactions to health, mental state, physical and social functioning, as well as non-medical aspects of life [1, 2, 3, 4].

Studies concerning the effectiveness of percutaneous coronary interventions (PCI) in patients with coronary artery disease (CAD) have shown that revascularization is associated with significant improvement in QOL [5, 6, 7, 8]. Recently, however, this notion has been challenged by reports of some discrepancy between the cardiological outcome of PCI and QOL improvement [9]. Although the interventions proved to be effective, a number of patients found that their general sense of well-being and life activity was impaired. Earlier studies of QOL in CAD patients neglected to address the problem of comorbid depressive disorders. These disorders constitute a serious clinical problem due to both their high rate of occurrence and negative impact on prognosis [10, 11].

AIM OF THE STUDY

The aim of the present study was to assess the relationship between depressive symptoms and the QOL in CAD patients after successful PCI.

SUBJECTS AND METHODS

Two hundred and twenty seven patients diagnosed with CAD (CCS II-III), with no previous history of PCI or coronary artery bypass grafting (CABG), qualified for an elective PCI (balloon angioplasty, angioplasty with stent implantation, rotational atherectomy) were enrolled in the study. Successful outcome of intervention, as well as lack of recurrent symptoms of ischemia during the four weeks following the intervention, made the patient eligible for further analysis. PCIs were performed according to generally accepted standards of practice. The interventional cardiologist's task was to achieve an optimal result for the procedure, which was defined as final diameter stenosis < 30% (estimated in quantitative coronary angiography) without a high grade of dissection with good coronary flow (TIMI 3). Stents were used for an abrupt or threatened vessel closure, as well as in the case of a suboptimal result of balloon angioplasty (final diameter stenosis < 20% was recognized as an optimal result of stent implantation). The interventional cardiologists were permitted to use intravascular ultrasonography for additional optimalization of intervention. The clinically successful PCI was defined as an angiographically effective procedure without serious complications, in conjunction with a reduction of clinical symptoms. Patients with one menial vascular disease, as well as those who had multivessel deterioration were included in the study. PCIs were performed either as non-staged or staged procedures during a one-day inpatient stay.

Symptoms of angina were assessed prior to PCI and four weeks subsequent to the intervention using classification endorsed by the Canadian Cardiovascular Society (CCS) [12]. In the instances of atypical chest pain subsequent to PCI, an evaluation of myocardial ischemia was determined by the results of an exercise test. Only those patients with complete functional revascularization were included in the study sample.

All patients completed the Polish version of the SF–36 questionnaire and instrument, widely accepted for QOL assessment in somatic diseases[1], the Beck Depression Inventory (BDI). Additionally, the Hamilton Depression Rating Scale (HDRS) was administered [13, 14, 15, 16, 17, 18]. A patient was classified as being depressed according to the results of the clinical examination and BDI, HDRS scores. Since the validity of depression rating scales and inventories may be problematic in patients with concurrent somatic illnesses, it has been suggested in the professional literature that the higher cutoff scores should be used to determine diagnostic accuracy [19, 20]. In this study, a score > 11 points on the BDI and a score > 10 on the $HDRS_{21}$ was used to indicate the presence of depressive symptomatology.

All patients were evaluated on four occasions: one day prior to the procedure, and at 1, 6 and 12 month intervals subsequent to the intervention.

A statistical analysis was preformed using the Wilcoxon test for paired variables and the Mann

1 Permission by Quality Metric, Inc., was obtained.

Whitney "U" Test for unpaired variables. Spearman's rank correlation coefficients were calculated to permit examination of the association between QOL and severity of depressive symptoms. All statistical tests were two-sided. A p value of < 0.05 was considered to be statistically significant.

RESULTS

Demographic data

Of 227 patients enrolled, 71 were excluded because of: suboptimal result of PCI (n=31); hospitalizations due to non-cardiological reasons during the one-year follow-up (n=14), compliance failure (n=26). The final group consisted of 156 patients (39–71 year-old; mean age: 55.05±8.25) including: 135 males (86.5%) and 21 females (13.5%), who were followed up for one year. 115 subjects (73.3%) had a previous history of cardiac infarction. According to the CAD risk factors: 108 of patients (69%) had hiperlipidemia, 97 (62%) were diagnosed with hypertension and 19 (12%) with diabetes, type II. 70 patients (45%) were smokers. In 126 patients (81%) angioplasty was performed as a one-stage procedure, in 27 (17%) it was two-stage. 3 patients (2%) had a three-stage procedure. One-vessel PTCA was performed in 78 subjects (50%), two-vessel in 72 patients (46%), and three-vessel in 6 (4%).

After the PCI, patients were treated with: acetylsalicic acid (95%), ticlopidine or clopidogrel (90%), statines (62%). Patients with hypertension, or lowered ejection fractions of the left ventricle received ß-blockers (65%), ACE (spell out)-inhibitors (68%) or nitrates (24%).

Quality of life and severity of depressive symptoms

In the entire group of patients studied (n=156), there were no significant correlations between cardiovascular function impairment (CCS criteria) and severity of depressive symptoms, assessed with HDRS or BDI; (Spearman rank correlation, HDRS vs. CCS r=0.25 ; BDI vs. CCS r=0.27). In the entire study group (n = 156), SF scoring one day before the PCI (SF1) was 45.43±14.75 and there was a significant correlation between the QOL and severity of depressive symptoms assessed with BDI (Spearman rank correlation, r= –0.72, p<0.001). The QOL one month after the PCI (SF2) was significantly improved: (SF1 = 45.43± 14.75 vs. SF2 = 59.24±14.47, p<0.001, Wilcoxon test for paired variables). This tendency persisted at the third (SF3 = 55.15±16.70, SF1 vs. SF3 p< 0.05, Wilcoxon test) and fourth examinations (SF4 = 55.82±15.75, SF1 vs. SF4 p<0.05, Wilcoxon test); however QOL at six months subsequent to the PCI was significantly worse than at the second examination period (SF3 vs. SF2, p< 0.05, Wilcoxon).

The presence or absence of depressive symptomatology during the first examination was the defining criterion for group I (n=75, 48.1%) – patients who experienced depressive symptoms before PCI and II (n=81, 51.9%) – patients without the symptoms of depression prior to intervention. One month after the PCI (second examination), depressive symptoms were observed in 45 patients (28.9%). Depressive symptoms were still present in 33 subjects from group I, while in the remainder of group I (n=42) spontaneous improvement was observed. Moreover, in group II (patients free of depressive symptoms one day before PCI) twelve patients developed depressive symptomatology during the 4 weeks after the procedure. Based on those findings, the following subgroups were identified for further analysis: Ia (n=33) – patients with depressive symptoms persisting for one month, Ib (n=42) – patients in whom depressive symptoms abated, IIa (n=12) – patients without depressive symptoms before PCI in whom depressive symptoms developed prior to the second examination, IIb (n=42) – patients without depressive symptoms both before and one month after PCI.

During each examination the QOL in group I was significantly poorer than in group II. (Fig.1, Tab 1).

The QOL in group I one month after PCI (SF2) was significantly improved (SF1 vs. SF2, p<0.001). This trend persisted at the third examination (SF2 vs. SF3 p< 0.001). One year after PCI, QOL was not significantly better than it was by the third examination (SF4 vs. SF3, p=NS). In group II, by the second examination the QOL had significantly improved (SF1 vs. SF2, p<

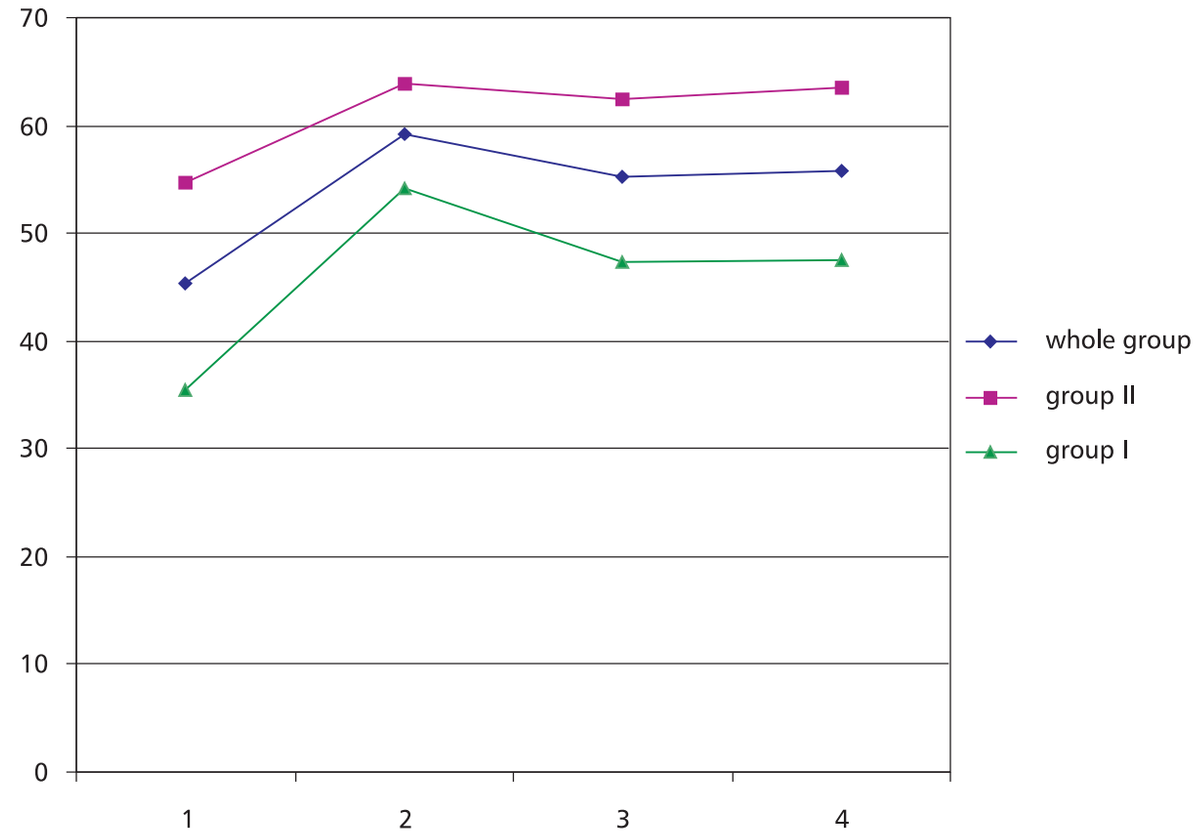

Fig. 1. The results of SF–36 obtained by patients with depressive symptoms (group I) and patients without depressive symptoms (group II) one day prior to the PCI procedure (1), and at one (2), six (3) and twelve month (4) intervals subsequent to the intervention.

Table1. The results of SF–36 obtained by patients with depressive symptoms (group I) and patients without depressive symptoms (group II) one day prior to the PCI procedure (SF1), and at one (SF2), six (SF3) and twelve (SF4) month intervals subsequent to the intervention. Mean value + SD.

	Group I	Group II	p*
SF1	35.4 ± 8.50	54.7 ± 13.2	p< 0.001
SF2	54.2 ± 15.9	63.9 ± 11.3	p< 0.001
SF3	47.2 ± 16.1	62.5 ± 13.7	p< 0.001
SF4	47.6 ± 12.9	63.4 ± 14.3	p< 0.001

*Mann-Whitney U test

0.001) and remained at the same level until the end of the follow-up (SF2 vs. SF3, p=NS; SF3 vs. SF4, p=NS), (Wilcoxon test for paired variables).

In subgroup Ia the QOL significantly improved after PCI, but the degree of this improvement was much smaller than in subgroup Ib. The total quality of life in subgroup Ia was stable during all examinations and was poorer than in sub-

Table 2. The differences between results of SF–36 obtained one day prior to the PCI procedure (SF1), and at one (SF2), six (SF3) and twelve (SF4) month intervals subsequent to the intervention by patients with depressive symptoms persisting one month after PCI (subgroup Ia) and patients in whom depressive symptoms abated one month after PCI (subgroup Ib). Mean value + SD

	Subgroup	p*
SF1 vs. SF2	Ia	p< 0.001
SF2 vs. SF3	Ia	NS
SF3 vs. SF4	Ia	NS
SF1 vs. SF2	Ib	p< 0.001
SF2 vs. SF3	Ib	p< 0.05
SF3 vs. SF4	Ib	NS

*Wilcoxon test for paired variables

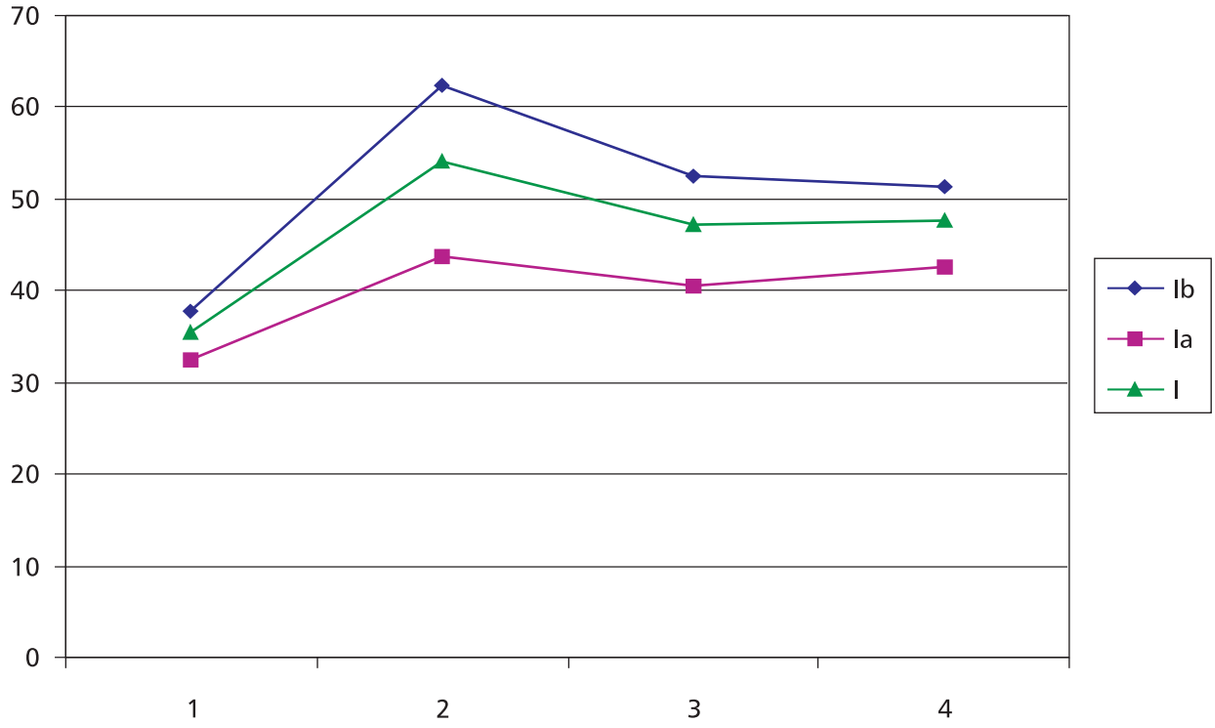

Fig. 2. Results of SF–36 obtained by patients with depressive symptoms persisting one month after PCI (subgroup Ia) and patients in whom depressive symptoms abated one month after PCI (subgroup Ib) one day prior to the PCI procedure (1), and at one (2), six (3) and twelve (4) month intervals subsequent to the intervention.

group Ib, whereas in subgroup Ib the QOL deteriorated at 6 and 12 months (Fig.2). Results of the Wilcoxon test for paired variables in sugroups Ia and Ib are presented in Tab. 2.

Table 3. The differences between results of SF–36 obtained one day prior to the PCI procedure (SF1), and at one (SF2), six (SF3) and twelve (SF4) month intervals subsequent to the intervention by patients without depressive symptoms before PCI in whom depressive symptoms developed prior to the second examination (subgroup IIa) and patients without depressive symptomatology both before and one month after PCI (subgroup IIb). Mean value + SD

	Subgroup	p*
SF1 vs. SF2	IIa	$p<0.05$
SF2 vs. SF3	IIa	$p<0.05$
SF3 vs. SF4	IIa	$p<0.05$
SF1 vs. SF2	IIb	$p<0.001$
SF2 vs. SF3	IIb	NS
SF3 vs. SF4	IIb	NS

*Wilcoxon test for paired variables

In subgroup IIa the QOL at one day prior to the PCI was significantly worse than in subgroup IIb. The quality of life in both subgroups had significantly improved by the second examination, but the degree of this improvement was much bigger in subgroup IIb, in which QOL remained unchanged for the remainder of the follow-up. Six months after PCI, despite a high rate of BDI, QOL in subgroup IIa improved when compared to the second examination and was not significantly different from subgroup IIb. However, after one year there was a worsening of the QOL in subgroup IIa, which was not observed in subgroup IIb. (Tab.3, Fig.3).

DISCUSSION AND CONCLUSIONS

Cardiac revascularisation procedures in patients with CAD proved to be highly effective in terms of immediate relief of angina symptoms, significant improvement of the patients' QOL and their return to work activities [6, 7, 8]. In this study we also report a significant improvement

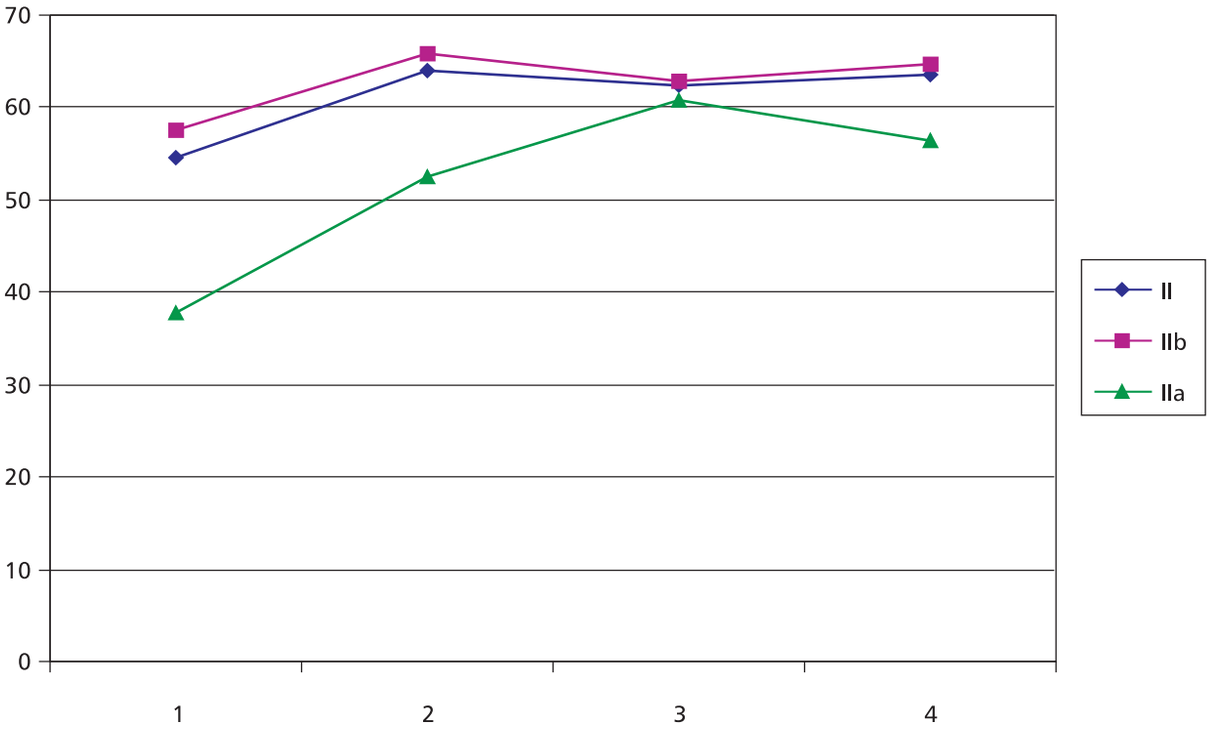

Fig. 3. Results of SF–36 obtained by patients in whom depressive symptoms developed prior to the second examination (subgroup IIa) and patients without depressive symptomatology both before and one month after PCI (subgroup IIb)one day prior to the PCI procedure (1), and at one (2), six (3) and twelve (4) month intervals subsequent to the intervention.

in the QOL: one, six and twelve months after the successful PCI with the entire study group.

However, in some reports the patients – immediately after the cardiac intervention as well as at six or twelve months follow-up – complained about their general sense of well-being and life situation, despite the positive result of the treatment [21, 22, 23]. In the group of patients qualified for coronary artery bypass grafting, it appeared that the individuals prone to react with high intensity of stress and psychopathological symptoms (anxiety, depression, psychosis) before the operation, held negative evaluation of their general sense of well-being and health condition both before CABG and in the long-term follow-up [21].

In our study, mood assessment made one day prior to the PCI revealed the presence of depressive symptoms in 48.1% of patients (group I). Their QOL was significantly worse one day before the intervention and one, six and twelve months after when compared to non-depressive subjects (group II). Obviously, depressive symptoms occurring just prior to the angioplasty may be treated as an emotional reaction to the expected invasive intervention. These symptoms can be short-lasting, of mild intensity and may disappear spontaneously, as in the 42 patients (subgroup Ib) in our study. Consequently, the disappearance of depressive symptoms resulted in a stable improvement in the QOL observed at all examinations during the one year follow-up. However, in the 33 patients (subgroup Ia) whose depressive symptoms were initially more intense, and persisted for four weeks after the PCI, improvement of the QOL was present, but it was significantly poorer than in subgroup Ib, in spite of a similarly optimal result of the coronary angioplasty I both subgroups. Moreover, in subgroup Ib the QOL had deteriorated by 6 and 12 months.

According to the illusion theory and depressive realism theory, the sudden and great improvement in the QOL and depressive symptomatology in subgroup Ib may be accounted for by a transient euphoric and over-optimistic perception of the world and personal capabilities immediately after successful PCI in those patients who later become more aware of the situation. In contrast, depressive patients (subgroup

Ia) are more moderate and stable in their perception of life. Additionally, it seems that the markers of improvement of patients' somatic state are not always related to their QOL [24, 25].

Recently, depressive disorders have become a major object of interest for the psychosomatic aspects of heart disease. Numerous studies have shown that widely defined depressogenic factors are a significant risk for CAD and occur in a large group of CAD patients. Depressive symptoms occur in 65% of patients subsequent to myocardial infarction and their duration and intensity meets the DSM-IV criteria for major depression in 16–22% of cases [26, 27, 28]. This result confirms the necessity of a holistic approach to CAD treatment, also giving attention to the mental state of patients frequently subjected to contemporary revascularization procedures. Although comorbidity of depression and CAD is an important clinical problem, depressive disorders are rarely diagnosed and treated in cardiac patients [11, 29].

The results derived from the present study suggest that the pre-existence of depressive symptoms may contribute to the lack of significant improvement of QOL after a successful PCI. A patient, who presents with a higher level of bigger severity of depression, anxiety or distress prior to the intervention, requires special attention. Depressive symptomatology may persist even one year subsequent to the intervention and no improvement of QOL could be observed despite the patient's optimal cardiac profile.

Limitations of the study

The study was focused on depressive symptoms but not on the detection of depressive episode and its relationships with QOL. Assessment of depressive symptoms one day before PCI without information about symptoms duration didn't give the possibility for diagnosing of depression. It may be hypothesized that part of the so called depressive symptoms may be related with anxiety before PCI.

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