UvA-DARE (Digital Academic Repository)

Early ambulation after coronary angioplasty and stenting with six French guiding catheters and low-dose heparin

Koch, K.T.; Piek, J.J.; de Winter, R.J.; Mulder, K.; David, G.K.; Lie, K.I.

DOI

[10.1016/S0002-9149\(97\)00609-7](https://doi.org/10.1016/S0002-9149(97)00609-7)

Publication date

1997

Published in

The American journal of cardiology

[Link to publication](#)

Citation for published version (APA):

Koch, K. T., Piek, J. J., de Winter, R. J., Mulder, K., David, G. K., & Lie, K. I. (1997). Early ambulation after coronary angioplasty and stenting with six French guiding catheters and low-dose heparin. *The American journal of cardiology*, 80, 1084-1086.
[https://doi.org/10.1016/S0002-9149\(97\)00609-7](https://doi.org/10.1016/S0002-9149(97)00609-7)

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

Early Ambulation After Coronary Angioplasty and Stenting With Six French Guiding Catheters and Low-Dose Heparin

Karel T. Koch, MD, Jan J. Piek, MD, Robbert J. de Winter, MD, Karla Mulder, George K. David, MD, and Kong I. Lie, MD

Percutaneous transluminal coronary angioplasty has become an established and widely employed technique in the treatment of coronary artery disease. The discrepancy between the increasing numbers of angioplasty procedures and hospital facilities requires alterations in patient management strategies. Early ambulation after coronary angioplasty may lead to a reduced in-hospital stay and add to patient comfort. However, it may increase the risk of puncture site complications, such as arterial bleeding, hematoma, pseudoaneurysms, and the need for surgical repair. The incidence of puncture site complications is reported to be up to 18% after interventional procedures, which is possibly related to intensity of anticoagulation and the size of the arterial sheath.¹ Early ambulation has been reported after 5Fr diagnostic cardiac catheterization and after angioplasty using hemostatic devices.² The present study evaluates the feasibility and safety of early ambulation after elective coronary angioplasty and stenting using 6Fr guiding catheters and low-dose heparin. Study end points were the occurrence of bleeding at the time of ambulation, necessitating repeat puncture site compression and the overall incidence of puncture site complications.

...

A total of 907 consecutive patients scheduled for elective coronary angioplasty were prospectively included. Angioplasty was performed with 6Fr guiding catheters using the femoral approach. Patients who underwent the procedure in the morning were ambulated after 4 hours and were compared with patients who underwent the procedure in the afternoon, who were ambulated the next morning. There were no angiographic exclusion criteria for the study. Six French guiding catheters were used in all elective procedures during the study, except for intended directional or rotational atherectomy and scheduled implantation of stent types, which required larger sized guiding catheters. Patients on oral anticoagulants or heparin treatment before the procedure were excluded as well as patients with a preexisting hematoma after a recent diagnostic angiography.

All patients were pretreated with aspirin 100 mg. A single dose of 5,000 IU of heparin was given immediately after insertion of the arterial sheath. This low-dose regimen allowed the use of an additional dose of

TABLE I Exclusion Criteria

Eligible for the study	n = 907
Death	0
Emergency coronary bypass surgery	2 (0.2%)
Repeat coronary angioplasty for out-of-lab closure	4 (0.4%)
Postprocedural heparin treatment	72 (7.9%)
Immediate sheath removal	n = 830
Early ambulation	420 (46.3%)
Late ambulation	410 (45.2%)

Values presented are number (%) of patients.

2,500 IU of heparin if a procedure lasted >90 minutes. This protocol was also applied in 165 patients (18.2%) in whom the diagnostic catheterization and angioplasty were performed in 1 session. It was left to the discretion of the attending interventional cardiologist whether to give more heparin during the procedure and/or to prolong treatment with heparin. These patients were excluded from early ambulation.

The arterial sheaths were removed immediately after completion of the procedure. Hemostasis was obtained by manual compression of the puncture site. Compression time to hemostasis and the immediate postcompression puncture site status were documented. Hemostasis was maintained with an inguinal compression bandage. The patient was ambulated after removal of the compression bandage, following 4 hours of bed rest in a supine position. The inguinal area was inspected for the recurrence of bleeding or the presence of hematoma. After discharge, the occurrence of delayed complications and the presence of late hematoma or bleeding were documented by a 48-hour follow-up phone call, and if present, verified by a physician. Puncture site complications were defined as the presence of a major groin hematoma (palpable mass >5 × 5 cm in size), any late bleeding, a pseudoaneurysm, or arteriovenous fistula (confirmed by ultrasound).

Eight hundred thirty of the 907 enrolled patients were eligible for early or late ambulation. The reasons for exclusion are shown in Table I. Continuation of heparin treatment was considered necessary in 72 patients for various reasons, including major dissection (2.2%), side branch occlusion (1.4%), suboptimal result (1.1%), angiographic appearance of thrombus (0.9%), or an unsatisfactory result after bail-out stenting (1.7%). A total of 420 patients were allocated to early ambulation; the control group, ambulated the following morning, consisted of 410 patients. The characteristics of the patients allocated to early ambulation, and the controls, are shown in Table II. Patients

From the Department of Cardiology, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands. Dr. Koch's address is: Department of Cardiology, Academic Medical Center B2, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands. Manuscript received February 13, 1997; revised manuscript received and accepted June 13, 1997.

TABLE II Patient Characteristics		
	4-Hour Ambulation (n = 420)	Late Ambulation (n = 410)
Age (yr)	60 ± 15.6	61 ± 11.0
Men	312 (74%)	295 (72%)
Height (cm)	174 ± 6.3	173 ± 5.9
Weight (kg)	81 ± 9.3	79 ± 8.1
Family history of coronary artery disease	189 (44%)	176 (43%)
Cigarette smoking	180 (43%)	164 (40%)
Systemic hypertension	172 (41%)	172 (42%)
Diabetes mellitus	55 (13%)	57 (14%)
Hypercholesterolemia	231 (55%)	217 (53%)
Single-vessel coronary disease	215 (51.2%)	207 (50.5%)
Multivessel coronary disease	205 (48.8%)	203 (49.5%)
Previous myocardial infarction	205 (49.2%)	208 (50.9%)
<3 months	61 (14.5%)	70 (15.1%)
Previous coronary angioplasty	94 (22.4%)	97 (23.6%)
Previous coronary bypass	26 (6.2%)	25 (6.2%)
Procedural data and angioplasty artery		
Coronary narrowings/ procedure	715/420 (1.7)	698/410 (1.7)
Right	210 (29.3%)	229 (32.8%)
Left anterior descending	328 (45.8%)	290 (41.6%)
Left circumflex	160 (22.5%)	165 (23.8%)
Left main	1 (0.1%)	1 (0.1%)
Saphenous vein graft	16 (2.3%)	13 (1.7%)
ACC/AHA		
Type A	27 (3.7%)	23 (3.3%)
Type B1	251 (35.1%)	236 (33.8%)
Type B2	275 (38.6%)	274 (39.2%)
Type C	162 (22.6%)	165 (23.7%)
Stent implantation	67 (15.9%)	61 (14.7%)
Procedural time (min)	88 ± 39.6	91 ± 42.9
mean ± SD		
Time to hemostasis (min)	9.6 ± 2.5	9.9 ± 2.9
mean ± SD		
Values presented are mean value ± SD or number (%) of patients. ACC/AHA = American College Cardiology/American Heart Association.		

TABLE III Puncture Site Complications		
	4-Hour Ambulation	Late Ambulation
No. of patients	420	410
Bleeding before ambulation	1	1
Bleeding at ambulation	3	0
Late bleeding (<48 hours)	1	1
Hematoma >5 cm	4	5
Arteriovenous fistula	0	1
False aneurysm	1	1
All	10 (2.3%)	9 (2.2%)
Values presented are number (%) of patients.		

who underwent stent implantation were treated with ticlopidin 250 mg and aspirin 100 mg/day.

The overall incidence of puncture site complications in the 2 patient groups was not significantly different (Table III). Ambulation after 4 hours was successful in all but 5 patients. It was cancelled in 1 patient for repeat bleeding during the 4 hours of bed

rest and in another because of a hematoma >5 cm after removal of the compression bandage. In the remaining 3 patients bleeding occurred at the time of ambulation. During 48-hour follow-up, 1 patient with late bleeding, 1 patient with false aneurysm, and 3 hematomas >5 cm were documented after an initially uncomplicated 4-hour ambulation. All complications were treated conservatively without further sequelae.

...

The present study demonstrates that early ambulation after elective coronary angioplasty with 6Fr guiding catheters and low-dose heparin is safe with a low incidence of puncture site complications. To our knowledge this is the first study on such an approach. In a previous study,³ we demonstrated, prospectively, in 1,375 patients that the routine use of 5,000 IU of heparin in elective coronary angioplasty is safe without an increased risk of ischemic complications. In that study, the Activated Clotting Time levels were 259 ± 60 seconds 15 minutes after bolus injection, and 240 ± 41 and 212 ± 60 seconds after 30 and 60 minutes, respectively. Recently, a randomized comparison between 5,000 and 20,000 IU of heparin in a small cohort of patients demonstrated comparable ischemic complication rates at the expense of an increase in puncture site complications with a high dose of heparin.⁴

The reported sheath dwell times in published reports after angioplasty vary from 4 to 10 hours in uncomplicated cases, and depend on the institutional heparinization protocol,^{1,5} whereas strict bed rest for at least 6 to 8 hours is maintained in the majority of angioplasty patients after hemostasis by manual compression.^{1,4,5} Consequently, the protocol applied in the present study may potentially reduce the hospital admission time.

The reported incidence of puncture site complications after angioplasty varies from 1.5% to 18%, depending on the definitions used and the diagnostic protocol; the occurrence has been associated with sheath size, the level of anticoagulation, and the sheath dwell time.¹ In the patient group allocated to early ambulation there was a 2.3% overall incidence of puncture site complications using a 6Fr sheath, low-dose heparin, and immediate sheath removal. The results demonstrate that 4-hour ambulation does not induce an excess in puncture site complications in comparison with a matched control group.

Our study group can be considered a selected population because patients on oral anticoagulants and pre- and postprocedural heparin therapy were excluded; they are probably at higher risk for puncture site complications. However, this represents an elective angioplasty population that is potentially eligible for outpatient percutaneous transluminal coronary angioplasty. The present protocol constitutes an alternative for outpatient balloon angioplasty and/or stenting by the radial approach.⁶

In conclusion, early ambulation 4 hours after elective coronary angioplasty with the use of 6Fr guiding catheters by the femoral route and low-

dose heparin is feasible and safe with a low incidence of puncture site complications and may facilitate a shorter hospital stay.

Acknowledgment: We gratefully acknowledge the technical and nursing staff of our Cardiac Catheterization Laboratory (Peter Belgraver, RN, Chief) for their skilled assistance.

1. Popma JJ, Satler LF, Pichard AD, Kent KM, Cambell A, Chuang YC, Clark C, Merrett AJ, Bucher TA, Leon MB. Vascular complications after balloon and new device angioplasty. *Circulation* 1993;88:1569-1578.

2. Kern MJ, Cohen M, Talley JD, Litvack F, Serota H, Aguirre F, Deligonul U, Bashore TM. Early ambulation after 5 french diagnostic cardiac catheterization: results of a multicenter trial. *J Am Coll Cardiol* 1990;15:1475-1583.

3. Koch KT, Piek JJ, de Winter RJ, David GK, Mulder K, Tijssen JPG, Lei KI. Safety of low-dose heparin in elective coronary angioplasty. *Heart* 1997;77:517-522.

4. Vainer J, Fleisch M, Gunnes P, Ramamurthy S, Garachemani A, Kaufmann UP, Meyer BJ, Lüscher TF, Meier B. Low-dose heparin for routine coronary angioplasty and stenting. *Am J Cardiol* 1996;78:964-966.

5. Friedman H, Cragg DR, Glazier SM, Vellappillil G, Masalese DL, Schreiber TL, O'Neill WW. Randomized prospective evaluation of prolonged versus abbreviated intravenous heparin therapy after coronary angioplasty. *J Am Coll Cardiol* 1994;24:1214-1219.

6. Kiemeneij F, Laarman GJ, Slagboom T, van der Wicken R. Outpatient coronary stent implantation. *J Am Coll Cardiol* 1997;29:323-327.

Repeat Coronary Angiography in Patients With Chest Pain and Previously Normal Coronary Angiogram

William R. Pitts, MD, Richard A. Lange, MD, Joaquin E. Cigarroa, MD, and L. David Hillis, MD

Of the one million Americans who undergo coronary angiography each year, about 1/3 have angiographically normal or only minimally diseased coronary arteries.¹ Although subjects with angiographically normal coronary arteries have excellent long-term survival,^{2,3} many continue to have chest pain, and some are disabled by their symptoms.⁴ These patients often undergo extensive evaluation in search of an etiology of their chest pain and some eventually have repeat coronary angiography. In subjects with known epicardial coronary artery disease, repeat coronary angiography demonstrates clinically significant progression of atherosclerosis in 1/4 to 1/3 of patients each year,^{5,6} but it is unknown if such disease progression is likely to occur in subjects in whom a previous angiogram showed normal coronary arteries. Accordingly, in patients with a previously normal coronary angiogram undergoing repeat angiography, we sought to determine the likelihood of the development of significant coronary artery disease.

...

We reviewed the records of all 10,366 cardiac catheterizations performed at Parkland Memorial Hospital, Dallas, Texas, from July 1970 to March 1997. During this period, 17 patients with a previously normal coronary angiogram had repeat angiography for the evaluation of continued chest pain. The group consisted of 15 women and 2 men, aged 43 to 73 years (mean, 55) at initial angiography (Table I). All patients had coronary angiography for the evaluation of chest pain. No patient had a myocardial infarction before the first angiogram. The initial angiogram demonstrated normal epicardial coronary arteries in all 17

TABLE I Demographic Data for the 17 Subjects

Patient	Age at First Cath (yr)	Gender	Risk Factors	Time Between Caths (yr)
1	43	F	Hypertension	3.8
2	59	M	Hypertension, diabetes	4.8*
3	58	F	Diabetes	4.9†
4	48	F	—	6
5	57	F	Hypertension, diabetes	6.8
6	73	F	Tobacco, Hypertension, diabetes	7.5
7	61	F	Tobacco, hypertension	7.7
8	56	F	Hypertension, diabetes	7.8
9	48	F	—	8.3
10	52	F	Tobacco, Hypertension, diabetes	9.8
11	54	M	—	9.8
12	47	F	Hypertension	10
13	50	F	—	10.2
14	68	F	—	11
15	49	F	Diabetes	12.1
16	49	F	Hypertension	15.1
17	55	F	Hypertension	15.3
Mean	55			8.9
SD	8			3.3

*CAD: 99% LAD; clinical event: CABG.

†CAD: 99% LAD; clinical event: MI.

CABG = coronary artery bypass grafting; CAD = coronary artery disease; Cath = catheterization; LAD = left anterior descending; MI = myocardial infarction.

patients. The elapsed time between angiograms was 8.9 ± 3.3 years (mean $\pm$ SD) (Table I), during which 2 patients (patients 2 and 3) developed single-vessel coronary artery disease, 1 of whom had a myocardial infarction. Thus, 15 of the 17 subjects had no angiographically demonstrable coronary artery disease.

...

In 1966, Proudfit et al¹ reported that about 1/3 of patients referred for the evaluation of chest pain had angiographically normal coronary arteries, and more

From the Department of Internal Medicine (Cardiovascular Division), the University of Texas Southwestern Medical Center, and the Cardiac Catheterization Laboratory, Parkland Memorial Hospital, Dallas, Texas. Dr. Hillis' address is: University of Texas Southwestern Medical Center, 5323 Harry Hines Blvd. Rm CS 7.102, Dallas, Texas 75235-904. Manuscript received April 30, 1997; revised manuscript received and accepted June 13, 1997.