

Early ambulation after percutaneous coronary interventions

Perkütan koroner girişim sonrası erken mobilizasyon

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Objectives: Early ambulation after coronary interventions may reduce in-hospital stay and add to the patients' comfort. This approach, however, may increase the risk for puncture site-related complications. We evaluated the safety of early ambulation after elective coronary stenting or angioplasty.

Study design: The study included 342 patients (212 males, 130 females; mean age 53±14 years) undergoing elective coronary stenting or angioplasty using a 6-F guiding catheter through the femoral artery and a standard dose of heparin 5,000 IU. Arterial sheath was removed immediately after the procedure. Homeostasis was achieved by manual compression and maintained with a compressive bandage. Subcutaneous low-molecular-weight heparin was administered one hour after sheath removal. Ambulation was allowed two hours after bed rest. Inguinal complications were recorded during a week follow-up.

Results: Bleeding occurred during ambulation in eight patients (2.3%). No hematoma developed after ambulation during hospital stay. Ecchymosis was the most frequent delayed complication (n=32, 9.4%). Late bleeding was observed in three patients (0.9%) and managed by compression and bed rest. Small hematomas, 1 to 2 cm in diameter, were noted in nine patients (2.6%). A large hematoma requiring blood transfusion and surgical intervention developed in a patient (0.3%) who was obese and had uncontrolled hypertension.

Conclusion: Early ambulation after coronary interventions using a 6-F sheath through the femoral route and low-dose procedural heparin and subcutaneous low-molecular-weight heparin one hour after sheath removal is associated with an acceptable rate of insertion site complications.

Key words: Angioplasty, transluminal, percutaneous coronary; coronary disease; early ambulation; stents; time factors.

Amaç: Perkütan koroner girişim sonrası erken mobilizasyon hastanede kalış süresini azaltmakta, hasta konforunu artırmaktadır. Bununla birlikte, bu yaklaşım ponksiyon bölgesi komplikasyonlarında artışa yol açabilir. Bu çalışmada elektif koroner stent implantasyonu veya balon anjiyoplasti sonrasında erken mobilizasyonun güvenliği araştırıldı.

Çalışma planı: Çalışmaya, femoral yol, 6 F kılavuz kateter ve 5000 IU heparin kullanılarak koroner anjiyoplasti veya stent uygulanan 342 hasta (212 erkek, 130 kadın; ort. yaş 53±14) alındı. Tüm hastalarda arteryel kılıf, işlem sonrasında hemen çıkarıldı. Hemostaz elle kompresyon ve sonrasında kompresyon bandajı ile sağlandı. Kılıf çıkarılması sonrası birinci saatte subkütan düşük molekül ağırlıklı heparin uygulandı. Mobilizasyon kılıf çekiminden iki saat sonra yapıldı. Bir haftalık takip döneminde kasık bölgesi komplikasyonları kaydedildi.

Bulgular: Sekiz hastada (%2.3) mobilizasyon sonrasında kanama izlendi. Hastanede yatış döneminde hematoma gelişimi izlenmedi. Ekimoz %9.4 oranıyla (n=32) en sık gözlenen geç komplikasyondur. Taburculuktan sonra üç hastada (%0.9) gözlenen kanama, kompresyon ve yatak istirahati ile kontrol altına alındı. Dokuz hastada (%2.6) 1-2 cm çapında küçük hematomlar gözlemlendi. Kontrolsüz hipertansiyonu ve obezitesi olan bir hastada (%0.3), kan transfüzyonu ve cerrahi girişim gerektiren hematoma gelişti.

Sonuç: 6 F kılavuz kateter, femoral yol, işlem sırasında düşük doz heparin, kılıf çıkarılmasından bir saat sonra düşük molekül ağırlıklı heparin kullanılarak yapılan perkütan koroner girişim sonrasında erken mobilizasyonla gözlenen komplikasyonlar kabul edilebilir sınırlardadır.

Anahtar sözcükler: Anjiyoplasti, transluminal, perkütan koroner; koroner hastalık; erken mobilizasyon; stent; zaman faktörü.

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Myocardial revascularization via percutaneous interventions (angioplasty or stenting) has gained much popularity. Increasing number of procedures has prompted attempts to reduce costs and resulted in changes in patient management protocols. Recent trends towards early ambulation after coronary interventions may reduce in-hospital stay and increase patient comfort. However, this protocol may increase the risk for puncture site-related complications like arterial bleeding, hematoma, and pseudoaneurysm formation. Our aim in this study was to evaluate the safety of early ambulation after elective coronary stenting or angioplasty.

PATIENTS AND METHODS

A total number of 432 patients underwent elective coronary stenting or angioplasty using a 6-F sheath and catheter through the femoral artery during the study period. A standard dose of 5,000 IU heparin was given as an intra-arterial bolus after insertion of the arterial sheath and an additional dose of heparin 2,500 IU was administered if the procedure lasted for more than 60 minutes. Patients who had only balloon angioplasty were treated with aspirin 100-300 mg/day, while those who had stent implantation were also given clopidogrel 300 mg before intervention and 75 mg/day thereafter.

Ninety patients (20.8%) were excluded for the following reasons alone or in combination: acute myocardial infarction or unstable angina of class III (n=27), postprocedural heparinization or tirofiban infusion (n=24), use of oral anticoagulants (n=5), difficult arterial access (n=13), hematoma formation within two hours of procedure (n=18), emergency coronary artery bypass graft (CABG) surgery (n=7), early coronary occlusion and need for repeat angioplasty (n=6), previous surgery to iliac or femoral arteries (n=2), and compression time longer than 20 minutes (n=16). Finally, the early ambulation protocol involved 342 patients (212 males, 130 females; mean age 53±14 years).

Arterial sheath was removed immediately after percutaneous transluminal coronary angioplasty (PTCA) and/or stenting procedure in the supine position by specially trained personnel. Homeostasis was achieved by manual compression and maintained with a compressive bandage. Ambulation for 10 to 15 minutes was allowed two hours after removal of the bandage. The inguinal area was inspected for bleeding or hematoma by specially trained personnel. Patients were discharged in the following morning.

The primary end points of the study were groin bleeding, hematoma, and pseudoaneurysm. Bleeding was defined as the emerging of blood at or during ambulation, requiring further compression and additional bed rest. Hematoma was defined as a visible and/ or palpable bulge containing subcutaneous blood at the puncture site, which was not present before the groin lines were removed. Hematomas were also classified as small (<5 cm) or large (≥5 cm) according to their size. Unless the patient did not present with bleeding, delayed complications were inquired with follow-up calls a day and a week after discharge and, if present, were verified by physical examination.

RESULTS

Clinical characteristics of the patients are listed in Table 1. Direct stent implantation was performed in 222 patients, 34 patients underwent PTCA, and 86 patients had stent implantation after predilatation. The mean time to hemostasis after sheath removal was 11.9±3.4 minutes. Bleeding occurred during ambulation in seven patients and after walking in one patient and was managed by manual compression. All these patients were re-ambulated after an additional two hours of bed rest without further complications. In-hospital hematomas occurred in 18 patients immediately after the procedure or within two hours of bed rest and were included in the exclusion criteria.

Ecchymosis was the most frequent delayed complication (n=32, 9.4%). Late bleeding was observed in three patients (0.9%) within 48 hours after discharge and managed by compression and bed rest. Interestingly, these patients described bleeding at strain. New small hematomas 1 to 2 cm in diameter were observed in nine patients (2.6%) during the first week of the follow-up. A large hematoma requiring blood transfusion and surgical intervention developed in a female patient (0.3%) who was obese and had uncontrolled hypertension. No signs of pseudoaneurysm were detected after the procedures.

Table 1. Clinical characteristics of the patients*

	No.	%
Diabetes mellitus	76	22.2
Systolic blood pressure ≥180 mmHg	61	17.8
Diastolic blood pressure ≥100 mmHg	32	9.4
Body mass index >27 kg/m ²	83	24.3
Prior catheterization	36	10.5
Peripheral vascular disease	14	4.1
Procedure longer than 60 min	12	3.5

*Not all patients are listed.

DISCUSSION

Immobilization and bed rest following percutaneous coronary interventions (PCI) cause discomfort to the patient. This is a significant issue particularly for patients who recall suffering from morbidity and discomfort due to a previous PCI. Although procedural time has decreased significantly due to our fast learning curve and technological developments (6F guiding catheters, hydrophilic guide wires, flexible balloons and stents) immobilization period remains unchanged. This study shows that early ambulation after percutaneous interventions through the femoral artery via 6 French sheaths is safe in selected patients.

The incidence of puncture site complications after angioplasty varies from 1.5% to 18% depending on the definitions and the protocol applied.^[1-4] Several studies demonstrated safety of early ambulation after PCI.^[1,5] Koch et al.^[1] applied a two-hour ambulation protocol in 300 patients who underwent PCI through the femoral artery via 6 F catheters and low-dose heparin (5,000 IU). They reported bleeding during ambulation in five patients (1.7%) and hematoma formation in nine patients (3%) within 48 hours of observation. In another study, no difference was found between 2, 4 or 6 hours of bed rest after PCI with respect to vascular complications.^[5] Our results also favor early ambulation after PCI. In difficult and multiple punctures, complication rates may increase independent of compression or immobilization times. Obese patients and patients with uncontrolled hypertension have higher complication rates.

Recent reports advocated the use of very-low-dose unfractionated heparin (2,500 to 5,000 IU) in patients undergoing PCI. In a single-centre observational study of 1,375 patients receiving 5,000 IU of heparin before PCI, Koch et al.^[6] reported relatively low rates of mortality, myocardial infarction, or repeat revascularization (5.4%) at 48 hours. Similarly, Kaluski et al.^[7] reported an overall rate of 3.3% for death, myocardial infarction, and urgent revascularization with 2,500 IU of heparin before PTCA.

Sheath dwell times after angioplasty vary from 4 to 10 hours in uncomplicated patients and depend on the heparin protocol applied. Immediate sheath removal after completion of the procedure was advocated in several studies in which low-dose heparin was used.^[1,8,9] Koch et al.^[8] reported that the incidence of puncture site complications was similar (2.3% vs 2.2%) after four-hour ambulation compared with bed rest for at least 12 hours after coronary angioplasty with 6F catheters and 5,000 IU heparin.

Vlasic et al.^[5] compared 2, 4 and 6 hours of bed rest after PCI in 299 patients. Administration of abciximab in a subgroup of patients (n=43) as part of the procedure did not yield any significant difference. We accepted glycoprotein IIb/IIIa receptor antagonist (tirofiban) infusion as an exclusion criterion due to the need for prolonged hospital stay.

Reduction of bed rest may add to the patients' comfort and reduce medical costs. For this purpose, brachial^[10] or radial^[11] techniques and femoral closure devices^[12] were used. Brachial and radial approaches have not gained popularity among interventional cardiologists due to longer procedural and x-ray times and better manipulation afforded by the femoral approach. On the other hand, new vascular closure devices allow early ambulation and patient comfort, but are associated with increased medical costs. The cost of closure devices is much higher than that of manual or mechanical compression. Vascular closure devices are not subsidized by social security systems in developing countries, so the patients should pay for these devices on their own. In addition, the key target of closure devices, i.e. early ambulation of the patient, is already achieved without their use.^[1,5,8]

Our findings suggest that early ambulation after coronary interventions using a 6-F guiding catheter by the femoral route and low-dose heparin is associated with an acceptable rate of puncture site complications. Early ambulation protocol decreases hospital stay and increases patients' comfort.

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