

The effectiveness of nurse led teaching in decreasing complications during femoral artery sheath removal after percutaneous coronary intervention in Ahvaz, Iran

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The most common complication after coronary angiography (CA) and percutaneous coronary intervention (PCI) are arterial access site bleeding, which is usually manifested by minor oozing or small hematomas. The frequency of hematomas was 1.3% (>10 cm) and 8.9% (>5 cm), which corresponds with reports from similar studies and departments.¹ Other complications, such as vasovagal episodes, local pain at puncture site, and chest pain had lower rates, but are uncomfortable and stressful for patients.¹ Due to antithrombotic therapy before, during, and after PCI, and sometimes due to the need for an urgent reintervention, the arterial femoral sheath is generally not removed immediately after PCI, unless a vascular closing device is used. This method causes discomfort to the patient, increases the workload for the nursing staff, and bears a risk of local complications. The care of patients after cardiac catheterization and/or PCI is largely the responsibility of nurses. Some recent studies have shown that patients of female gender, with reintervention, thrombolytic treatment, venous sheath use, and intra-aortic balloon adjustment are at high risk for serious femoral vascular complications, especially when they are aged.²

A meta-analysis of 30 randomized trials (with a total sample size of 4000 patients) indicated that vascular closure device increases the risk of femoral access site complications compared to manual compression.³ Most nursing interventions aimed at decreasing bleeding at the vascular access site increase nursing workload, but do not significantly affect bleeding in the groin. The effect of many types of psychological treatment on cardiac patients showed a beneficial effect. There are no any studies on the effect of health education, relaxation therapy, single methods and breathing on a decreased rate of complications after sheath removal among patients undergoing coronary balloon angioplasty.⁴ Sheath removal after PCI by registered nurses can improve patient comfort and shorten immobilization time, but sheath removal is not without risk and it is important to assure that registered nurses achieve the norm for good performance. Also, multi-center studies could test the association between the quality of arterial femoral sheath removal and the occurrence of vascular

complications. We evaluated the result of a teaching program by staff nurses on patient complication rates after manual femoral sheath removal by registered nurses. We do not use any vascular closure devices or other mechanical instrument from different companies after sheath removal.

This randomized clinical study was conducted on the Interventional Cardiology Ward of the Jondi Shapour University Hospital (Imam Khomeini) in Ahvaz, Iran between April 2006 and March 2008 on patients undergoing elective uncomplicated coronary balloon angioplasty. Four hundred patients with uncomplicated coronary balloon angioplasty with or without stenting were randomized into 2 equal groups: sheath removal was performed by trained registered nurses under the supervision of interventional cardiologist with prescription of anxiolytics and local anesthesia and manual compression with (Group 1) and without (Group II) staff nursing teaching. The major risk factors were identified during admission and included hypertension (>130/80 mm Hg on 2 separate occasions), diabetes mellitus (fasting blood glucose >126 mg/dl on 2 separate occasions), and smoking (10 cigarettes per day for the past 5 years). This study had approval from the Ethical Committee of the university hospital. The exclusion criteria were as follows: patients with severe systemic complications that required reintervention, emergency, or primary angioplasty procedures, patient refusal, and needs for intra-aortic balloon pump, multiple puncture, need for continuous anticoagulation after PCI. Four registered nurses passed the full course of training under observation of the interventional team in catheterization laboratory for 6 months and were certified for this work by the team. Nursing staff teaching was carried out randomly for one group by 2 staff nurses and included individual or group counseling to deal with them, instruction and education on balloon angioplasty and the possible complications, including systemic and local treatment options, and single methods of meditation with diaphragmatic breathing and progressive muscle relaxation according to the checklist for 30-45 minutes before and after sheath removal. Other groups had simple teaching that involved 10 minutes of assurance without relaxation and other techniques by registered nurses. The sheath and guiding catheter sizes of 6 or 7 F were used in all patients, and no patients had venous sheaths.

Patients were taken full dose of unfractionated heparin (50-70 unit/kg) with activated clotting time between 300-350 seconds during the procedure. Sheath removal was carried out with control of the partial protrombin time (<45 seconds) 4-6 hours after the procedure

with local injection of 20 cc of 2% lidocaine and prescription of a low dose of alperazolam (0.5 mg twice daily). Following sheath removal, manual compression of the site for 10-15 minutes and application of a 3 sand bag (every sand bag 2000 gram) were performed for one and 2 for 3 and one for 5 hours consequently. All patients were under close observation for local and systemic complications and cardiac monitoring for 24 hours after the procedure. Patients were ambulating approximately 12-16 hours after the procedure. The complication rate was collected in a checklist for both groups. Baseline characteristics are presented as means (standard deviations) for continuous variables and as percentages for categorical data. Continuous variables were compared using student t-test, and χ^2 test for categorical data. The t-test was used to compare the difference between the study groups in continuous variables. The SPSS statistical software package (version 11.0 SPSS Inc., Chicago, IL, USA) was used for all statistical calculation.

The differences were considered statistically significant if the probability value was <0.05 with a 95% confidence interval. Four hundred patients were randomly divided into 2 groups. Ten patients were omitted from the study according to the exclusion criteria or refusal. There were no significant differences between baseline characteristics of the groups such as age, gender, coronary risk factors (hypertension, smoking, and diabetes), one arterial puncture, duration of sand bag holding (2-6 hours), unfractionated heparin during PCI (50-70 unit/kg), time sheath in situ (4-6 hours), and total bed rest (12-14 hours) (**Table 1**). The complications and complication rates with and without teaching, were as follows: hematoma (>5 cm rising of skin overlying puncture site with or without color change), 5.6% and 2% ($p=0.07$); anxiety (≥ 3

of the 6 symptom: restlessness, being easily fatigued, difficulty concentrating, irritability, muscle tension, sleep disturbances), 53.6% and 0.5% ($p=0.0001$); local pain at the site of the puncture, 53.6% and 0.5% ($p=0.0001$); chest pain, 11.8% and 0.5% ($p=0.0001$); local minor hemorrhage at 12 hours (<20 cc), 9.7% and 2% ($p=0.001$); nausea 16.4% and 1.5% ($p=0.0001$); vomiting 15.4% and 1.5% ($p=0.0001$); pallor 10.8% and 1.5% ($p=0.0001$); prescription 9.7% and 2% ($p=0.001$) and vasovagal reaction (hypotension, pallor and bradycardia) 9.2% and 2% ($p=0.03$). In the present study, we evaluated the incidence of local and general complications after femoral sheath removal by registered nurses under supervision of a cardiologist among patients undergoing elective coronary angioplasty and the effect of nursing staff teaching on decreasing the rate of complications. Some studies have shown that sheath removal by trained registered nurses under close observation of a cardiologist is safe without attendant complications.⁵ Nevertheless, this procedure needs continuous close surveillance and organized training courses (examination score $>90\%$ for nurses). In our center, this procedure is performed under these conditions with yearly regular training courses. The rate of complications in our study do not differ significantly with studies from other centers and this helps to show the effect of the teaching process before and after the procedure on decreasing the rate of complications. In other studies, there have been no significant differences among complications with manual compression using a Femostop and other closure devices.³ Lidocaine injection at the site of the sheath did not have a prominent effect on the decreased rate of complications, but some other powerful anesthetic and anxiolytic drugs had some useful effects on the decrease rate of complications. There were no significant differences in the incidence

Table 1- Baseline characteristic of patients with and without nursing staff teaching.

Patient's characteristic	Group I (n=196) (with teaching) n (%)	Group II (n=194) (without teaching) n (%)	P-value
Females	78 (39.7)	72 (37.1)	>0.5
Mean age (SD) (years)	53.1	55	>0.5
Smoker	165 (84.1)	152 (78.3)	>0.5
Diabetes	154 (78.5)	152 (78.3)	>0.5
Hypertension	103 (52.5)	104 (53.6)	>0.5
One arterial puncture	180 (91.8)	172 (88.6)	>0.5
Duration of sand bag holding (2-6 hours) (SD)	4.1	3.8	>0.5
Unfractionated heparin during PCI (50-70u/kg)	190 (96.9)	194 (100.0)	>0.5
Time sheath in situ(4-6 hours) (SD)	5.13	4.91	>0.5
Total bed rest (12-14 hours) (SD)	12.2	12.6	>0.5

PCI - percutaneous coronary intervention

of hematomas between the 2 groups, which may be due to the other factors such as dwell times of sheath, coagulation status, anterior or posterior puncture and complete bed rest time, but the rate was somewhat lower in the first group. Other harmful complications had significant differences among the patients as a function of the nursing staff teaching. Complications, such as prescriptions, nausea and vomiting, pallor, and vasovagal reactions that may be dangerous had a statistically significant lower rate among Group I than Group II, which may be due to the effect of teaching, relaxation, and medical reassurance. It is important to note that nursing staff teaching is very simple, safe and effective important intervention for decreasing the rate of complications. We recommend the need for hard-working nurses and better surveillance and closer observation. By decreasing the rate of complications, the hospital stays are shorter with better improvement in general conditions.⁶ Staff nurse's teaching of patients undergoing coronary angioplasty may decrease the rate of sheath removal complications and we recommend this simple and effective method.

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