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Original Article

Comparison of Sleep Quality, Comfort Level, and Related Factors in Patients Using the Sandbag or the Vascular Closure Device After Coronary Angiography

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ABSTRACT

Objective: This study was conducted to investigate whether sleep quality, comfort level, and related factors differ depending on the use of the sandbag or the vascular closure device after coronary angiography.

Methods: This comparative and cross-sectional study was conducted on 210 patients (Sandbag: 105, Device: 105) who underwent coronary angiography in the coronary intensive care and cardiology service. Data were collected using a Descriptive Characteristics Form, a Coronary Angiography Follow-up Form, the Richard-Campbell Sleep Scale, and the Early Postoperative Comfort Scale.

Results: Comfort scores were higher in patients using the device (4.02 ± 0.45) than those using the sandbag (3.8 ± 0.45). In both groups, pain negatively affected comfort. Mobilization had an effect on comfort only in patients using the sandbag and comfort was higher in mobilized patients. Sleep scores were higher in vascular closure device users (57.18 ± 17.69) than in sandbag users (51.99 ± 18.14). Severe pain, long surgical intervention time, and large hematoma size adversely affected sleep quality in patients using the sandbag.

Conclusion: The use of sandbags and vascular closure devices in patients who have undergone coronary angiography affected sleep quality and patient comfort, and that device users were better in terms of comfort and sleep quality than sandbag users.

Keywords: Coronary angiography, sandbag, vascular closure devices, comfort, sleep

Introduction

Coronary artery disease (CAD) ranks first among the causes of death in developed and developing countries despite developments in technology and interventions.[1] In the treatment of CAD, life-saving and interventional methods such as catheterization procedures with minimal risks are frequently preferred. The most widely used interventional method is coronary angiography.[2] The classical sandbag method is frequently used to prevent bleeding and other complications in the femoral artery region after coronary angiography.[3,4] In the classical sandbag method, manual pressure is applied on the application area for 10-15 minutes in order to control bleeding. Then, a sandbag weighing 2.3-4.5 kg is placed on the area that is pressed by hand and it is ensured that it remains there for 4-6 hours. During this time, the patient's movements are limited and they are only allowed to lie in the supine position.[3,5] Along with the developing technology, vascular closure devices have become a frequently used method. Vascular closure devices are new pneumatic compression devices developed to maintain pressure after short-term pressure is applied on the intervention site[6] It is considered that such devices shorten the length of hospital stay and the time to stop bleeding and increase patient comfort and sleep quality compared to sandbags.[4,7] In addition, after coronary angiography, patients experience many problems such as deterioration in sleep quality, fatigue, and difficulty in performing daily life activities.[8] Insufficient sleep quality and disturbances in the circadian rhythm are common in patients hospitalized in the intensive care unit after coronary angiography.[9] Conditions such as deterioration in sleep quality, fatigue, and difficulty in performing daily life activities after Coronary Angiography affect patient comfort.[9,10] It is predicted that preventing such complications that may develop after coronary angiography will provide patient comfort.[11,12] Providing and maintaining the comfort of the patients after an invasive intervention should be one of the goals of holistic nursing care.[7,12] In the study by Özden[13] on patients' pain, comfort, and vital

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signs, non-pharmacological methods used by nurses for patients, such as position changes and support for mobilization, relieved the patient and increased comfort. As a result of this study, the evidence to be presented about the effectiveness of both methods will contribute to ensuring patient comfort and increasing sleep quality.

Methods

Aim

In the study conducted to compare patients who used sandbag or pneumatic closure device after coronary angiography in terms of sleep quality, comfort level, and related factors, the following study questions were identified to this end:

1. The use of a sandbag after coronary angiography affects sleep quality and comfort level.
2. The use of a device after coronary angiography affects sleep quality and comfort level.
3. There is a difference between sleep quality and comfort levels of patients using the sandbag or the device after coronary angiography.

Study Design and Sample

This is a correlational, cross-sectional study. The population of the study consisted of patients hospitalized in the Coronary Intensive Care and Cardiology Service of a Training and Research hospital. The sample of the study consisted of patients who met the inclusion criteria and were selected by a simple random sampling method. As a result of the power analysis made using the G* power program, it was determined that 210 patients should be included in the sampling at the bidirectional significance level, with 0.5 effect size, 0.95 power to represent the universe, and 0.05 error level (Sandbag: 105 Close Pad: 105). Individuals aged 18 years and over, who stayed in the hospital for at least 1 night, were capable of answering the survey questions, and underwent coronary angiography were included in the study. Patients who took antihistamines, psychiatric drugs or sleeping pills, and had systolic and diastolic blood pressure values above 150/100 mm/Hg were excluded from the study.

Data Collection

Data were collected by the first investigator between September 2021 and January 2022. The researcher collected the data in the patient's room by visiting the coronary intensive care and cardiology service every day of the week. The findings of the patients were started to be recorded after the femoral sheath was removed. In patients routinely followed in the supine position, the sheath is removed and a sandbag or a pneumatic closure device is applied to the intervention site together with a pressure dressing. In this study, all applications were applied in the same way as clinical routine. Accordingly, the closure method to be applied and the sheath withdrawal time were determined by the specialist cardiologist who performed the procedure, taking into account the patient's general condition, age, bleeding risk, and duration of the surgery. Sheath removal was also performed by the cardiologist responsible for the patient and manual compression was applied for 15 minutes. The determined sandbag or Close Pad was applied after bleeding control. A sandbag weighing 5 kg was placed in such a way as to provide pressure to the area where the intervention was made. The Close Pad was placed in the area where the intervention was performed, with the balloon sac. It was planned to mobilize the patients 6 hours after the sandbag application and 4 hours after the close-pad application. Patients who could not be mobilized within the specified times were marked as not mobilized.

The researcher who collected the data listed all the patients who underwent the procedure between the data collection dates and evaluated them for suitability. After this procedure, the researcher approached to the patient, introduced himself, provided information about the purpose of the study, and obtained their written consent. Then, he received information about the general condition of the patient and their illness. First, the researcher filled the introductory data form and entered the data regarding the patient's follow-up into the Coronary Angiography Follow-up Form. Information about the procedure (duration of surgical intervention, systolic and diastolic blood pressure, and amount of heparin given in the procedure) was recorded from the file immediately after the procedure. Pain and hematoma measurements were recorded at 9:00 AM the day after the procedure. Likewise, the questionnaires regarding the sleep quality and comfort level of the patient the previous night were filled in at 9:00 AM the day after the procedure. All measurements and calculations of Kristin Swain's Checklist and Numerical Pain Rating Scale in the Coronary Angiography Follow-up Form were made by the researcher who collected the data. The researcher accompanied the procedures of the included patients by being in the clinic throughout the day and obtained the data by making observations and interviews.

Measures

Demographic characteristics of the patients, characteristics during and after angiography, and comfort and sleep values were recorded using the forms and questionnaires listed later.

Introductory Characteristics Form

This is a form in which variables such as age, gender, diagnosis, educational status, marital status, body mass index (BMI), smoking, chronic diseases, and regularly used drugs are recorded.[9,11,14]

Coronary Angiography Follow-Up Form

This form was used to follow the physiological state of the patient and information about the procedure during and after the angiography procedure. In this form, there are questions about the duration of the surgical intervention, systolic and diastolic blood pressure, compression time applied to the entrance site after sheath removal, amount of heparin given in the procedure, state of mobilization after the procedure, development of hematoma/bleeding, and pain. Kristin Swain's Checklist was added to the form to evaluate hematoma and bleeding and the Numerical Pain Rating Scale was added to evaluate pain. In Kristin Swain's checklist, bleeding greater than 5 cm was defined as significant hematoma, and those greater than 100 mL were defined as significant bleeding. A ruler was used to determine the hematoma diameter. The dressing material was weighed using a digital scale for the amount of bleeding. The value measured is recorded on the chart. The pain of the patients was measured and recorded by scoring between 0 and 10 on the numerical pain assessment scale (0 no pain-10 unbearable pain).[15] All measurements and calculations were made by the researcher who collected the data. The researcher accompanied the procedures of the included patients by being in the clinic throughout the day and obtained the data by making observations and interviews.

Richard-Campbell Sleep Scale

This scale consists of 6 items measuring the characteristics of the previous night's sleep (depth of night sleep, time to fall asleep, frequency of awakening, time to stay awake when awakened, sleep quality and noise level in the environment). Scores in the range of 0-25 indicate very poor sleep quality and 76-100 indicate very good sleep quality.[16] In this study, the Cronbach's α value of the scale was determined as 0.90.

The Early Postoperative Comfort Scale

This scale consists of 24 items questioning the comfort status of the individual regarding the surgical intervention. Each statement in the

scale has a Likert-type scoring ranging from 1 to 6. The lowest score that can be obtained from the scale is 24 and the highest score is 144. Low scores indicate poor comfort and high scores indicate good comfort.[17] In this study, the Cronbach's α value of the scale was determined as 0.64.

Data Analysis

Data analysis in the study was carried out with Statistical Program for the Social Sciences 25 (IBM SPSS Corp.; Armonk, NY, USA) program. The conformity of the data to the normal distribution was evaluated with the Kolmogorov–Smirnov test. Any P value $\leq .05$ was considered significant. Paired group comparisons were evaluated with the Student's t-test, and multiple group comparisons were evaluated with the analysis of variance (ANOVA) test. The Cronbach's α value was used to analyze the reliability of comfort and sleep scales according to the ANOVA test. The relationship between the variables was examined with the Pearson correlation test.

Ethical Aspect of Study

Ethical approval for the study was obtained from the Inonu University Scientific Research Ethics Committee (Acceptance date: 11.06.2020; Decision no: 2020/169) and written institutional permission from the Ministry of Health, Turkish Public Hospitals Institution. Written informed consent was obtained from all participants and the study was conducted in accordance with the Declaration of Helsinki.

Results

Two hundred eighty-six patients were evaluated for eligibility in the study. Seventy-six patients were not included in the study because they did not meet the inclusion criteria (52 used antihistamine, psychiatric, or sleeping pills and 24 had blood pressure above 150/100 mm/Hg). As a result, the study was completed with 210 patients (Figure 1).

In the study, the mean age was calculated as 56.69 ± 14.71 for patients using the sandbag and 53.14 ± 15.43 for device users. It was determined that 59% of the patients using the sandbag and 54.3% of those using the device were male. Myocardial infarction was diagnosed in 60% of the patients using the sandbag and 66.7% of those using the device. It was determined that 39.0% of the patients using the sandbag were primary school graduates and 40% of the patients using the device did not receive any formal education. It was determined that 87.6% of the participants using the sandbag and 89.5% of those using the device were married. According to the BMI variable, 48.6% of the patients using the sandbag and 61% of those using the device were overweight. It was determined that 50.5% of the patients using the sandbag and 56.2% of those using the device did not have a smoking habit. It was determined that 52.4% of the patients using the sandbag and 48.6% of the patients using the device had chronic diseases. It was determined that 51.4% of the patients using the sandbag and 48.6% of the patients using the device were regular drug users (Table 1).

Intervention time in patients using the sandbag was higher than in patients using the device. This difference between patients using the sandbag and device according to the duration of surgical intervention was statistically significant ($P < .05$) (Table 2). When the characteristics of the patients regarding the complications were examined, it was determined that the majority of the patients who used sandbag after the intervention were not mobilized (n = 72, 80.9%), and the patients who used device were mostly mobilized (n = 88, 72.7%). A statistically significant difference was found between the patients using the sandbag and device according to their mobilization status ($P < .05$) (Table 3).

The mean comfort score was higher in patients using the device compared to those using the sandbag. This difference between the groups according to the comfort scale mean scores was statistically significant ($P < .05$). The mean sleep score was higher in device users than in sandbag users. Sleep problems were significantly lower in the device group ($P < .05$). The patients' score related to their staying awake the previous night (item 4) was significantly higher in device users than in sandbag users ($P < .05$). This result showed that patients using the device had a low problem of staying awake. Again, the mean score regarding the sleep quality of the previous night (item 5) was significantly higher in device users compared to sandbag users ($P < .05$) (Table 4).

In the study, the comfort scores of patients using the sandbag were significantly higher in mobilized patients than in non-mobilized patients ($P < .05$). The scores of the patients regarding the comfort scale were higher in the pain-free group in both sandbag and device users than in the pain group. This difference between patients with and without pain was statistically significant for both groups ($P < .05$). The comfort scores of the participants using the sandbag were significantly lower in patients with pseudoaneurysm than in patients without

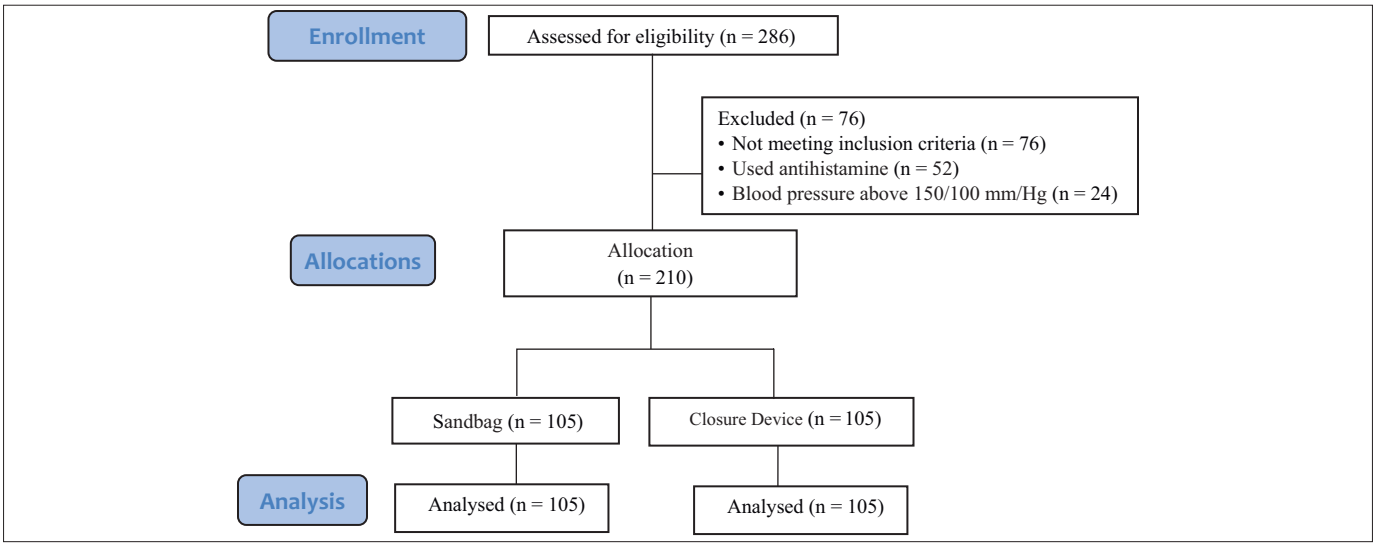

Figure 1. Flow diagram of the study conduction.

Table 1. Comparison of Demographic Characteristics (n = 210)

	Sandbag		Closure Device		Test	*P*
Variable	**Mean ± SD**		**Mean ± SD**		***t***	
Age	56.69 ± 14.71		53.14 ± 15.43		1.107	.089
	n	**%**	**n**	**%**	***X²***	
Sex						
Female	43	41.0	48	45.7	0.485	.486
Male	62	59.0	57	54.3		
Diagnosis						
Chest pain	42	40.0	35	33.3	1.005	.316
MI	63	60.0	70	66.7		
Education level						
None	30	28.6	42	40.0	6.885	.076
Primary school	41	39.0	24	22.9		
High school	26	24.8	31	29.5		
University	8	7.6	8	7.6		
Marital status						
Married	92	87.6	94	89.5	0.188	.664
Single	13	12.4	11	10.5		
BMI						
Normal	32	305	12	11.4	11.521	.03
Overweight	51	48.6	64	61.0		
Obese	22	21.0	29	27.6		
Smoking status						
No	53	50.5	59	56.2	0.689	.407
Yes	52	49.5	46	43.8		
Chronic disease						
Yes	55	52.4	51	48.6	0.305	.581
No	50	47.6	54	51.4		
Regular drug use						
Yes	54	51.4	51	48.6	0.171	.679
No	51	48.6	54	51.4		

X^2, chi-square; BMI, body mass index; MI, myocardial infarction; *t*, independent groups *t*-test;
*P < .05.

Table 2. Comparison of Characteristics During Angiography (n = 210)

Scale Dimensions	Group	Mean ± SD	Test[a]	*P*
Surgery duration (minutes)	Sandbag	51.89 ± 28.95	***4.597***	***<.001****
	Device	36.52 ± 18.29		
Systolic pressure (mmHg)	Sandbag	127.9 ± 14.83	1.122	.263
	Device	132.04 ± 34.73		
Diastolic pressure (mmHg)	Sandbag	79.92 ± 12.61	−0.100	.920
	Device	80.1 ± 13.58		
Compression duration (minutes)	Sandbag	11.65 ± 2.62	−0.331	.741
	Device	11.78 ± 3.19		
Heparin amount (cc)	Sandbag	1.4 ± 0.79	0.330	.742
	Device	1.36 ± 0.88		

[a]*t*-test value.
**P* < .05.

Table 3. Comparison of Characteristics of Complications (n = 210)

Characteristics	Sandbag, n (%)	Device, n (%)	Test[a]	*P*
Mobilization				
Yes	33 (27.3)	88 (72.7)	***58.989***	***<.001****
No	72 (80.9)	17(19.1)		
Pain				
Yes	59 (49.2)	61 (50.8)	−0.020	.780
No	46 (51.1)	44 (48.9)		
Hematoma				
No	81 (52.6)	73 (47.4)	0.090	.210
Yes	24 (42.9)	32 (57.1)		
Ecchymosis				
No	102 (49.5)	104 (50.5)	−0.070	.310
Yes	3 (75.0)	1 (25.0)		
Pseudoaneurysm				
No	103 (49.5)	105 (50.5)	−0.100	.160
Yes	2 (100.0)	0 (0.0)		
Vagal				
No	96 (49.5)	98 (50.5)	−0.040	.600
Yes	9 (56.3)	7 (43.8)		
Bleeding				
No	96 (48.2)	103 (51.8)	3.454	.063
Yes	9 (81.8)	2 (18.2)		

[a]Chi-square (χ^2) value.
**P* < .05.

pseudoaneurysm ($P < .05$). In the study, a weak correlation ($r = 0.198$) was found between diastolic blood pressure and the scores obtained from the comfort scale in the participants using the sandbag ($P < .05$). In addition, a low level of negative correlation (sandbag $r = -0.225$; device $r = -0.331$) was found between the pain severity score and comfort scores of the patients in both groups ($P < .05$) (Table 5).

In the study, sleep scores of patients using the sandbag were significantly lower in patients with pain compared to patients without pain ($P < .05$). Similarly, the sleep score of patients using the sandbag was significantly lower in patients with hematoma than in patients who did not develop hematoma ($P < .05$). In patients using the sandbag, surgical intervention time ($r = -0.300$), systolic ($r = -0.243$) and diastolic ($r = -0.240$) blood pressure, compression time ($r = -0.232$), pain intensity ($r = -0.262$), and hematoma size ($r = -0.329$) were negatively correlated with sleep scores ($P < .05$). Furthermore, in patients using the device, a low negative correlation was found only between systolic blood pressure ($r = -0.304$) and compression duration ($r = -0.193$) and sleep scores ($P < .05$) (Table 5).

Discussion

In this study, in which the sleep quality, comfort level, and the affecting factors were examined in patients who used sandbags and Close Pads after coronary angiography, the average comfort and sleep scores of the patients were found to be higher in patients using Close Pad compared to those using sandbags. It has been observed that pain is the leading factor affecting sleep and comfort. In addition, it was observed that mobilization status, long surgical intervention time, and large hematoma size adversely affected sleep quality.

In this study, the incidence of complications such as pain, hematoma, ecchymosis, pseudoaneurysm, and vagal after coronary angiography was consistent with the literature. Bektaş[18] also reported that there was no difference in terms of ecchymosis, hematoma, and

Table 4. Comparison of Comfort and Sleep Between Groups (n = 210)

Scale		Group	Mean ± SD	Test[a]	*P*
Comfort scale total score		Sandbag	3.8 ± 0.45	**−3.547**	**<.001***
		Device	4.02 ± 0.45		
Richard-Campbell Sleep Scale	Sleep total score	Sandbag	51.99 ± 18.14	***−2.099***	***.037****
		Device	57.18 ± 17.69		
	Item 1: Previous night sleep depth	Sandbag	51.14 ± 20.71	−0.985	.326
		Device	54.1 ± 22.67		
	Item 2: Previous night difficulty falling asleep	Sandbag	50.62 ± 18.63	−1.905	.058
		Device	55.71 ± 20.1		
	Item 3: Previous night waking frequency	Sandbag	52.19 ± 21.29	−1.550	.123
		Device	56.71 ± 21.01		
	Item 4: Previous night staying awake	Sandbag	54.19 ± 20.12	***−2.723***	***.007****
		Device	61.67 ± 19.67		
	Item 5: Previous night sleep quality	Sandbag	51.81 ± 20.99	***−2.025***	***.044****
		Device	57.71 ± 21.27		
	Item 6: Previous night noise level	Sandbag	54.48 ± 19.99	−0.624	.534
		Device	56.24 ± 20.95		

[a]*t*-test value.
**P* < .05.

pseudoaneurysm between the sandbag and device users. Similarly, Hermanides et al[19] stated that using a closure device in patients undergoing coronary angiography was not superior to manual compression in reducing bleeding and antithrombotic treatment time. In addition, in a review study, it was demonstrated that vascular closures provided improvement in the time to hemostasis and ambulation. The same study reported that most studies are underpowered to show differences, but even after meta-analysis or Cochrane review, complication rates as well as safety and efficacy between devices and mechanical compression remained comparable.[20] On the contrary, Beşli et al[6] found major local complications and hematomas more frequently in device users compared to the sandbag users. These different study results of compression devices and sandbags could not be freed from the confounding effect of factors such as the expertise level of the team performing the procedure and different patient characteristics. Therefore, it is thought that the main advantage of a closure device may be to increase patient comfort with shorter bed rest.[21]

In the sandbag application, which is the most commonly used method to control bleeding after coronary angiography, patients must lie motionless in the supine position for at least six hours.[21,22] Since lying in a supine position for a long time causes back pain and discomfort, it has been questioned whether compression devices can be used more frequently to ensure patient comfort and prevent pain. In this study, the average comfort scores of the patients were higher in patients using the device compared to those using the sandbag. In studies investigating the factors affecting comfort in patients undergoing coronary angiography,[23,24] the differences in the application of sandbags and closure devices in terms of comfort were not explained. However, there are studies showing that patients using closure devices reported less pain than those using the sandbag.[25] The low levels of pain and discomfort reported with different closure devices are consistent with our findings.[25,26] Besides, Pieper et al[25] also observed that sandbag increased patients' dissatisfaction.

In our study, the finding that pain negatively affects comfort in both groups is thought to be related to factors such as anxiety level in previously reported coronary interventions, sensitivity in the femoral region, previous experience of catheter extraction, and length of the procedure.[27] In addition, it was stated that position change and regional weight application affect the severity of pain in cardiac invasive procedures.[27,28]

In this study, it was observed that mobilization had a positive effect on comfort in patients using the sandbag. Augustin et al[29] have found that the patients' satisfaction and comfort levels increased by keeping the bed rest period short. Rezaei-Adaryani et al[30] reported that position change and early mobilization increase the comfort and satisfaction of patients. Wilcoxson et al,[31] found that early mobilization increases patient comfort and satisfaction. In our study, the high level of comfort in mobilized patients in the sandbag group may be due to the effect of position change and weight. As can be seen, the limited number of studies on comfort indicate that the use of compression devices can be encouraged. However, it is clear that more research is needed on pneumatic closure devices, which were found to increase patient comfort in the present study.

Another main variable that we compared the effects of using the sandbag and device was "sleep." Accordingly, although the mean sleep scores of the patients were moderate in both groups, the sleep scores of the patients using the device were higher than those using the sandbag. It is noteworthy that patients using the device, in particular, stayed awake less the previous night and had better quality sleep. In some studies, patients experienced severe anxiety, sleep disturbance, and fatigue and low energy sensations after angioplasty.[32,33] In addition, in our study, severe pain, long surgical intervention time, and large hematoma size adversely affected sleep quality in patients using the sandbag. Öneği and Arslan[34] reported that long-term lying on the back with stent implantation after angiography, stent procedure performed along with angiography, and environmental factors adversely affected the sleep quality of the patients.

Our study and past studies have revealed the advantages and disadvantages of the sandbag and compression device. Sandbag is easy to apply and provides leg immobility due to its weight. However, it directly applies widespread pressure (hence minimal) to the intervention area and may tend to slip easily from the groin area. In patients using the sandbag, variables such as pain and mobilization disturb patient comfort. Again, pain, long surgical intervention time, large hematoma size, and drug use affect sleep quality negatively in patients who use sandbags. The compression device applies significant direct pressure and is stable in terms of remaining in position. However, it has a higher cost and it can easily get dirty. None of these shortcomings is large enough to preclude the use of compression devices if clinical benefit emerges. Our results support the existing literature that vascular closure devices

Table 5. Comparison Between Groups Regarding Factors Affecting Comfort and Sleep (n = 210)

			Comfort		Sleep	
			Sandbag	Device	Sandbag	Device
Variables	**State**	**Test**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**	**Mean ± SD**
Mobilization	Yes		3.85 ± 0.44	4.03 ± 0.45	52.76 ± 17.76	57.58 ± 17.44
	No		3.67 ± 0.43	3.94 ± 0.47	50.3 ± 19.12	55.12 ± 19.4
		t-test	*2.015*	−0.712	0.644	−0.523
		P	***.046****	.478	.521	.602
Pain	Yes		3.70 ± 0.46	3.90 ± 0.41	47.05 ± 17.53	56.02 ± 17.05
	No		3.91 ± 0.40	4.17 ± 0.47	58.33 ± 17.06	58.8 ± 18.62
		t-test	*−2.477*	*−3.125*	*−3.308*	−0.793
		P	***.015****	***.002****	***.001****	.430
Hematoma	No		3.78 ± 0.43	4.02 ± 0.41	54.42 ± 17.6	59 ± 17.4
	Yes		3.83 ± 0.52	4 ± 0.54	43.79 ± 17.88	53.03 ± 17.92
		t-test	−0.448	0.265	*2.859*	1.603
		P	.655	.791	***.011****	.112
Ecchymosis	No		3.8 ± 0.45	4.02 ± 0.45	51.61 ± 18.25	57 ± 17.68
	Yes		3.68 ± 0.23	3.79 ± 0	65 ± 5.57	76 ± 0
		t-test	0.452	0.496	−3.662	−1.069
		P	.652	.621	.209	.287
Pseudoaneurysm	No		3.81 ± 0.43	4.01 ± 0.45	52.4 ± 18.07	57.18 ± 17.69
	Yes		2.90 ± 0.27	-	31 ± 4.24	-
		t-test	*2.988*	-	1.666	-
		P	***.004****	-	.099	
Vagal	No		3.78 ± 0.46	4.03 ± 0.45	51.32 ± 18.75	56.6 ± 17.56
	Yes		3.94 ± 0.24	3.76 ± 0.38	59.11 ± 6.33	65.29 ± 19.01
		t-test	−1.014	1.586	−1.235	−1.258
		P	.313	.116	.220	.211
Bleeding	No		3.80 ± 0.46	4.02 ± 0.45	52.29 ± 18.32	57.08 ± 17.85
	Yes		3.77 ± 0.34	3.85 ± 0.44	48.78 ± 16.74	62.5 ± 2.12
		t-test	0.190	0.508	0.554	−0.428
		P	.850	.612	.581	.670
			r/p	**r/p**	**r/p**	**r/p**
Surgery duration			0.024	−0.064	*−0.300*	−0.029
			0.806	0.516	***0.002****	0.771
Systolic blood pressure			0.138	−0.043	*−0.243*	*−0.304*
			0.161	0.667	***0.013****	***0.002****
Diastolic blood pressure			*0.198*	−0.047	*−0.240*	−0.179
			0.043*	0.635	***0.014****	0.068
Compression duration			0.057	0.149	*−0.232*	*−0.193*
			0.561	0.130	***0.017****	***0.048****
Heparin amount			−0.056	0.062	−0.191	0.144
				0.530	0.052	0.142
			0.573			
Pain level			*−0.225*	*−0.331*	*−0.262*	−0.16
			0.021*	***0.001****	***0.007****	0.104
Hematoma size			−0.148	−0.046	*−0.329*	−0.161
			0.132	0.639	***0.001****	0.101

r, Pearson correlation coefficient.
*$P < .05$.

are fast and effective as an alternative to manual compression. For this reason, it is thought that compression devices are effective in terms of providing comfort and increasing sleep quality, and it may be beneficial to use them more frequently when possible.

Study Limitations

The study contains several limitations. First, the significantly shorter duration of the surgery may be a limitation in patients who have been applied Close Pad. However, the duration of the surgery is not a variable that can be controlled, and in the analyzes performed, we found that the sleep scores were related to the duration of the surgery only in patients who applied sandbags. Although these results suggest that the duration of the surgery does not have a strong effect on sleep and comfort, it is recommended to investigate the relationship between comfort, sleep and surgery duration in further studies. Second, the cross-sectional nature of the study limits inferences about the long-term consequences of causal relationships between variables. Third, in defining pain and comfort in patients undergoing coronary

angiography, it should be taken into account that the following factors may have an impact on the results: cultural and individual differences, subjective aspects of pain and comfort, intensive care environment, fear of death, and anxiety experienced by patients for the procedure.

Conclusion and Recommendations

As a result of the study, it was seen that patients using the device were more comfortable and had a better sleep quality compared to those using the sandbag. Pain negatively affected Comfort in both Close Pad users and sandbag users. Mobilization had an effect on comfort only in patients using the sandbag, and comfort was higher in mobilized patients. Severe pain, long surgical intervention time, and large hematoma size adversely affected sleep quality in patients using the sandbag. As a result, it was observed that the use of a closure device after coronary angiography had more positive results than the sandbag in terms of sleep quality and comfort level. For this reason, the closure device should be considered to increase comfort and sleep quality after coronary angiography. In addition, it is recommended that nurses consider problems such as pain, mobilization, duration of surgical intervention, and hematoma that affect comfort and sleep quality in patients using the sandbag. Furthermore, they should plan, implement, and evaluate nursing interventions that can increase comfort and sleep quality in patients using the sandbag.

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Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

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