Risk Analysis for Depression and Patient Prognosis
After Open Heart Surgery

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Background  The aim of the present study was to determine the predictors of depression as a complication after open heart surgery and influence of depression on the patients’ prognosis.

Methods and Results  During the last 3 years, 97 patients (21.5%) of the 452 adult patients who had open heart surgery at our institute experienced depression after the operation. Patients who scored over 16 points using a Center for Epidemiological Studies Depression Scale were diagnosed with significant symptoms of depression. Depressed patients (group I, n=97) and non-depressed patients (group II, n=355) in terms of mortality and length of hospital stay were compared. Predictors for depression were identified by logistic regression analysis. The postoperative hospital stay was significantly longer in group I. Hospital mortality was also significantly higher in group I. Female gender (odds ratio (OR): 5.15, p<0.0001), emergency surgery (OR: 4.46, p<0.0001), and being over 70 years of age (OR: 4.67, p<0.0001) were found to be significant predictors for postoperative depression.

Conclusion  The prognosis for patients who had depression developed after open heart surgery was poor. It might be important to start prophylactic medication as soon as possible after the operation, particularly for patients at risk of having depression. (Circ J 2006; 70: 389–392)

Key Words: Depression; Open heart surgery; Postoperative patient care

Several investigators have reported that depression is associated with mortality in patients with cardiovascular diseases. Previous studies described that depression in patients was one of the causes of poor condition for patients undergoing coronary bypass surgery or valve replacement. However, those studies assessed the preoperative patient’s co-morbidity; but sometimes, although the patient had been well before surgery, depressive symptoms might appear postoperatively affecting the patient’s recovery. Surprisingly, there is little information on depression after open heart surgery. The aim of the present study is to determine an independent predictor for post-cardiovascular surgery depression, and evaluate how it affects the patient’s prognosis.

Methods  The current study was designed as a prospective follow-up study. Between April 2002 and March 2005, 530 adult patients underwent open heart surgery in our institution. Patients who had depressive syndrome preoperatively, who had a major stroke postoperatively, or who had severe cognitive dysfunction were excluded, thus the clinical records of 452 patients were reviewed.

Ninety-seven (21.5%) of the 452 patients had depressive symptoms after surgery. Patients who complained of symptoms associated with depression, such as easy fatigability, poor appetite, sleep disturbance, or difficulty concentrating, were interviewed by a psychiatrist and were given the Center for Epidemiological Studies Depression (CES-D) scale test. Those whose CES-D scale was over 16 points, were diagnosed as having depression by consensus agreement between the psychiatrist and cardiac surgeons. These patients were started on an antidepressive therapy (paroxetine, 10 mg/day). The average CES-D scale score was 27.8±8.1 points in those 97 patients.

Of the 452 patients, 293 (64.8%) were male, and the average age of the whole group was 65.0±11.0 years, ranging from 18 to 90. None of the patients had a history of depression nor had they ever taken an antidepressant or any other psychosomatic medication. In the case of patients subjected to an emergency surgery, the information was obtained from the patient’s family. A total of 247 patients underwent coronary artery bypass grafting (CABG), including 42 patients who underwent emergency CABG. One hundred and one patients were subjected to valve replacement, including 5 emergency operations. Eighty-five patients had aortic surgery, including 49 patients who underwent emergency Aortic dissection. Other miscellaneous operations were carried out in 18 patients. We divided the 452 patients into 2 groups. Group I consisted of 97 patients who had complications of postoperative depression. Group II comprised 355 patients without depression. All the patients have been followed up at the outpatient clinic of our cardiovascular surgical unit. We compared depressed patients and non-depressed patients in terms of age, sex, operative characteristics,
duration of cardiopulmonary bypass (CPB), length of postoperative hospital stay, incidences of preoperative heart failure, emergency surgery, re-operation, and postoperative low-output state (LOS), postoperative morbidity, hospital mortality, and late mortality using univariate Fisher’s exact test or unpaired Student’s t-test. Independent predictors for postoperative depression were examined using the multivariate analysis with logistic regression from the parameters detected by univariate analysis. Statistical significance was defined as a p-value < 0.05. All analyses were conducted with Stat View software (SAS Institute, Cary, NC, USA).

Results

The average age of the patients was significantly higher in group I than in group II (78.2±9.1 vs 63.5±11.1, p<0.0001, Table 1). The percentage of female patients was also significantly higher in group I than in group II (58.8% vs 28.7%, p<0.0001, Table 1). There was a significant difference regarding operative characteristics. The percentage of CABG and aortic surgery were significantly higher in group I (Table 1). However, there was no difference in terms of the duration of CPB (Table 1). The percentage of patients over 70 years of age was significantly higher in group I than in group II (62.9% vs 32.0%, p<0.0001, Table 2). Although the frequency of preoperative heart failure, re-operation, postoperative LOS, infection of the surgical site, hemodialysis for acute renal failure, and paraplegia was similar between the 2 groups, that of emergency surgery (p<0.0001), minor stroke (p=0.0062), and pneumonia (p=0.0003) was significantly higher in group I (Table 2). The postoperative hospital stay was significantly longer in group I than in group II (39.8±35.8 vs 17.1±14.5 days, p<0.0001, Table 3). The incidence of postoperative hospital death within 30 days was significantly higher in group I than in group II (11 patients, (11.3%) vs 0, p<0.0001, Table 3). There were 10 cases of late death in each group after discharge from the hospital. The frequency of late death was significantly higher in group I than in group II (p=0.0012, Table 2). Table 4 shows the cause of late death. In the depressive group, 4 patients died of a major stroke within 5 months after discharge from the hospital. One patient committed suicide 6 months after discharge from the hospital. In the non-depression group, 2 patients died of arrhythmia at 6 months after discharge from the hospital, otherwise, late death occurred in more than 1 year after discharge (Table 4). The multivariate logistic regression analysis revealed that female gender (odds ratio (OR): 5.15, 95% confidence limit (CL): 2.39–7.02, p<0.0001), emergency surgery (OR: 4.46, 95% CL: 2.01–6.07, p<0.0001), and being over 70 years of age (OR: 4.67, 95% CL: 2.06–5.92, p<0.0001) were significant predictors for postoperative depression (Table 5).

Discussion

The overall prevalence of depression in the medically ill has been estimated to be approximately 20%. The frequency of depression in patients undergoing open heart surgery in our study was compatible with that found in other medically ill patients. In the present study, we investigated the frequency and course of depressive disorders identified about 5 to 7 days after open heart surgery and the short-term psychological and medical outcomes associated with de-
pression. In contrast to the lack of differences in relation to surgical status such as aortic cross clamping time, duration of CPB, and postoperative maximum myocardial-bound creatine kinase levels, there was a significant association in depression, old age, and female gender. Mallik et al also reported that the patients with depressive symptoms were more often female. Our findings were consistent with those of previous investigations in which depression was shown to have a greater effect on poor cardiovascular outcomes in women than in men. This suggested a greater vulnerability of women not only toward depression, which is well established; but also toward the adverse effects of depression on open heart surgery.

The main finding of our study was that old age and female gender were independent predictors of increased risk for postoperative depression for patients undergoing emergency surgery. Moreover, once the patients fell into a depressive mood, they had further complications by being confined to bed rest and pneumonia, and finally died in the hospital. Furthermore, in the depressive group, 4 patients died of major stroke within 5 months after discharge from the hospital. These findings indicated that the presence of depressed mood should alert clinicians on the high risk of non only longer hospital stay, but also a high occurrence of early death after discharge from the hospital.

Ho et al reported that depressed patients more frequently had LOS, and more likely required preoperative intra aortic balloon pumping! LOS itself is probably associated with mortality. However, it is reported that the degree of cardiac impairment was not significantly associated with depression and depressed patients do not have increased clinical congestive heart failure, nor do they have decreased overall functional status. In the present study, the incidence of postoperative LOS was similar between the groups. Furthermore, univariate analysis does not show a significant relation between the depression and LOS. However, in the present study, the LOS occurred in only 5 patients. Further cases should be required in the future.

In the case of emergency operations, the patients can fall into an emotional and agitated state. Stress has been shown to be one of the most potent triggers or inducers of depression. Under a situation of stress, the hypothalamic-pituitary-adrenocortical axis and the sympathetic adrenomedullary system are activated. Upon resolution of stress, these 2 systems should return to their basal states. Older patients are also more likely to become chronically depressed than younger patients. Philibert et al also reported that depressed elderly women with no previous history of affective disorder were at a markedly increased risk of morbidity and mortality compared with elderly women with a history of affective illness and that a significant proportion of elderly depressed patients were admitted to a psychiatric hospital for a depression secondary to serious medical illness. The exact mechanism by which depressive symptoms might predispose some individuals to increased cerebrovascular risk is unknown. The depressive state is associated with poor physical activity and less exercise. The patients with depression, particularly the elderly, are easily complicated by chronic dehydration because they do not eat or drink too much. The depressive state, as a condition of mental stress, increases autonomic sympathetic activation. This activation can result in increased levels of circulating platelets, fibrinogen, and thromboxane A2. The depressive state is related to lipid metabolism, so that there is an increased production of steroid and free fatty acids and a reduced use of glucose when a patient is depressed. This combined sympathoadrenal activation stimulates platelets via the a2-adrenoreceptor activation and augments arterial thrombosis. Another possible explanation is that depressive symptoms stem from the increased inflammatory activity that characterizes emergency conditions. Depression is associated with several physiological derangements that could contribute to an adverse cardiac outcome. Patients with depression have a high sympathetic tone, hypercortisolemia, elevated catecholamine levels, abnormal platelet activation, increased inflammatory markers, and endothelial dysfunction. Those factors might contribute to the development of other diseases. However, it is still difficult to elucidate an obvious cause of the ill effect of depression to the patient prognosis. Therefore, it is important to treat not only the general and cardiac function, but also early mental illness by antidepressive agents.

In the present study, as soon as the diagnosis of depression was made, we administered an antidepressive agent to the patients. However, it takes 2 to 3 weeks for this antidepressant to reach effective serum levels. Therefore, the patients' depressive mood persists for those 2 to 3 weeks. Furthermore, some patients cannot even take the tablets as a result of severe depression. If depression really affects the postoperative patient's prognosis, prophylactic treatment of depression might reduce the morbidity and mortality after emergency surgery in elderly women and reduce the public health costs associated with postoperative managements. Future studies to determine if preoperative or postoperative interventions to treat depression can improve outcome for such patients are warranted.

Limitations of this study relates to mortality. Because the elderly rate was higher in the depressive group, and elderly itself might be a risk for mortality; therefore, we cannot draw strong conclusions about depressive symptoms being a major risk factor for total mortality. Further studies with preoperative detail assessments are needed to obtain more comprehensive estimates of the incidence and predictors of depression after open heart surgery.

Conclusion

The patient's prognosis was poor if depression developed after open heart surgery. It might be important to start prophylactic medication as soon as possible, particularly for elderly women subjected to emergency surgery.

References

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