ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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The Relationship of Anxiety with Perioperative Hemodynamic Parameters and Complications in Patients to Undergo Coronary Angiography

Koroner Anjiyografi Uygulanacak Hastalarda Anksiyetenin Perioperatif Hemodinamik Parametreler ve Komplikasyonlar ile İlişkisi

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ABSTRACT Objective: The aim of this study was to examine the effect of preprocedural anxiety levels on developing complications and the effect of anxiety on perioperative vital parameters in patients scheduled for coronary angiography. **Material and Methods:** The study included 150 patients who were admitted to the cardiology outpatient clinic with chest pain and/or any complaints and who were indicated for coronary angiography for the first time as a result of examinations. Anxiety scores were evaluated using the Hamilton Anxiety Rating Scale. Increased blood pressure (>180/100 mmHg), increased heart rate (<120/min), hemodynamic collapse, vagotonia, hemorrhage and hematoma during and after the procedure were evaluated as complications. The patients were divided into two groups as Group 1 including 38 patients, the group with complications (27M; mean age 61.8±14.0 years), and Group 2 including 112 patients, the group without complications (69M; mean age 61.2±12.1years), according to whether or not complications developed. **Results:** Hamilton anxiety scores and procedure periods were significantly higher in Group 1 compared to Group 2. Blood pressures before and during the procedure and heart rates after the procedure were significantly higher in Group 1 compared to Group 2. Anxiety scores were significantly correlated with waiting periods and procedure periods. Anxiety scores were also significantly correlated with heart rates before and after the procedure. **Conclusion:** Anxiety scores were significantly higher in patients with complications. Effective anxiety treatment in patients whose preprocedural anxiety scores higher should be determined.

Keywords: Anxiety; complication; coronary angiography

ÖZET Amaç: Çalışmamızın amacı, koroner anjiyografi uygulanması planlanan hastalarda işlem öncesi anksiyete düzeylerinin gelişen komplikasyonlar üzerine etkisi ve anksiyetenin perioperatif vital parametrelere etkisinin incelenmesidir. **Gereç ve Yöntemler:** Çalışmaya göğüs ağrısı ve/veya herhangi bir şikayetle kardiyoloji polikliniğine başvuran ve yapılan incelemeler ve tetkikler neticesinde ilk defa koroner anjiyografi endikasyonu konulan 150 hasta dahil edilmiştir. Anksiyete skorları Hamilton anksiyete değerlendirme ölçegi ile değerlendirildi. Hastaların işlem öncesi bekleme süreleri, işlem süresi, işlem öncesi, sırasında ve sonrasında kan basınçları ile kalp hızları kaydedildi. İşlem esnasında ve sonrasında, kan basıncının yükselmesi (>180/100 mmHg), kalp hızının yükselmesi (<120/dk), hemodinamik kollaps, vagotoni gelişmesi, kanama, hematom gelişimi komplikasyon olarak değerlendirildi. Komplikasyon gelişip gelişmemesine göre hastalar 2 gruba ayrıldı; Grup 1; 38 hasta, komplikasyon gelişmiş grup (27 E; ortalama yaş. 61,8±14,0 yıl), Grup 2; 112 hasta, komplikasyon gelişmemiş grup (69 E; ortalama yaş 61,2±12,1yıl). **Bulgular:** Hamilton anksiyete skorları ile işlem süreleri Grup 1'de Grup 2'ye göre anlamlı olarak yüksekti. İşlem öncesi ve işlem esnasındaki kan basınçları ile işlem sonrası kalp hızları Grup 1'de Grup 2'ye göre anlamlı olarak yüksekti. İşlem sonrası kan basınçları ile kalp hızları ise benzerdi Anksiyete skorları bekleme süreleri ve işlem süreleri ile anlamlı şekilde korele idi. Anksiyete skorları yine işlem öncesi ve sonrası kalp hızları ile anlamlı şekilde korelasyon göstermekteydi. **Sonuç:** Komplikasyon gelişen hastalarda anksiyete skorları belirgin derece yüksektir. İşlem öncesi anksiyete skoru belirlenen ve yüksek bulunan hastalarda etkin anksiyete tedavisi uygulanmalıdır.

Anahtar Kelimeler: Anksiyete; komplikasyon; koroner anjiyografi

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Preoperative anxiety is an important problem for patients before the procedure. It can cause emotional and psychiatric problems as well as physical problems.[1] Preprocedural anxiety is associated with increased autonomic functions, greater need for anesthesia, increased risk of nausea and vomiting, and greater pain in the postoperative period.[2-4]

Coronary angiography, which is the gold standard examination in the diagnosis of coronary artery diseases, is widely and successfully performed. It can induce anxiety and fear since it is an interventional procedure. The major reason for this is the risk of death and complications and it is less observed in individuals who are well-informed in terms of the procedure.[5,6] Past evidence has shown that high levels of anxiety during coronary angiography and percutaneous interventions are associated with worse cardiac outcomes.[7,8]

We aimed to examine the effect of preprocedural anxiety levels on developing complications and the effect of anxiety on perioperative vital parameters in patients scheduled for coronary angiography.

MATERIAL AND METHODS

STUDY DESIGN

This is a descriptive and cross sectional study aiming to investigate effect of preprocedural anxiety levels on developing complications and the effect of anxiety on perioperative vital parameters in patients undergoing coronary angiography.

STUDY SAMPLE

This is a cross sectional study included 150 patients who were admitted to the cardiology outpatient clinic with chest pain and / or any complaints and who were indicated for coronary angiography as a result of examinations and investigations (96 M, 54 F; mean age 61.3±12.6 years). Patients who will undergo coronary angiography for the first time were included in the study. Patients admitted with acute coronary syndrome and active chest pain were excluded. The patients with diagnosed psychiatric disease, using antidepressant and / or sedative drugs, the patients to whom sedative drugs had to be administered before the procedure and the patients who refused to participate were excluded. In addition, patients with previous angiography experience, patients with coronary artery bypass grafts and patients with stent implantation were also excluded (total 107 patient).

Detailed anamnesis of all patients were obtained and detailed physical examinations were performed. All risk factors and drugs used were determined and recorded. Laboratory tests were performed from venous blood samples of all patients following 8-hour fasting. Besides, fasting blood sugar, lipid panel, renal and liver functions were also determined. The patients' waiting periods before the procedure, procedure period, blood pressures and heart rates before, during and after the procedure were recorded.

ANXIETY SCORE EVALUATION

Anxiety scores were evaluated using the Hamilton Anxiety Rating Scale. The Hamilton Anxiety Rating Scale is a 14-item scale that measures the severity of anxiety. The HAM-A includes an assessment in which the interviewer and patient are in direct contact. Symptoms are generally categorized as general mental anxiety symptoms, cognitive symptoms and physical symptoms divided into 14 mental categories. Scores range between 0-56 points. A point between 8-14 indicates mild anxiety, a point between 15-23 indicates moderate anxiety, and a point more than 24 indicates severe anxiety In the Hamilton Anxiety Rating Scale evaluation, the validation of the Turkish version for our country's society was created by Yazıcı et al.[9,10]

CORONARY ANGIOGRAPHY

Coronary angiography was performed with Siemens branded coronary angiography device (Artis Zee, Erlangen, Germany). Selective coronary angiographies performed by Judkins technique with femoral approach using 6 french (F) and 7F catheters were evaluated by quantitative evaluation system. 200 mg prilocaine was administered to all patients before puncture. Coronary angiography images were evaluated by two different cardiologists who had no knowledge of the clinical findings of the patients. Increased blood pressure (> 180/100 mm Hg), increased heart rate (<120/min), hemodynamic collapse, vagotonia, hemorrhage and hematoma dur-

ing and after the procedure were evaluated as complications. The patients were divided into two groups as Group 1 including 38 patients, the group with complications, (27 M, 11 F; mean age 61.8±14.0 years) and Group 2 including 112 patients, the group without complications, (69 M, 43 F; mean age 61.2±12.1 years) according to whether or not complications developed.

ETHICAL CONSIDERATION

Informed consent was obtained from all patients, and the local ethics committee of our hospital approved the study with the approval ID 1840. The study was carried out in accordance with the 2008 declaration of Helsinki

DATA ANALYSIS

We used Statistical Package for Social Sciences (SPSS) for Windows 16.0 program for statistical analysis. The conformity of numerical variables to normal distribution was examined by Kolmogorov-Smirnov test. The numerical variables were expressed as mean±standard deviation and non-normally distributed variables with median (25th percentile- 75th percentile). Categorical variables were expressed as frequency (n) and percentage (%). Comparisons between two independent groups were performed by independent t test when numerical variables provided normal distribution and by Mann Whitney U test when numerical variables did not provide normal distribution condition. Correlation analyses were performed by Spearman's and Pearson's tests. The results were evaluated and a value of $p<0.05$ was considered significant.

RESULTS

There was no difference between the groups in terms of age, sex ratio and laboratory values (Table 1). Hamilton anxiety scores and procedure times were significantly higher in Group 1 compared to Group 2 (Table 1). Blood pressures and heart rates before, during and after the procedure are shown in Table 2. Blood pressures before and during the procedure and heart rates after the procedure were significantly higher in Group 1 compared to Group 2. Blood pressures and heart rates after the procedure were similar (Table 2). Anxiety scores were significantly correlated with waiting times and procedure times ($r = 0.27$, $p = 0.04$, $r=0.29$, $p=0.02$, respectively). Anxiety scores were also significantly correlated with heart rates before and after the procedure ($r=0.26$, $p =0.05$, $r=0.21$, $p=0.01$, $r=0.28$, $p = 0.02$, respectively).

DISCUSSION

The main result of our study was that preprocedural Hamilton anxiety scores were significantly higher in the patients with complications after coronary an-

TABLE 1: Demographic features, laboratory findings, anxiety scores, waiting and procedure durations of the groups.

	Group 1 (n=38)	Group 2 (n=112)	p
Age (years)	61.8±14.0	61.2±12.1	0.81
Gender (F)	11	43	0.34
Hypertension (n)	18	54	0.57
Diabetes Mellitus (n)	19	49	0.19
Family history of CAD (n)	9	25	0.89
Smoking (n)	20	59	0.53
Glucose (mg/dL)	149.3±71.0	128.4±47.5	0.09
Total cholesterol (mg/dL)	180.3±62.8	191.0±59.7	0.43
Triglyceride (mg/dL)	160.7±138.1	146.4±80.9	0.51
LDL cholesterol (mg/dL)	115.6±43.9	117.3±46.9	0.85
HDL cholesterol (mg/dL)	41.2±11.6	45.3±11.7	0.10
Anxiety score	11.4±5.6	8.6±4.7	**0.003**
Waiting duration (min)	122.2±97.1	99.7±65.4	0.11
Procedure duration (min)	52.2±43.4	37.4±24.1	**0.01**

F: female; CAD: coronary artery disease; LDL: low density lipoprotein; HDL: high density lipoprotein.

TABLE 2: Systolic, diastolic blood pressures and heart rate of the groups before, during and after the procedures.

	Group 1 (n=38)	Group 2 (n=112)	p
SBP before procedure (mm Hg)	152.2±24.2	143.1±21.5	**0.03**
DBP before procedure (mm Hg)	83.7±19.7	77.5±12.1	**0.02**
HR before procedure (beat/min)	89.0±13.4	81.1±10.3	**<0.001**
SBP during procedure (mm Hg)	150.9±22.9	144.1±18.9	0.07
DBP during procedure (mm Hg)	82.7±21.4	76.7±7.7	**0.01**
HR during procedure (beat/min)	85.6±14.3	82.1±12.9	0.16
SBP after procedure (mm Hg)	141.9±23.9	142.5±23.8	0.89
DBP after procedure (mm Hg)	76.1±14.3	76.9±8.6	0.66
HR after procedure (beat/min)	80.3±12.9	82.2±10.0	0.34

Abbrevations: SBP: Systolic blood pressure; DBP: diastolic blood pressure; HR: heart rate.

giography compared to those without complications. The patients with high anxiety scores had higher blood pressure and heart rates before and during the procedure, and waiting times and anxiety levels were significantly correlated.

A feeling of apprehension and fear, characterized by physical symptoms such as palpitations, sweating, and feelings of stress with the activation of the autonomous nervous system.[11] Anxiety and depression are more frequently observed in patients with diagnosed coronary artery disease.[12] The incidence rates range between 20-50% for anxiety and 30-60% for depression.[13,14] In a study of 3000 patients with generalized anxiety and depressive disease, Barger et al. showed that these patients were associated with an increased risk of CAD compared to normal population, regardless of accompanying depression or anxiety.[15] In three large prospective studies, various negative mental disorders such as anxiety, fear and stress were stated to occur due to hospitalization, treatment settings, unknown test results and possible complications, especially in patients hospitalized 2-3 days before coronary angiography.[16,17]

Although the relationship between anxiety and clinical outcomes could not be clearly shown, the direct effects of anxiety on cardiovascular physiology are known. Anxiety primarily causes activation of the sympathetic nervous system. It causes an increase in central and local myocardial levels of both adrenaline and noradrenaline, resulting in increased heart rate, changes in vascular tone, and tendency to increased rhythm disturbances.[18] In our study, it was understood that previously described complications developed in 34 of the total study group. Anxiety scores were significantly higher in the patients with complications compared to those without complications. These patients had significantly higher blood pressures during the procedure and pulse rates after the procedure. Factors such as pain during the procedure may have an effect on this as well as anxiety. However, the close relationship between anxiety and pain is known (virtual reality for pain and anxiety management in children). As a result, it cannot be denied that anxiety significantly contributes to these hemodynamic changes in patients.

It has been reported in several studies that anxiety and stress can be seen in up to 80% of patients who will undergo coronary angiography.[19] Anxiety can severely affect several organs, especially the heart.[20] Anxiety can trigger a range of physiological and chemical responses, activate the sympathetic nervous system, and precipitate catecholamine release. Therefore, blood pressure, heart rate and respiratory rate rise, workload and myocardial oxygen demand of the heart increase and the risk of myocardial ischemia and cardiac dysrhythmia during coronary angiography increases.[19]

In our study, blood pressures and heart rates before the procedure were higher in all patients. Heart rates and blood pressures before and during the procedure were significantly higher in the patients with complications. In our study group, blood pressures and heart rates after the procedure were similar. The

reason for this is the inclusion of the development of hypotension and vagotonia in complications in the study design. We think that the hemodynamic parameters were similar between the groups due to the development of hypotension and vagotonia after the procedure.

Again, the significant relationship between anxiety score and waiting time shows us that as the waiting time increases, anxiety increases. We think that effective anxiety treatment in patients whose preprocedural anxiety scores were determined and were found to be high may lead to more stable hemodynamic parameters during the procedure and may reduce the risk of complications.

The study is an observational and cross-sectional single-center study, and therefore there is no follow-up data for both groups, and our results have all the limitations specific to this type of analysis and should be evaluated accordingly.

CONCLUSION

In conclusion, anxiety is a parameter that will affect perioperative procedure quality and patient health in patients to undergo coronary angiography for the first time. Anxiety may affect hemodynamic parameters before and during the procedure. Determination of anxiety scores of patients before the procedure and premedication of patients with high anxiety scores as well as keeping waiting periods as short as possible may positively affect the development of complications and perioperative hemodynamic parameters.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Zuhal Koç, Havva Gençosman, Turgut Karabağ;* ***Design:*** *Turgut Karabağ;* ***Control/Supervision:*** *Turgut Karabağ;* ***Data Collection and/or Processing:*** *Zuhal Koç, Havva Gençosman;* ***Analysis and/or Interpretation:*** *Turgut Karabağ;* ***Literature Review:*** *Turgut Karabağ, Havva Gençosman;* ***Writing the Article:*** *Zuhal Koç, Havva Gençosman, Turgut Karabağ;* ***Critical Review:*** *Turgut Karabağ;* ***References and Fundings:*** *Turgut Karabağ;* ***Materials:*** *Zuhal Koç, Havva Gençosman, Turgut Karabağ.*

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