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Depression as a risk factor for early and late morbidity after coronary artery bypass surgery

Depressão como fator de risco de morbidade imediata e tardia pós-revascularização cirúrgica do miocárdio

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Abstract

Objective: **To assess presence of depression symptoms in the preoperative period, immediate postoperative period (IPP) and in the late postoperative period (LPP) in patients with coronary artery disease undergoing bypass surgery and its impact on early and late postoperative morbidity.**

Method: **Fifty-eight inpatients waiting to undergo a bypass elective surgery completed the Beck Depression Inventory (BDI) before surgery (period I), after surgery just before hospital discharge (period II) and three months later (period III). Patients mean age was 61.2 (34 to 78 years; SD: 10.1), 34 (58.6%) were male, 31 (55.4%) had a history of infarction, 35 (62.5%) had ejection fraction >40%, 19 (33.0%) had diabetes.**

Results: **Depression symptoms were identified in 12 (20.7%) patients on period I, 13 (23.6%) on period II e 4 (9.8%) on period III. Eighteen (31.0%) patients had complications on the IPP, 17 (34.0%) on the LPP. IPP complications were more frequent for older patients (more than 65 years; p=0.003), with at least three grafts (p=0.001) and depression on period I (p=0.011). When those variables were associated with complications on the LPP, there was a significant difference for females (p=0.006) and depression on period II (p=0.008). Female patients had more depression symptoms while staying in hospital (p=0.04).**

Conclusion: **More than 65 years, females, three or more grafts and depression symptoms on the postoperative period were associated with more complications after bypass surgery. Patients undergoing bypass surgery should be carefully monitored for depression and treated if necessary since it may be associated with complications after surgery.**

Descriptors: **Coronary disease. Depression. Myocardial revascularization.**

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Resumo

Objetivo: **Avaliar a presença de sintomas de depressão no pré-operatório, no pós-operatório imediato (POI) e pós-operatório tardio (POT) de pacientes com indicação eletiva de cirurgia de revascularização do miocárdio e seu impacto na morbidade pós-operatória imediata e tardia.**

Método: **Cinqüenta e oito pacientes internados na Enfermaria de Cirurgia Cardíaca para realização de operação eletiva de revascularização do miocárdio responderam ao Inventário de Depressão de Beck, antes da operação (fase I), antes da alta hospitalar (fase II) e três meses após a alta (fase III). A média de idade dos pacientes foi 61,2 (34 a 78 anos; DP:10,1), 34 (58,6%) eram homens, 31 (55,4%) com infarto prévio, 35 (62,5%) com fração de ejeção maior que 40% e 19 (33%) diabéticos.**

Resultados: **Doze (20,7%) pacientes apresentaram sintomas de depressão na fase I, 13 (23,6%), na II e 4 (9,8%), na III. Dezoito (31,0%) pacientes apresentaram complicações no POI, 17 (34,0%), no POT. Complicações no POI ocorreram com maior freqüência em pacientes mais velhos (idade superior a 65 anos; p=0,003), com pelo menos três vasos revascularizados (p=0,001) e com depressão na fase I (p=0,011). Quando estas variáveis foram associadas às complicações presentes no POT, houve significância para o sexo feminino (p=0,006) e depressão na fase II (p=0,008). Pacientes do sexo feminino apresentaram mais sintomas de depressão durante a internação (p=0,04).**

Conclusão: **Idade superior a 65 anos, sexo feminino, pelo menos três vasos revascularizados e sintomas de depressão durante a internação mostraram-se associados a maior número de complicações no pós-operatório de cirurgia de revascularização do miocárdio. Pacientes submetidos à cirurgia de revascularização do miocárdio devem ser avaliados em relação à depressão e tratados se necessário, uma vez que esta pode estar associada a complicações no pós-operatório.**

Descritores: **Coronariopatia. Depressão. Revascularização miocárdica.**

INTRODUCTION

Research on coronary artery disease (CAD) and behavior started to be made when epidemiological studies identified numerous environmental factors and associations with the life style involved in the etiology and pathogenesis of the disease. With the advances in knowledge, evidence started to appear that "recognizing and treating psychological stress in patients with CAD might reduce the subsequent morbidity and mortality" [1].

From the psychosocial point of view, several variables have been identified as possible risk factors for the development and progression of the disease such as acute and chronic stress, hostility, depression, social support and socioeconomic status [1].

Depression is associated to risk for cardiovascular diseases independently of the classical risk factors, both for healthy patients and those who present with CAD [2-5]. Among the CAD patients, the risk for death due to heart disease is from two to four times higher than those who present with depression [6]. Among the physiological mechanisms possibly associated to depression and the increase in cardiovascular risk are endothelial dysfunction, dysregulation of the autonomous nervous system and of the hypothalamo-hypophyseal-adrenal axis and hypercoagulation [6,7].

Several studies performed over the last decade have documented an increase in the prevalence of depression in patients with differing manifestations of CAD. The prevalence of major depression, as defined by DSM-IV [8], varies between 16% and 23% and the prevalence of high levels of depression symptoms between 31.5% and 60% [5,9]. Additionally, depression predicts important future cardiac events [3,5,9,10].

The association between depression and the prognosis of patients with CAD submitted to coronary artery bypass grafting (CABG) has been the focus of some studies, whose results indicate the necessity of adequately identifying and managing patients with higher risks of depression [11,12]. Blumenthal et al. [13] evaluated 817 patients submitted to this procedure and concluded that, in spite of the clinical and surgical advances, "depression is an important independent predictor of death after CABG and should be carefully monitored and treated when necessary".

Considering the frequency that CABG has been performed and the risk of complications associated to depression the objectives of this work were to evaluate the symptoms of depression in the pre-, immediate post- and late post-operative periods of patients indicated for elective surgery and the impact on the immediate and late postoperative morbidity.

METHOD

After being duly informed about the nature of the study and signing informed written consent forms, 58 patients with CAD hospitalized on the heart surgery ward with indication of elective CABG were included in the study.

The patients responded the Beck Depression Inventory* [14,15] before the operation (Phase I), before being released

from the hospital (Phase II) and three months later (Phase III). The Beck Depression Inventory is a scale of 21 items that evaluate the existence and severity of depression symptoms. Each item is graduated on a scale of 0 to 3; the total score can range from 0 to 63 points and the results are significantly associated to clinical evaluations of depression. It has been widely utilized with heart patients and the evidence suggests that the risk for future cardiac events is associated with the magnitude of the depression symptoms. The Brazilian version was approved by the Evaluation of Psychological Test System/ Federal Counsel of Psychology.

The characteristics of the sample were evaluated for any risk factors; prior depressive states, social class according to the ABIPEME classification [16], ejection fraction prior to the operation with a cutoff point greater than or equal to 40% assessed by echocardiography and slight or normal left ventricle dysfunction seen by a hemodynamic study. The complications analyzed in the postoperative period were divided into cardiological (arrhythmias and recorded infarctions), renal (increases in creatinine to levels higher than 2 mg/dL), neurological (stroke, transitory ischemic events), infectious (any infection requiring antibiotics) and others (pleural effusion, venous thrombosis, dehiscence of sutures). The immediate postoperative (IPO), the period between finishing the surgery and release from hospital and the late postoperative (LPO), the period from hospital release up to three months after, were investigated. These data were obtained by means of reviewing patients' records.

The chi-squared test, Mood test and logistic regression were utilized with a p-value < 0.05 considered statistically significant.

RESULTS

The ages of the patients ranged from 34 to 78 years old (mean 61.2 – standard deviation (SD) 10.1) and 34 (58.5%) of the patients were men. Table 1 illustrates that 75.4% of the sample did not present with a history of depression and 80% were smokers. An analysis of the characteristics of the state of these patients showed 35 (62.5%) had good ejection fractions, 31 (55.4%) had suffered from infarction and 19 (33.0%) were diabetics. In respect to the social class, 25 (50%) were from class D, 22 (37.9%) from class C, 5 (8.6%) from classes A and B and 2 (3.4%) from class E.

The mean time of hospitalization before the operation was 6.2 days (SD = 6.2; Median = 4) and after the operation the mean time was 8.5 days (SD = 5.2; Median = 7). Eleven (18.9%) patients were hospitalized for five days or less during the postoperative period.

Complications in the IPO occurred in 18 (31%) patients: 12 cardiac complications, 12 infectious, five renal and three deaths. In the LPO, 17 (34%) patients suffered complications: 13 infectious, two cardiac, one renal, one neurological and three others. For 5 (9.1%) patients it was impossible to evaluate the complications in the LPO as they did not complete the three months necessary for the postoperative evaluation (Phase III).

In Phase I (preoperative), 12 (20.7%) patients had a depression score greater than or equal to 10 (10 mild and two moderate). In Phase II (before hospital release), 13 (23.6%) patients obtained scores greater than 10 (eight mild and five moderate). In Phase III (three months after release) four (9.8%) patients presented with depression symptoms; three mild and one severe. It was not possible to perform the inventory at Phase III in 14 (25.5%) patients as they did not appear for the late follow-up examination.

In the logistic regression for the variables and the depression symptoms in Phases I and II, there were significant differences in respect to the gender (female) (p-value = 0.04; OR = 3.25 CI 1.05-10.02).

In the analysis of the variables with the presence of complications in the IPO, there were statistically significant differences in respect to age greater than 65 years old (p-value = 0.003), 3 or more grafts (p-value = 0.001) and depression symptoms in Phase I (p-value = 0.011). In relation to the presence of complications in the LPO, there were significant differences between gender (female) (p-value = 0.006) and depression symptoms in Phase II (p-value 0.008). Additionally, the patients who presented with depression symptoms in Phase I had a greater number of complications in the IPO (p-value = 0.003) and those who presented with symptoms in Phase II had a greater number of complications in the LPO (p-value = 0.002) – Figures 1 and 2.

In this study, there were associations between depression symptoms and complications in the postoperative period of CABG. The patients who presented with depression symptoms in Phase I had more complications in the IPO (cardiac, infectious and renal), whilst those who presented with symptoms in Phase II had more complications in the LPO (cardiac, infectious, renal, neurological and others).

Apart from depression, three other factors were associated with postoperative complications: age greater than 65 years old and 3 or more grafts were associated to complications in the IPO and gender (female) to complications in the LPO. In this study there were no significant differences among the social classes A, B, and C compared to D and E. Nevertheless, when social classes A and B were grouped (8.6%) the patients presented with no complications in the IPO and LPO, nor depression symptoms.

Of the three deaths of the series, only one presented with depression symptoms in Phase I and therefore no statistical significance was seen.

Table 1. Relationship between analyzed variables, depression and complications in the immediate (IPO) and Late (LPO) postoperative periods

	Number of patients	BDI ≥ 10 in phase I or II	Complications IPO	Complications LPO
age				
< 65 years	32 (55.2%)	11 (34.4%)	4 (12.5%)*	10 (34.5%)
≥ 65 years	26 (44.8%)	9 (34.6%)	14 (53.8%)*	7 (33.3%)
gender				
male	34 (58.6%)	8 (23.5%)*	8 (23.5%)	5 (16.7%)*
female	24 (41.4%)	12 (50.0%)*	10 (41.7%)	12 (60.0%)*
History of depression				
no	43 (75.4%)	13 (30.2%)	11 (34.4%)	13 (35.1%)
yes	14 (24.6%)	7 (50.0%)	6 (42.9%)	4 (30.8%)
smoker				
no	44 (80.0%)	16 (36.4%)	14 (31.8%)	13 (34.2%)
yes	11 (20.0%)	3 (27.3%)	3 (27.3%)	4 (40.0%)
diabetes				
no	39 (67.2%)	12 (30.8%)	9 (23.1%)	11 (31.4%)
yes	19 (32.8%)	8 (42.1%)	9 (47.4%)	6 (40.0%)
History of AMI				
no	25 (44.6%)	8 (32.0%)	8 (32.0%)	7 (35.0%)
yes	31 (55.4%)	12 (38.7%)	10 (32.3%)	10 (35.7%)
social Class				
A, B or C	27 (46.6%)	7 (25.9%)	6 (22.2%)	5 (22.7%)
D or E	31 (53.4%)	13 (41.9%)	12 (38.7%)	12 (42.9%)
Lives alone				
no	53 (93.0%)	19 (35.8%)	15 (28.3%)	17 (36.2%)
yes	4 (7.0%)	1 (25.0%)	2 (50.0%)	0
Ejection fraction				
≥ 40% or slight dysfunction	35 (62.5%)	13 (37.1%)	13 (37.1%)	10 (33.3%)
< 40% or moderate/severe	21 (37.5%)	7 (33.3%)	4 (19.1%)	7 (35.0%)
number of grafts				
1 or 2	34 (60.7%)	10 (29.4%)	5 (14.7%)*	10 (33.3%)
3 or more	22 (39.3%)	10 (45.5%)	13 (59.1%)*	7 (36.8%)
BDI in phase I				
< 10	46 (79.3%)	-	10 (21.7%)*	-
≥ 10	12 (20.7%)	-	8 (66.7%)*	-
BDI in phase II				
< 10	42 (76.4%)	-	-	8 (21.6%)*
≥ 10	13 (23.6%)	-	-	9 (69.2%)*

** p<0.005. BDI – Beck Depression Inventory*

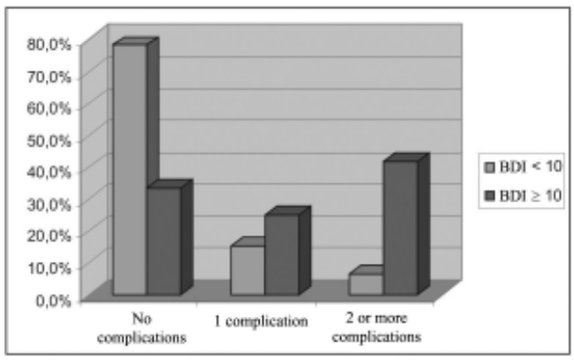

Fig. 1 - Score of the Beck Depression Inventory in Phase 1 and number of complications in the immediate post-operative period (p-value = 0.003)

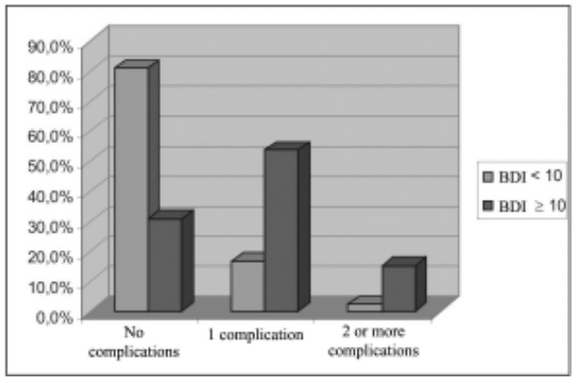

Fig. 2 - Score of the Beck Depression Inventory in Phase 2 and number of complications in the late post-operative period (p-value = 0.002)

DISCUSSION

In relation to the age and gender of the sample, the data obtained are compatible with the literature, that is, there was a predominance of older patients and male patients submitted to CABG [6,11-13,17].

An analysis of the health conditions of the patients indicated that these are also compatible with the literature [6,12,13,17]. Diabetes, smoking, prior infarction and depression, conditions identified in some of the patients, are associated to CAD [2-5].

The predominance of patients in social classes C and D corresponds to the reality of the patients attended in the institution in which the study was performed.

A longer period of hospitalization for the patients in the series was observed when compared to the only other study identified in the literature that analyzed the period of hospitalization [17]. It is possible that a longer period of hospitalization for the patients in this study is related to social questions such as the lack of adequate medical services near to the residences of the patients or the necessity of high cost medications in the postoperative period which are not available in government health centers.

Postoperative complications, observed in 18% of the patients in this sample, stressed the necessity of special care in respect to these patients, although some complications can really occur.

It was impossible to evaluate 14 patients in Phase III of the study as they did not go to the outpatient follow-up in the institution. The fact that many of the patients consulted in the institution come from other cities, even from other states, means that after the operation they attend follow-up consultations near to their homes.

Rymaszewska et al. [11] identified the presence of depression symptoms in 32% of the patients in Phase I and in 28.3% in Phase II; in higher numbers than in Phase III (26.4%). It is possible that this difference in the depression of the patients in this study is related to the loss of some patients in Phase III, the possibility of patients being referred for depression treatment or even improvements in the quality of life of patients, thereby reducing the symptoms of depression. Other studies reported prevalences of depression, before and after the operation, of around 20 to 25% and 38%, respectively [13,17].

The greater frequency of depression for women in this study is also compatible with the literature [6,11,13,18].

In this study a relationship was seen between the symptoms of depression and complications in the postoperative period. Works with follow-ups of more than three months also reported this relationship. Connerney et al. [17] observed that 20% of the patients with symptoms of depression suffered cardiac events within 12 months after the surgery, with only 11% of those who did not present with depression having this type of problem. Blumenthal et al. [13] found a two-fold higher frequency of cardiac events in depressive patients compared with non-depressive patients at 12 months after surgery.

Apart from depression and ages greater than 65 years old, three or more grafts was also associated to complications in the immediate postoperative period, whilst being a woman was associated with complications in the late postoperative period. Connerney et al. [17] reported that being a woman and having more severe depression were independent

predictors of cardiac events within 12 months of surgery.

According to Kop [19] and Rozanski et al. [3], there is strong evidence that low socioeconomic levels are associated to risk for CAD and its clinical manifestations. When only Class A and B patients were grouped in this study neither complications in the IPO and LPO nor symptoms of depression were seen.

There was no statistical significance between the number of deaths that occurred and the symptoms of depression. This datum is similar to that obtained by Connerney et al. [17], however different to what was reported by Blumenthal et al. [13].

Some limitations of the study should be mentioned such as the short follow-up time of the patients which may be associated to a smaller number of complications and deaths. The difficulty experienced by some patients to understand the Depression Inventory associated to poor schooling and the low sample size and the difficulty in completing the follow-up for all patients should also be mentioned.

CONCLUSIONS

Symptoms of depression above the cutoff point were identified in 25% of the patients.

There was an association between the symptoms of depression and complications in the postoperative period. Other factors associated to complications were being female, aged over 65 years old and 3 or more grafts in the surgery.

Although the instrument utilized to evaluate depression does not provide a diagnosis of mood disorders, it is useful to identify patients with symptoms in a sufficient number to investigate in relation to the problem.

Future research is necessary with a larger sample size and a longer follow up. Additionally, comparative studies of groups that receive psychological and/or clinical interventions for depression with a control group concomitant to the conventional treatment would be useful to verify the effectiveness of mental health interventions for these patients.

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* A lower cutoff score was utilized to minimize false negative results as suggested by Beck & Steer, 1993 [14]

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