The Effect of Position Change and Bed-Rest Duration after Coronary Angiography on Vascular Complications

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Abstract
Aims: Improper positioning and excessive immobility has serious side effects on patients after angiography. The present study tries to determine the effects of position change and bed-rest duration on vascular complications after angiography.

Methods: In a random clinical trial, 130 patients, who had undergone a coronary angiography via the femoral artery, were randomly assigned into a test and a control group (each group consisting 65 participants). The patients in the test group experienced position changes in four hours. For two hours, they rested with a sand bag in their bed. In the fourth hour, they were allowed to leave the bed. The patients in the control group received routine treatment. Vascular complications were investigated in both groups at regular intervals. The required samples were randomly taken from among patients of “Research and Education Center of Rasht” in two months, in 1389. The collected data was analyzed by applying descriptive and inferential statistics and also SPSS16 software.

Results: In the test group, bleeding occurred in one of the patients in the fourth hour. It also happened for one of the patients of the control group immediately after coming to ward (p<0.315). In the second hour, in the test group, hematoma occurred in one of the patients. It was also observed in one of the patients of the control group during the first and the second hour (p<0.315). In the fourth hour, two cases of hematoma were observed among the patients of the control group (p<0.154). The Fisher’s exact test proved no significant difference between the two groups.

Conclusion: In accordance with the findings of this study, position change and early ambulation after angiography do not increase the risk of vascular complications, can bring patients some comfort, and result in their earlier discharge from hospitals.

Key words: Coronary angiography; Position change; Vascular complications; Bed-rest duration

Introduction
Due to the increase of life expectancy and also according to the improvements in treating illnesses, chronic diseases are also increasing [1]. Cardiovascular diseases are significant since they are among the most common chronic diseases of the 21st century and are regarded as the main cause of disabilities and deaths all over the world [2]. By 2020, ischemic heart disease will have become the most usual cause of death in the world [3]. In Iran, cardiovascular diseases were considered as the first cause of mortality in people over 35 up to 1387 [4]. In Gilan Province, cardiovascular diseases are the first cause of deaths, in a way that during the last year the number of patients with heart disease increased about 12.5%. In accordance with the presented statistics, cardiovascular diseases are of the most dangerous and fatal illnesses. As coronary diseases make a high percentage of cardiovascular diseases [3], early diagnosis and treating of them will lead into fewer complications and deaths.

Experiments and diagnostic methods are essential for timely diagnosis of heart diseases [5]. One of the most common and important diagnostic methods are coronary angiography [6]. It is the only test which is able to detect the presence or absence of coronary artery diseases up to 100% and provides a clear view of the anatomy and function of the heart [7]. Annually, more than two million catheterizations and cardio-angiographies, with diagnostic or therapeutic purposes or both, are carried out in the United States [3]. In the first half of 1384, over one hundred thousand of angiography and fourteen thousand cases of coronary interventions were performed in Iran [5].

Angiographies investigate the openness of coronary arteries from various aspects. Therefore, according to the achieved results, it would be plausible to estimate the percentage of arteries’ block and suggest the most practical treatment method [8]. Vascular injuries are common in diagnostic and invasive treatment methods which are

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provided through vascular access. After angiography, due to trauma caused in artery wall, complications such as bleeding, hematoma and distal emboli are probable in the area where the catheter was entered [9]. Indeed, vascular complications are among the most common complications of catheterization. Today, considering the application of modern methods, the risk of major and minor complications associated with catheterization is generally increasing [10]. The estimated rate of vascular complications caused by coronary angiography is 0.7 to 28 % [11]. One of caring measures taken to reduce angiography complications in patients is taking a complete or relative rest for ten or 24 hours without moving their legs [12].

Although this measure is accepted by majority of specialists, a fixed and equal time and process is not provided for it in medical references [13]. It is worth mentioning that the rest period after angiography differs among current treatments and available studies and they are not in complete accord [9, 12, 14, and 15]. Unsuitable position and excessive immobility cause patients to experience pain in their back, to change their ability to communicate with others, to face problem with excretion [16], and to feel uncomfortable [17]. In better words, there is not any scientific support for a complete and long rest, lying on the back, and this method of resting mostly relies on experience and taste [6].

Currently in our country, the existing treatment method after angiography includes a complete rest on the back for eight to 24 hours. This method reduces coronary complications after angiography; however, based on the long duration of complete rest and unchanging position, it results in patients’ backache, their dissatisfaction, increase in costs, and also increase in nurses’ loads of task. Therefore, this study aims to suitably position the patients during the complete rest, decrease the duration of complete rest without increasing the probable coronary complications, provide patients with more comfort, increase patients’ satisfaction from services and treatments, reduce the length of being bedridden, reduce the costs, and increase the possibility of utilizing facilities for individuals.

Methods

This study is a clinical trial. In two months (Aban 15th to Day 15th 1389), 130 participants were randomly chosen from among patients of Dr. Heshmat Educational and Clinical Center of Rasht. For this reason, hospitalized patients in angiography unit of this center were selected as this study’s participants in case of meeting the criteria and after signing the informed consent form. Participants were randomly put into groups of experimental and control (65 participants in each group). Since patients who had undergone angiography were visited by the same specialist, samples were randomly put into the experimental group for one week and into the control group in the following week. Entrance criteria included satisfactorily taking part in the study, being older than 18, having undergone femoral artery angiography, inserting needle to achieve the artery only for once, having no deep vein thrombosis before the procedure, using seven and six F sheet to reach artery, having no previous thrombolytic treatment, and having no bleeding disorder. Exclusion criteria included more than 190 of systolic pressure and more than 110 of diastolic pressure, any case of bleeding before extracting the sheet, and complications during the procedure such as hematoma, bleeding, arrhythmia, and unconsciousness.

After obtaining the permission from Committee of Medical Ethics of Gilan University of Medical Sciences and registering the study in IRCT, the following required data was collected: data gathering instrument including demographic information (personal information, gender, age, BMI, marital status), clinical information including results of clotting tests (PT, Platlet count PTT, INR, PTT activity), measuring blood pressure at regular intervals, sheet size, duration of angiography, homeostasis method, and any other nursing actions during the complete rest. More than 100 mm of bleeding and 50 cm of visible hematoma were regarded as the research factor in the present research.
Bleeding was measured through weighing bloody bandages by a 0.1 g scale made in Japan (Standard Feutre). To evaluate hematoma level a standard transparent flexible ruler was utilized.

The intervention process was carried out as follows: vital signs of patients in both groups, who were moved to beds after angiography, were initially checked. The patient’s leg, which had undergone the operation, was controlled for peripheral pulses, hematoma, or bleeding at the place of catheter entrance.

After extracting the sheet by a nurse, the primary homeostasis was done manually until blood clotting and bleeding stop. Next, a transparent bandage was placed on the wound. In the experimental group, positioning was done according to a novel method. Patients of this group rested on their back for one hour with a three-kilogram-sandbag located at the place of catheter entrance. In the second hour, patients rested in the same position while the angle of the bed was 30 to 45 degrees and the sandbag was still in its position. In the third hour, after checking the catheter entrance place, the sandbag was removed and patients relaxed on their left side for thirty minutes (the opposite side of catheter entrance to femoral artery) and then on their right side for another thirty minutes (the side of catheter entrance to femoral artery). Their bed had an angle of 30 to 45 degrees. While the patients were lying on their sides, a pillow was placed behind them for support. In the fourth hour, if no complications were observed, after sitting on the edge of their beds for some minutes, patients left the beds to walk. After that, patients rested partially. In case of any complications in these four hours and after leaving the bed, patients were immediately asked to lie on their backs. Afterwards, necessary measures were taken to prevent and treat the complications, the intervention was stopped, and variables which obliged participants to leave the study were recorded.

Treatment process in the control group was performed without changing the position of patients and having them completely rest for eight to ten hours and then with a three-kilogram sandbag for four to five hours. In the first and third hour of being in the unit, vascular complications were recorded each half an hour. They were also checked and recorded in the second, fourth, sixth, and tenth hour and also in the following morning. Finally, the collected data was analyzed by the help of descriptive statistics (mean, standard deviation, and percentage), inferential statistics (Fisher's exact test, chi-square, and t-test), and SPSS16 software.

Findings

In general, 65 patients took part in the experimental group (49.2% women and 50.8% men) and 65 patients participated in the control group (43.1% women and 56.9% men). Average of participants’ age in the experimental group was 59.54 (±9.68) and in the control group was 58.46 ± (8.09). There was no significant statistical difference between the two groups in accordance with their age and gender (p<0.493 and p<0.482 respectively). The average of BMI in the experimental group was 26.37 ± 3.92 and in the control group was 26.04 ± 4.28 which showed no statistically significant difference (p<0.649). 96.9 % of participants of the experimental group and 89.2 % of them in the control group were married which revealed no statistically significant difference (p<0.084).

Regarding coagulation tests, average of PT in the experimental group was 12.41 ± 0.24 and in the control group was 12.49 ± 0.11 which indicated no meaningful statistical difference (p<0.07). PTT average in the experimental group was 30.09 ± 3.18 and in the control group was 29.67 ± 3.00 which is not a significant statistical differences (p<0.446). INR mean in the experimental group was 1 ± 0.04 and in the control group was 1 ± 0.00 which means that the differences were not statistically significant (p<0.165). The mean of platelet number in the experimental group was 231000 ± 53666.82 and in the control group it was 230000 ± 6768.41 and it means that their difference was not statistically significant (p<0.979).

Based on the t-test, the average of blood pressure at determined intervals was not statistically significant (Table 1).
In most research units, sheet number 6 was used for angiography; in the experimental group (92.3%) and in the control group (90.8%). There was not a meaningful difference between sheet size and the studied group (p<0.753). Angiography duration in most research units was about twenty to thirty minutes; in the experimental group (84.6%) and in the control group (83.1%). No significant statistical difference was observed between the studied group and angiography duration (p<0.541).

One case of bleeding was observed in the experimental group in the fourth hour and in the control group immediately after entrance (p<0.315). A case of hematoma was observed in the experimental group in the second hour and in the control group in the first and second hour (p< 0.315). Two cases of hematoma were found in the control group in the fourth hour (p< 0.154). Fisher's exact test did not indicate a meaningful difference between the two groups. Based on the Fisher's exact test, he two groups were not statistically different (Table 2).

### Table 1: Average of blood pressure in determined intervals in the experimental and control group

<table>
<thead>
<tr>
<th>Blood pressure</th>
<th>Experimental group (Mean and SD)</th>
<th>Control group (Mean and SD)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systole pressure before angiography</td>
<td>125.83 ± 24.52</td>
<td>128.51 ± 20.02</td>
<td>0.497</td>
</tr>
<tr>
<td>Diastole pressure before angiography</td>
<td>77.12 ± 11.14</td>
<td>77.62 ± 11.22</td>
<td>0.802</td>
</tr>
<tr>
<td>Systole pressure after angiography</td>
<td>136.98 ± 17.34</td>
<td>131.55 ± 23.87</td>
<td>0.141</td>
</tr>
<tr>
<td>Diastole pressure after angiography</td>
<td>81.71 ± 9.35</td>
<td>80.72 ± 11.00</td>
<td>0.584</td>
</tr>
<tr>
<td>Systole pressure in the second hour</td>
<td>123.89 ± 17.18</td>
<td>128.42 ± 20.72</td>
<td>0.178</td>
</tr>
<tr>
<td>Diastole pressure in the second hour</td>
<td>75.74 ± 13.44</td>
<td>78.66 ± 29.37</td>
<td>0.438</td>
</tr>
<tr>
<td>Systole pressure in the fourth hour</td>
<td>129.91 ± 15.23</td>
<td>127.02 ± 19.39</td>
<td>0.718</td>
</tr>
<tr>
<td>Diastole pressure in the fourth hour</td>
<td>77.75 ± 8.82</td>
<td>76.32 ± 10.68</td>
<td>0.407</td>
</tr>
<tr>
<td>Systole pressure in the sixth hour</td>
<td>122.42 ± 13.77</td>
<td>123.63 ± 18.50</td>
<td>0.672</td>
</tr>
<tr>
<td>Diastole pressure in the sixth hour</td>
<td>76.60 ± 8.89</td>
<td>74.38 ± 9.22</td>
<td>0.166</td>
</tr>
</tbody>
</table>

### Table 2: Vascular complication rate in the experimental and control group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental Group (number)</th>
<th>Control Group (number)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate bleeding</td>
<td>(0) 0%</td>
<td>(1) 1.5%</td>
<td>0.315</td>
</tr>
<tr>
<td>Bleeding in the fourth hour</td>
<td>(1) 1.5%</td>
<td>(0) 0%</td>
<td></td>
</tr>
<tr>
<td>Hematoma in the first hour</td>
<td>(0) 0%</td>
<td>(1) 1.5%</td>
<td></td>
</tr>
<tr>
<td>Hematoma in the second hour</td>
<td>(0) 0%</td>
<td>(1) 1.5%</td>
<td></td>
</tr>
<tr>
<td>Hematoma in the second and half hour</td>
<td>(1) 1.5%</td>
<td>(0) 0%</td>
<td></td>
</tr>
<tr>
<td>Hematoma in the fourth hour</td>
<td>(0) 0%</td>
<td>(2) 3.1%</td>
<td>0.154</td>
</tr>
</tbody>
</table>

**Discussion**

Findings of other research are consistent with the results of the present study, i.e. there was no significant difference between vascular complications and catheter entrance after angiography in both groups. Some studies confirm the result of the present research. Same as the present study, the study conducted by Cheer et al., which aimed to investigate the impact of changing position in bed after angiography, proved that changing position does not increase vascular complications [9]. Yelmaz et al.’s study, which tried to decrease short-term complications in patients undergoing aggressive methods (changing position and sandbag), bleeding level did not change significantly. The findings of their study are consistent with those of the present one. May et al. in their study sought the effect of
mobility and immobility after primary homeostasis during two hours of resting in bed on the level of hematoma in patients after femoral artery angiography. They discovered no meaningful difference between the two groups regarding hematoma [19]. Agustin et al. studied early extraction of the sheet and early leaving the bed. They found out that these two factors do not increase vascular complications after coronary interventions [20]. In the present study, reducing the duration of resting in bed did not augment vascular complications either. A study was also conducted by Gozelian et al. in Iran, which aimed to determine the influence of complete rest duration on vascular complications after angiography. The findings of this study indicated no significant difference between the two groups considering vascular complications [13]. Adriany et al. came to a similar result investigating the impact of position change after coronary angiography. Likewise, in the present study changing position and reducing the duration of resting did not affect vascular complications. This is similar to the results of all the previous studies.

Conclusion
The findings of this study indicate that positioning patients during the complete rest and reducing resting period do not result in amplifying vascular complications. In addition, changing position reduces the patients’ pain and results in their physical and mental relaxation. It also decreases the costs by reducing the duration of being hospitalized.

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References