

## Preoperative education may attenuate anger scores of patients after cardiac surgery

*Ameliyat öncesi verilen eğitim kalp ameliyatı sonrasında hastaların öfke skorlarını azaltabilir*

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**Background:** This study aims to evaluate the anger status of patients undergoing open heart surgery and to examine possible effects of psychological support on anger control.

**Methods:** Anger status and type A personality were evaluated in 68 patients who underwent coronary artery bypass grafting (CABG) between September 2012 and January 2013. The patients were divided into two groups: group 1 (18 males and 16 females; mean age 55.0±8.7 year; range 43 to 78 years) received routine preoperative preparations, whereas group 2 (17 males and 17 females; mean age 54.9±9.1 years; range 41 to 81 years) received patient education for 30 minutes one day before surgery during preoperative period on anger management after heart surgery. To obtain anger scores of the patients, The State-Trait Anger Expression Inventory-2 and Scale of Type A Behavior were used to achieve anger scores of the patient groups before surgery and four days after surgery.

**Results:** Baseline preoperative characteristics and operative variables were similar between the groups. Based on the preoperative test results, total anger scores were similar in both groups, however, it was significantly lower in group 2 in the postoperative period ( $p<0.001$ ). The total anger scores significantly increased in group 1 after surgery. Pre- and postoperative state anger scores were significantly different between the patient groups. In group 2, the state anger score was not increased after operation, while the repressed anger (Ax-In) was significantly lower postoperatively ( $p<0.001$ ). Postoperative trait anger was similar between the groups.

**Conclusion:** We suggest that education of patients on anger management before CABG is critical which may affect surgical prognosis positively and shorten the duration of hospital stay.

**Keywords:** Anger; coronary artery bypass grafting; management; patient education.

**Amaç:** Bu çalışmada açık kalp ameliyatı yapılan hastaların öfke durumu değerlendirildi ve psikolojik desteğin öfke kontrolü üzerindeki muhtemel etkileri araştırıldı.

**Çalışma planı:** Eylül 2012 - Ocak 2013 tarihleri arasında koroner arter baypas greftleme (KABG) yapılan 68 hastada öfke durumu ve tip A kişilik değerlendirildi. Hastalar iki gruba ayrıldı: grup 1'e (18 erkek, 16 kadın; ort. yaş 55.0±8.7 yıl; dağılım 43-78 yıl) rutin ameliyat öncesi uygulamalar yapılırken, grup 2'ye (17 erkek, 17 kadın; ort. yaş 54.9±9.1 yıl; dağılım 41-81 yıl) ameliyat öncesi dönemde ameliyattan bir gün önce kalp ameliyatı sonrası öfke yönetimine ilişkin 30 dakikalık hasta eğitimi verildi. Ameliyattan önce ve dört gün sonra hasta gruplarının öfke skorlarını hesaplamada Sürekli Öfke ve Öfke İfade Tarzı Ölçeği-2 ve Tip A Davranış Ölçeği kullanıldı.

**Bulgular:** Başlangıç ameliyat öncesi özellikler ve ameliyat sonrası değişkenler gruplar arasında benzerdi. Ameliyat öncesi test sonuçlarına göre, total öfke skoru gruplar arasında benzer olmakla birlikte, ameliyat sonrası dönemde grup 2'de anlamlı düzeyde daha düşüktü ( $p<0.001$ ). Total öfke skoru ameliyat sonrasında grup 1'de anlamlı düzeyde artmıştı. Ameliyat öncesi ve sonrası sürekli öfke skorları, hasta grupları arasında anlamlı düzeyde farklıydı. Grup 2'de sürekli öfke skoru ameliyat sonrasında artış göstermezken, baskılanmış öfke (Ax-In) ameliyat sonrası anlamlı düzeyde daha düşüktü ( $p<0.001$ ). Ameliyat sonrası öfke tarzı gruplar arasında benzerdi.

**Sonuç:** Koroner arter baypas greftleme öncesinde öfke yönetimine ilişkin verilen hasta eğitiminin, cerrahi prognozunu olumlu yönde etkilenmesinde ve hastanede kalış süresinin kısaltılmasında çok önemli olduğu görüşüdeyiz.

**Anahtar sözcükler:** Öfke; koroner arter baypas greftleme; yönetim; hasta eğitimi.



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Coronary heart disease (CHD) is the most common cause of mortality in the world. Psychosocial, biochemical, and genetic factors are among the known etiologic factors, and to obtain the maximum benefits, all of these factors should be considered when deciding on a treatment strategy. It is known that anger, anxiety, and depression increase mortality and morbidity cases involving CHD,<sup>[1,2]</sup> but there is insufficient research regarding the postoperative anger and anxiety status of these patients. In this prospective study, we evaluated the effects of preoperative anger management education and psychological support as they related to anger management in patients who underwent coronary artery bypass graft (CABG) surgery.

## PATIENTS AND METHODS

This prospective, randomized, controlled study was conducted on volunteers who underwent CABG between September 2012 and January 2013 under elective conditions. In addition, we explained the study details to all of the participants and obtained their written informed consent. The local ethics committee also gave their approval. Initially, 80 patients were to be included in the study, but 12 were excluded due to wrong or incomplete coding, leaving a total of 68 patients.

The participants were randomly allocated into one of two study groups based on protocol numbers. Group 1 was composed of odd-numbered patients while those with even numbers made up group 2. Group 1 (18 males, 16 females; mean age 55.0±8.7 years; range 43 to 78 years) received routine preoperative care and then underwent CABG, whereas group 2 (17 males, 17 females; mean age 54.9±9.1 years; range 41 to 81 years), in addition to a preoperative education session a day before the surgery, also received a 30-minute educational session on anger management and psychological support on postoperative day one. Furthermore, for group 2, ward nurses were also educated by nursing instructors and hospital psychologists about possible postoperative problems.

In order to evaluate the pre- and postoperative anger status of the patients, we used a sociodemographic form (10 questions), an eight-question ERCTA (Escala Retiro de Patrón de Conducta Tipo A) that uses a scale to assess type A behavior, and the 57-question State-Trait Anger Expression Inventory-2 (STAXI-2). The patients filled out the forms the day before the surgery and again on the fourth postoperative day, and they also gave positive suggestions without giving unnecessary details. Furthermore, all of the participants filled out the questionnaires without any

outside help. The instructions were given verbally but were also available in written form. Each question of the ERCTA received a score of between one and five points; thus, the total scores ranged from a low of eight to a maximum of 40 for each patient. Those who scored higher than 22 were accepted as having a type A personality.

All of the patients underwent CABG with non-pulsatile extracorporeal circulation [cardiopulmonary bypass (CPB)] using mild-to-moderate hypothermia (esophageal temperature 26-28 °C) and antegrade cold blood cardioplegia. Furthermore, the pre- and postoperative routine patient care processes were the same for both groups. Those who completed less than 75% of the questionnaires were excluded from the study. In addition, patients who were illiterate or those with psychotic disorders, dementia or mental retardation, or neurological problems in the postoperative period were not included as well as those patients who underwent revision surgery due to bleeding, those who had used psychotropic drugs for more than one year, and those with a malignancy. Furthermore, deceased patients were also excluded from our study.

The total anger index (Ax-index) of the STAXI-2 was calculated using the following formula in which Ax/con represents the anger control subscale, Ax-out the anger expression subscale, and Ax-in the internal anger subscale showing repressed anger.

$$\text{Ax-index} = 48 + [(Ax\text{-out}) + (Ax\text{-in})] - [(Ax\text{/con-out}) + (Ax\text{/con-in})]$$

The total scores ranged between 105 and 276, and the subscale scores varied between eight and 32.

## Statistical analysis

The data was expressed using descriptive statistics [mean, standard deviation (SD), and percentages]. The homogeneity of the study groups and intergroup comparisons were conducted using a chi-square test and a t-test, whereas repeated measures analysis of variance (ANOVA) was used for intragroup comparisons. Additionally, the internal consistency of the questionnaires was analyzed using Cronbach's alpha reliability test, and a p value of lower than 0.05 was accepted as being statistically significant.

## RESULTS

The two study groups were similar in terms of age, gender, and education level as well as the number of patients with morbid obesity, a history of smoking, diabetes mellitus (DM), chronic lung disease, and kidney disease ( $p > 0.05$ ). Furthermore, the functional

capacity based on the classification of New York Heart Association (NYHA), blood cholesterol levels, and family histories along with the number of patients with accompanying peripheral vascular diseases and cerebrovascular disorders were also similar ( $p>0.05$ ) (Table 1). The groups were also compared according to their operative data, and the patients were evaluated based on their educational background. We determined that the study groups were similar in terms of cross-clamp time, CPB time, cerebrovascular events, and number of bypasses ( $p>0.05$ ), but the intubation time, length of time in the intensive care unit (ICU), and hospitalization time were significantly shorter in group 2. The operation data and postoperative complications are summarized in Table 2.

In addition, we found that the internal consistencies of the ERCTA and STAXI-2 were quite good (see Table 3 for Cronbach’s alpha scores). Furthermore, the preoperative Ax-index was similar for both groups, but it was significantly lower after the operation in

group 2. The State (S) Anger differed significantly in both the pre- and postoperative measurements, and the increase in this score of group 2 could not attributed to the surgery. The post-test results of the Ax-index, S anger, Ax-in, and Ax-out subscales between the two groups were significantly different ( $p<0.05$ ); however, the Trait (T) anger results were similar. The groups were also similar in terms of type A personality as determined by the ERCTA before and after surgery ( $p>0.05$ ). Table 4 shows the relationship between the subscale results and type A personality characteristics and reveals that the Ax-index and Ax-in scores of group 2 were significantly reduced in the post-test evaluation ( $p<0.05$ ) (Table 5). In addition, the 30-day mortality rate in our study was zero.

### DISCUSSION

The relationship between individual health and personality characteristics is known, and the evidence available to support the strong correlation between

**Table 1. Comparison of the demographic and clinical data between the study groups**

	n	%	Mean±SD	n	%	Mean±SD	p
Age (years)			55±8.72			54.95±9.12	0.160
Sex							
Male	18			17			0.766
Female	16			17			0.766
Body mass index (kg/m <sup>2</sup> )			32±4			34±6	0.08
Systolic blood pressure (mmHg)			136±21			139±24	0.207
Diastolic blood pressure (mmHg)			79±12			78±16	0.51
History of smoking	15	39.4		17	44.7		0.06
Previous family history of heart disease	23	67.6		22	64.7		0.713
Fasting plasma glucose (mg/dl)			92±12			94±15	0.172
Total cholesterol (mg/dl)			207±28			212±32	0.165
Triglycerides (mg/dl)			185±18			187±22	0.35
Uric acid (mg/dl)			5.1±2.2			5.2±2.6	0.69
Cardiovascular events							
Unstable angina	9	26.47		7	20.58		0.072
Recent myocardial infarction	7	20.58		8	23.52		0.651
Heart failure	8	23.52		10	29.41		0.063
Three vessel disease	28	82.35		26	76.47		0.562
Risk factors							
Smoking	11	32.35		13	38.23		0.623
Morbid obesity	6	17.64		4	11.76		0.072
Peripheral vascular disease	8	23.52		6	17.64		0.523
Comorbidity							
Diabetes mellitus	13	38.23		11	32.35		0.062
Chronic obstructive lung disease	7	20.58		8	23.52		0.453
Chronic renal failure	3	8.82		2	5.88		0.865
New York Heart Association class			3±2.2			3±1.2	0.325
Preoperative ejection fraction			42±12.2			39±5.2	0.452
Left main coronary artery lesion	9	26.47		11	32.35		0.562

SD: Standard deviation.

**Table 2. Procedural data for the study groups**

	Group 1 (n=34)			Group 2 (n=34)			p
	%	Mean±SD	Min.-Max.	%	Mean±SD	Min.-Max.	
Number of distal anastomoses		3.72±3.6			3.48±4.2		0.093
Cross-clamp time (minutes)		39.6±14.3			40.2±24.3		0.235
Perfusion time (minutes)		72.7±26.2			69.3±34.6		0.095
Positive inotropic support	29.6			31.9			0.065
Intraaortic balloon counter pulsation	0.7			0.5			0.423
Use of left internal thoracic artery grafts	97.62			98.48			0.896
Blood transfusion (unit)		2.4±2.7			2.6±1.4		0.086
Days in intensive care unit			1-5			1-3	0.021
Total days in hospital			5-13			4-6	0.001
Intubation time (hours)		8.67±4.8			6.86±9.2		0.001
Reoperation for bleeding	0.4			0.6			0.089
30-day mortality	0			0			

SD: Standard deviation; Min.: Minimum; Max.: Maximum.

personality-based characteristics, such as type A behavior, anger and stress, and cardiovascular disorders, is increasing. Many patients experience serious psychological problems due to fear of death and surgical trauma; therefore, their treatment costs are higher. Furthermore, some patients are not able to return to their daily routine until much later, which results in a loss of labor power.<sup>[3]</sup> In CHD patients, the incidence of the accompanying anger control disorder and mood disorders (major depression, minor depression, and dysthymia) has been reported as being between 5-10% and 10-15%, respectively.<sup>[4,5]</sup> In

addition, anger and anxiety may lead to atherosclerotic plaque rupture, coronary vasospasms, and fatal ventricular arrhythmias.<sup>[6-8]</sup> Hyperventilation caused by increased anger levels has also been shown to result in vasospasms and arrhythmia, even in healthy individuals.<sup>[8,9]</sup> In addition, some studies have reported that anger may lead to a ventricular ectopic beat and tachycardia, which can lead to myocardial infarction.<sup>[10-12]</sup> A change in cerebral activity during emotional stress can also lead to the presence of non-homogenous repolarization fields as the electrical stability deteriorates.<sup>[13,14]</sup> Moreover, repressed anger can lead to strong internal stress that may subsequently cause somatic problems. Transient increases in blood pressure may also stem from acute developing anger, but providing education related to anger management could result in a reduction in blood pressure.<sup>[15]</sup>

**Table 3. Between-group comparison of the internal consistency of the ERCTA and STAXI-2 scales**

Scale subdimensions	Cronbach alpha
ERCTA-TR	0.670
S anger	0.840
S anger/F	0.787
S anger/V	0.928
S anger/P	0.939
T anger	0.916
T anger/T	0.910
T anger/R	0.715
Ax-out	0.837
Ax-in	0.675
AN/CON-out	0.845
AN/CON-in	0.863
Ax-index	0.788

ERCTA: Escala Retiro de Patrón de Conducta Tipo A; STAXI-2: State-Trait Anger Expression Inventory-2; ERCTA-TR: The scale that use to assess type A behavior for Turkish people; S anger: State anger; T anger; Trait anger; Ax-out; Anger expression subscale; Ax-in; Internal anger subscale; AN/CON-out; Anger control out; AN/CON-in; Anger control in; Ax-index; Total anger index.

In this study, we found that CABG surgery increases the total Ax-index, but our research indicated that preoperative anger management education can have a beneficial effect on postoperative recovery. In fact, we believe that giving these patients this type of education in conjunction with psychological support may even shorten ICU and hospital stays. Furthermore, educating patients preoperatively about anger management may also decrease the pre- and/or postoperative S anger scores. However, the T anger scores showed no change after our efforts at education, whereas all of the other anger subgroup scores decreased.

A person with a type A personality may be enthusiastic, hasty, aggressive, impatient, and competitive and are extremely dedicated to their work. Additionally, these individuals experience many problems associated with different dimensions of

**Table 4. Differences between the preoperative and postoperative tests**

	Preoperative test			Postoperative test		
	Group 1	Group 2	<i>p</i>	Group 1	Group 2	<i>p</i>
	Mean±SD	Mean±SD		Mean±SD	Mean±SD	
Total anger index	182±5.9	176±6.1	0.065	214±9.7	141±3.2	0.001
Structural anger	25±2.3	14±4.2	0.001	22±2.1	13±1.2	0.001
Trait anger	28±4.7	29±2.8	0.169	28±3.4	29±1.8	0.07
Internal expression of anger	26±3.9	19±3.8	0.004	21±2.8	12±2.3	0.001
Outward expression of anger	21±2.7	18±7.1	0.045	28±1.6	24±1.4	0.03
ERCTA	34±4.8	36±5.7	0.07	35±4.3	35±3.4	0.97
Female	137±8.6	135±3.4	0.05	145±6.4	141±6.1	0.08
Male	186±3.4	182±7.2	0.06	192±5.2	156±4.1	0.04
Married	142±7.1	141±6.7	0.42	151±3.4	121±3.2	0.03
Single	188±5.4	192±4.8	0.09	196±8.4	184±5.4	0.065
Age (>50 years)	156±3.5	147±3.4	0.04	165±4.3	151±6.7	0.05
Age (<50 years)	172±4.2	169±2.6	0.23	184±6.1	189±7.1	0.08
Comorbidity (+)	186±5.6	179±9.8	0.07	142±3.1	145±7.9	0.29
Comorbidity (-)	167±7.8	161±7.7	0.06	195±7.3	159±6.8	0.04

SD: Standard deviation; ERCTA: Escala Retiro de Patrón de Conducta Tipo A (a scale that evaluates type A behavior).

anger (emotional, verbal, S and T anger, and anger expression). In this study, the ERCTA scores and T anger scores were high in both the pre- and postoperative measurements of all patients.<sup>[16,18]</sup>

We also observed that as the patients planned for the CABG, they became anxious because they of their fear of death, thus indicating their need for psychological support. However, psychological factors are usually not considered as part of the daily routine of cardiac patients, even though they are very important.<sup>[17]</sup> The intubation time and length of ICU and hospital stays were significantly shorter in patients who attended the 30-minute preoperative education session. Therefore, we suggest that the lack of availability of this type of education and psychological support may adversely affect a patient’s prognosis. In our study group, the physicians, who were blinded to the groups, made the decision to extubate the patient, transfer the patient from the ICU, or discharge the patient from the hospital.

The STAXI-2 is the gold standard for evaluating patients’ preoperative anger levels,<sup>[19,20]</sup> but to the best of our knowledge, it has not been used in the past to analyze anger in CABG patients. In our study, the preoperative T anger levels were high in patients who needed CABG surgery, and their were increased T anger scores in both groups, indicating that T anger cannot be changed by education or psychological support. However, our efforts at education did manage to reduce the total Ax-index scores in type A individuals.

Because of this lack of change in the T anger scores, we hypothesize that this type of anger is the result of various genetic factors. The S anger and Ax-in levels were significantly reduced by the education offered to group 2; thus, we believe that preoperative education and counseling can significantly reduce the problems encountered during the postoperative care period.

This study is important because it demonstrates the role that preoperative education can play in reducing the fear and anger that stem from the patients’ fear of death and uncertain prognoses. In addition, our research also showed that education is more effective in patients who are over the age of 50.

**Conclusion**

Education is comprised of teaching patients how they will feel after the operation and explaining to them where they will be when they wake up, which functions they might lose and for how long, the reason for the tubes or drains in his body after the operation, and how to cope with postoperative pain. Giving patients an adequate education before surgery is crucial and can influence the surgical prognosis. Furthermore, offering psychological support has been proven to have a positive effect on anger management and provides the patient with valuable coping strategies. Our results showed that preoperative interviews and education along with good communication can facilitate better anger management in patients who are candidate for CABG.

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