

# Psychiatric Morbidity in Coronary Artery Bypass Graft Surgery

Azza A. El-Bakry

**Forty patients, who were candidates for open-heart surgery, were examined for anxiety and depression, using state anxiety and depression inventories, one day before, ten days after and four months later. Those with anticipatory anxiety preoperatively had persistent anxiety later on. When excluding items concerning somatic complaints of depression, cardiac surgical patients were not found to have significant postoperative depression related to affective and cognitive symptoms. Preoperative assessment is predictable of short and long term emotional disorders. Peri-operative psychiatric assessment and counseling would help in improving outcome.**

(Egypt.J.Psychiat., 2001, 24 : 9 - 16 ).

## INTRODUCTION

It is assumed that major surgery or that with uncertain outcome produces more anxiety than in cases with relatively less worry about the course of events. (Grabow et al, 1990; Lucent & Fleck, 1972). Open-heart surgery, being an extensive operation with a relatively uncertain outcome is assumed to trigger anxiety before and after the operation (Strauss & Pauigen, 1992). Many patients also experience depressive symptoms presurgically which have been thought to increase after the operation (Speidel, 1990; Mahler et al, 1992). But patients can experience somatic and vegetative symptoms that are unrelated to depression. Several studies have advocated the use of the non-somatic items of depressive questionnaires to differentiate between clinically depressed and non-depressed hospitalized patients with medical illness (Beck, 1993; Plumb & Holland, 1977). Unfortunately, the medical and paramedical staff of the surgery

wards does not have the time, or the training, to adequately deal with the patients notional distress. Some recent research, however, points to a negative relationship between preoperative psychological stress and recovery, denoting the importance of emotional factors in treatment (Stengrevics et al, 1996).

The aim of this study is to test for patient reported pre and postoperative anxiety and depression. This might help in selecting patients who would benefit from psychological support and management. Is the preoperative anticipatory anxiety directly or inversely related to post operative affective arousal? Previous studies are controversial. Another aim is to differentiate between clinically depressed and non-depressed patients whose alleged depression might be related to increased somatic complaints of the medically ill. Depression questionnaires often investigate affective, cognitive as well as somatic and vegetative symptoms. Since patients undergoing invasive surgery might have similar somatic and vegetative symptoms, such as insomnia, loss of appetite, fatigability and weight loss, it is wise to bypass them for more accurate assessment.

---

Azza El-Bakry, Assistant Professor of Psychiatry, Faculty of Medicine, Cairo University

## SUBJECTS AND METHODS

40 patients scheduled for elective cardiac surgery, coronary artery bypass graft surgery (CABG), in a private hospital in Saudi Arabia, over a period of one year were selected. The patients were tested on the day before, 10 days after and 4 months after surgery. Patients had to be of sufficient cognitive ability to provide accurate information. No history of previous psychiatric treatment. The preoperative and early postoperative assessments were done during hospitalization while follow up was conducted at outpatient. The preoperative assessment was done shortly after admission. The average stay of patients in coronary care unit was 3 days and hospital stay was 10 days. No in hospital psychiatric complications were observed. No florid incidences occurred except for two patients who developed short-term postoperative delirium. One patient died and 2 patients dropped out at follow up. The 40 patients included in the study included 28 men and 12 women with a mean age of 53 years (mean for women 57 and for men 52). Medication usually consisted of beta-blockers, calcium antagonists and nitrate, with occasional use of benzodiazepines.

Clinical interview was done for assessment and orientation and exclusion of organic and psychotic disorders. Patients completed State Trait Anxiety Inventory (Spielberger et al, 1983), Beck Depression Inventory BDI (Beck and Steer, 1993). Arabic translation and back translation were done. STAI is a self-report questionnaire that evaluates both persons who are currently anxious (state) and those who are characteristically anxious (trait). It actually measures cognitive and motor (somatic) manifestations of anxiety. The state scale of STAI is used extensively in clinical re-

search and has proved to be an adequate indicator for presurgical stress (Krohne et al, 1990). State anxiety refers to temporary states of unpleasant feelings of tension and apprehension accompanied by arousal of autonomic nervous system. BDI has been successfully used in research on patients undergoing cardiac surgery (Pimm & Jude, 1992). This 21-item scale assesses the presence and severity of affective, cognitive, motivational, vegetative and psychomotor components of depression. Eleven deal with cognitive, two with affect, two with overt behaviour, one with interpersonal symptoms and five with somatic symptoms. Therefore the sum of the first 13 BDI items creates a cognitive-affective subscale for estimating depression in the medically ill patients whose somatic and vegetative complaints might over estimate the severity of their depressions. The sum of the last eight creates a subscale that measures somatic-performance complaints (Beck and Steer, 1993). Both total depression and subscale were applied in this study in a trial to focus on cognitive-affective scale as a true estimate of depression, rather than counting on somatic complaints in the medically ill. Trait anxiety was only assessed preoperatively. Trait anxiety refers to more state individual differences in anxiety disposition, which is the tendency to react anxiously in a threatening situation. The distinction between state anxiety and trait anxiety refers to the fact that anxious behaviour develops not only as a function of the tendency to react anxiously to aversive stimuli but also as a result of situation-specific conditions.

## RESULTS

The preoperative, postoperative and follow up of anxiety and depression

(table 1) show that women had higher trait anxiety, state anxiety and depression scores in all assessments than did men. It was only significant for preoperative state anxiety score ( $T(78) = 2.12$ ,  $p = 0.04$ ). Compared to anxiety cut off scores, patients reported increased level of anxiety in all assessments but it was not significant to the age in years. Percentages of patients with clinically significant anxiety and depression scores are listed in table (2).

Using ANOVA for analysis of variance, significant differences in state anxiety scores over the three assessments were found, ( $T2(2.78) = 20.90$ ,  $P < 0.001$ ) Significant reduction in reported anxiety symptoms shortly after surgery was found. After four months, a further, but small reduction in anxiety was noted. A stepwise multiple regression analysis indicates that the early postoperative state anxiety is best predicted by the patients preoperative trait anxiety and state anxiety scores, explaining 40% of variance. Preoperative trait anxiety and early postoperative depression entered the equation to explain 57% of the variance of the state anxiety score at follow up. The Pearson correlations between the trait-anxiety score and pre and postoperative and follow up state anxiety scores are 0.59, 0.52 & 0.43 respectively ( $p < 0.001$ )

To test for the degree of state anxiety, patients were further sub grouped into high ( $n=7$ ), medium ( $n=27$ ) and low ( $n=7$ ) anxiety according to the scores and standard deviations in preoperative assessment. A repeated measure using ANOVA (Fig. 1) showed that the same degrees of preoperative anxiety were retained high, moderate and low respectively in postoperative and follow up assessments.

As for BDI, significant differences in total depression scores over the three as-

sessments using (ANOVA)  $T2(2.78) = 11.86$   $P < 0.001$  Table 3. F- tests showed a significant increase in depression score shortly after surgery ( $F(1.79) = 14.34$ ,  $P < 0.001$ ). When results were split into assessing somatic versus cognitive subscales for depression, no significant effect was found for cognitive subscale but significant for somatic complaints. There was significant increase in somatic complaints in early postoperative assessment ( $F(1.79) = 27.42$ ,  $p < 0.001$ ) with significant drop at follow up below preoperative assessment ( $F(1.79) = 28.46$   $p < 0.001$ ). Stepwise multiple regression analysis shows that the preoperative affective-cognitive depression score explains 35% of the variance of the early postoperative affective-cognitive depression score. The follow up depression score is best predicted by the preoperative and early postoperative affective-cognitive depression scores, explaining 51% of its variance.

## DISCUSSION

Our results show that patients undergoing CABG experience increased morbid anxiety immediately before surgery. In about 1/3 (32.5%) of cases, significant anxiety was recorded preoperatively. Drop in the level of anxiety ten days after surgery, most prominently in patients with high preoperative anxiety levels. After surgery, a further but small decrease in anxiety level is noticed. 12.5% and 20% experience early and late postoperative anxiety respectively. Therefore, it is assumed that emotional arousal caused by a major surgery is replaced by less vigorous but longstanding emotional arousal (the operation). Oxman et al (1994) said that 38.9% of patients developed adjustment disorder

**Table 1**  
Depression and Anxiety Scores in CABG Patients (n=40)

|                    | Trait Anxiety | State Anxiety |           |                      | Depression |           |         |
|--------------------|---------------|---------------|-----------|----------------------|------------|-----------|---------|
|                    | Pre           | Pre           | Post      | follow up pre        | Post       | follow up |         |
| Males<br>(n = 28)  | 36.6±10.7     | 43.5±11.3     | 39.1±10.9 | 35.3±10.7            | 8.2±6.7    | 9.3±7.4   | 6.3±5.9 |
| Females<br>(n=12)  | 40.2±12.7     | 52.3±13.6     | 40.9±10.2 | 42.3±10.0            | 10.7±6.9   | 11.2±7.6  | 7.5±5.7 |
| Total              | 40.3±11.0     | 44.9±11.7     | 38.8±10.7 | 37.3±10.1            | 8.5±6.6    | 9.5±7.6   | 6.5±6.4 |
| Mean ± SD          |               |               |           |                      |            |           |         |
| pre = preoperative |               |               |           | post = postoperative |            |           |         |

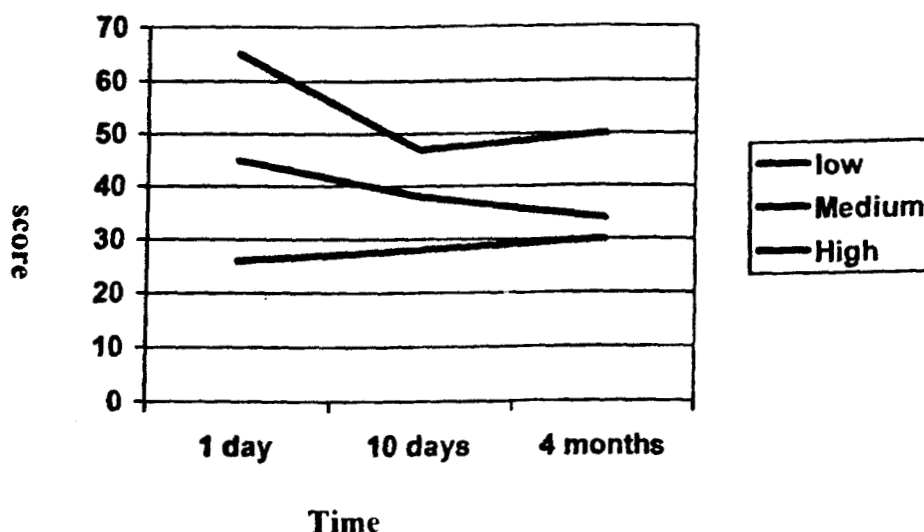
**Table 2**  
Percent of State-anxiety and Depression

|                            | Preoperative |      | Preoperative |      | Follow up |      |
|----------------------------|--------------|------|--------------|------|-----------|------|
|                            | No           | %    | No           | %    | No        | %    |
| State anxiety              | 13           | 32.5 | 5            | 12.5 | 8         | 20   |
| Mild depression            | 10           | 25   | 14           | 35   | 9         | 22.5 |
| Moderate-severe depression | 5            | 12.5 | 5            | 12.5 | 3         | 7.5  |

**Table 3**  
Beck Depression Inventory Total and Subscale Scores

|                           | Preoperative | Preoperative | Follow up |
|---------------------------|--------------|--------------|-----------|
| Total scale score         | 8.5±6.8      | 9.7±7.5      | 6.5±6.6   |
| Cognitive-affective Score | 4.0±4.2      | 4.1±4.5      | 3.4±4.1   |
| Somatic performance Score | 4.5±3.1      | 5.6±3.5      | 3.1±2.8   |
| Mean ± SD                 |              |              |           |

**Fig I**  
**Post Operative Scores in Patients with High, Medium and Low Preoperative Anxiety**



predominantly depression or anxiety one month after surgery. It is assumed that persistent state anxiety or worries about one's health is created.

Our results seem to confirm with linear relation between preoperative low, moderate and high rates of anxiety and in postoperative period, 4 months in our study. It refers to state-trait hypothesis of anxiety according to which the level of subjective feeling of anxiety is related to the patients tendency to react anxiously in stressful situations. Could this be related to state-trait anxiety disposition? We found that patients with high, moderate or low anticipatory anxiety maintained the same levels in the postoperative period (Fig. I). Although those patients with high anxiety level had a significant drop in their anxiety postoperatively, their scores were still considered in the high range, compared to the cut-off score. The preoperative finding of trait anxiety contributes significantly

with postoperative state anxiety, confirming the impact of basic anxiety on emotional stress. These results agree with prior studies who found that patients who were emotionally at risk before cardiac surgery have the highest number of emotional problems 3-5 years after surgery (Boli et al, 1992).

Patients with low anticipatory anxiety experience a small increase during postoperative period. The moderate anticipatory anxiety patients show a steady decrease in anxiety over the whole period. The high anticipatory anxiety shows an initial early drop followed by later increase at follow up period (Fig. I). This finding disagrees with Stengrevics et al (1996) who found that patients with too high or too low preoperative anxiety would experience more emotional problems after surgery. It has been hypothesized by Janis (1985) that too high or too low preoperative anxiety lead to more emotional problems after surgery. In

contrast, our data describe linear relation with high preoperative anxiety levels associated with highest postoperative arousal; a contributing factor in high trait-determined anxiety.

Several studies reported an increased rate of major depression after heart surgery (Carney et al, 1988; Smith et al, 1986), and others of adjustment disorder (Oxman et al, 1994).

Camey et al (1988) conducted psychiatric examination of consecutive patients undergoing coronary angiography. 20% of those confirming the presence of coronary artery disease had depression. The depressed group turned out to be 2 times more likely to develop serious cardiac complications over the next 12 months. In addition, Frasure-Smith et al (1995) obtained structured psychiatric examinations of 5-15 days after myocardial infarction and then 6, 12, 18 months later and found that 16% shared evidence of major depression. But Fava et al (1996) stressed on anxiety and hostility as the main risk factors for mortality in coronary artery diseased patients with depression.

The use of the BDI in this study in assessing the level of depression which have items for somatic and others for vegetative symptoms such as insomnia, fatigability, loss of appetite and weight loss, helped to discriminate reported depression. The results of this study show that early postoperative increase in reported depression is entirely attributable to an increase in the somatic complaints of post surgical patients. Therefore after omitting the items of somatic complaints from BDI score showed that post CABG patients do not experience significant changes related to depression. It is noticed that patients with medical problems suffer from vegetative and somatic symptoms without being related to depressive disorder. Our results revealed

an increase in somatic complaints as found in BDI in early postoperative assessment. Although it can be argued that medical patients are more likely to translate feelings of depression into somatic complaint (Pimm et al, 1992), cardiac surgery is a major operation with justified postoperative somatic complaints. It can thus be generalized that relying on somatic-performance subscale in BDI or any somatic symptoms of depression, could give misleading data about the occurrence of depression. Beck and Steer (1993) describe cognitive-affective subscale score >10 as indicative of moderate depression. Applying the cut off in this study reveals clinically relevant depression scores in 10% (4 patients) preoperatively and 7.5% (3 patients) postoperatively. Correlation between depression on cognitive-affective subscale and state anxiety score were high ( $r=0.52$  to  $0.69$ ,  $p<0.001$ ) pointing to interrelation between anxiety and depression.

Recent research found that higher levels of preoperative state anxiety are correlated with poor outcome after cardiac surgery (Stengrevics, 1996). We found that patients with high preoperative emotional distress remain the most stressed postoperatively. Thereto after, discrimination of those patients at risk for postoperative anxiety and depression is quite important. Psychiatric interference and counseling will then aim at minimizing or decreasing the associated morbidity. Emotional arousal is thought by some to be an independent risk factor for increased mortality and morbidity in cardiovascular patients (Frasure-Smith et al, 1995). According to Oxman et al (1994), the severity of depressive symptoms before surgery and anxiety symptoms after surgery was significantly correlated to each other and to the presence of disorder 6 months later. The level of depressive symptoms before surgery

was the symptom variable most significantly related to the presence of a disorder at 6 months. While this might imply that treating depressive symptoms before surgery would decrease the frequency of persistent disorder, it is probably more valid to say that reduction of depressive or anxiety symptoms at either time point might reduce the frequency of persisting disorder. Psychiatric preoperative assessment and intervention could thus improve and minimize postoperative early and late hazards. This would encourage further research on psychological distress and keep us aware of cultural differences that might be estimated for current distress.

## REFERENCES

- Boli, A, Dahme B, Meffert, H. U. (1992) Psychological adaptation of patients 3 to 5 years after heart surgery; in Willner AE, Rodewald G (eds.) *Impact of Cardiac Surgery on Quality of Life: Neurological and Psychological Aspects*. New York, Plenum.
- Beck, A. T. Steer, R. A. (1993) *Beck Depression Inventory Manual*. San Antonio, TX, The Psychological Corporation.
- Camey, R. M. Rich, M. W. Freedland, K. E. Sinai, J. Tevelede, A. et al (1988) Major depressive disorder predicts cardiac events in patients with coronary artery disease. *Psychosom. Med.*; 50: 627- 633.
- Fava, M. Abraham, M. Pava, J. (1996) Cardiovascular risk factors in depression. *Psychosomatics*; 37: 31- 37.
- Frascore-Smith, N. Lesprance, F. Talajic, M. (1995) Depression and 18-month prognosis after myocardial infarction. *Circulation*; 91: 999-1005.
- Glassman, A. H. Shapiro, P. A. (1998) Depression and the course of coronary artery disease, *Am. J. of Psychiatry*, 155: 959-964.
- Grabow, L. Buse, R. (1990) Preoperative anxiety about the operation, anxiety about anesthesia, anxiety about pain? *Psychother. Psychosom. Med. Psychol.* 40:255-263.
- Janis, I. L. (1985) *Psychological Stress*. New York, Wiley.
- Krohne, H. W. Kleeman, P. P. Hardt, J. (1990) Relations between coping strategies and presurgical stress, in Scmitt LR, Weinman J et al (eds). *Theoretical and Applied Aspects of Health Psychology*, New York Theme.
- Lucente, F. E. Fleck, S. (1972) A study of hospitalization anxiety in medical and surgical patients. *Psychosom. Med.*, 34: 304-312.
- Mattler, C. E. Knufs, L. R. Engblam, E. (1992) Neuropsychological findings and personality structure associated with coronary artery bypass surgery (CABG). In Willner AE, Rodewald G (eds.) *Impact of Cardiac Surgery on the Quality of Life: Neurological and Psychological Aspects*. New York, Plenum.
- Oxman, T. E. Barnett, J. E. Freeman, D. H. Manheimer, E. (1994) Frequency and correlates of Adjustment Disorder related to cardiac surgery in older patients. *Psychosomatics*; 35: 557- 568.
- Plumb, M. M. Holland J (1977) Comparative studies of psychological function in patients with advanced cancer. *Psychosom. Med.*; 39: 264-279.
- Pimm, J. B. Jude, J. R. (1992) Beck Depression Inventory scores of coronary bypass patients with or without psychological intervention, in Willner AB, Rodewald G (eds) *Impact of Cardiac Surgery on the Quality of Life: Neurological and Psychological Aspects*. New York, Plenum.
- Smith, P. L. Treasure, T. Newman, S. P. (1986) Cerebral consequences of cardiopulmonary bypass. *Lancet*; 333: 823- 825.
- Speidel, H. (1990) Emotional reactions to

- surgery. *J. Consult. Clin. Psychiatry*; 40: 33-38.
- Spielberger, C. D. Gorsuch, R. L. Lushene, R. L. (1983) *State Trait Anxiety Inventory: Test Manual*. Palo Alto, CA, Consulting Psychologists Press.
- Stengrevics, S. Sirois, C. Schwartz, C. E. (1996) The prediction of cardiac surgery outcome based upon preoperative psychological factors. *Psychol. Health*; 11: 471-477.
- Strauss, B. Pauigen, G. (1992) Psychiatric methods of the international study: Hamilton Depression and Anxiety scales, in Willner AB, Rodewald G (eds) *Impact of Cardiac Surgery on the Quality of Life: Neurological and Psychological Aspects*. New York, Plenum.

## المراضة الطبية النفسية فى عمليات استبدال الشريان التاجى

يقوم هذا البحث على دراسة أربعين مريضاً قيد جراحة القلب المفتوح لاستبدال الشرايين التاجية. تم فحص المرضى قبل الجراحة بيوم ثم بعد عشرة أيام وبعد ٤ شهور لوجود القلق والاكتئاب. دلت النتائج على أن المرضى الذين يعانون من القلق النفسى قبل الجراحة كانوا مازالوا يعانون بعد ٤ شهور، لم تشر النتائج لوجود نسبة الاكتئاب ذات الدلالة الإحصائية ولكن أشارت إلى وجود أعراض جسمية قد تنتج عن مرض القلب بذاته ويكون للفحص النفسى أهمية فى تحديد وتقييم وجود اضطرابات نفسية قصيرة أو بعيدة المدى ويكون للتشخيص المبكر أثراً إيجابياً فى تحسين الحالة الصحية للمرضى.