

# Early Ambulation Without Invasive Vascular Closure Devices

## **"Rapid Ambulation Protocol in 1,009 Diagnostic Cardiac Catheterization Procedures"**

- Ting H, Konz B, et al; Division of Cardiovascular Diseases, Mayo Clinic and Foundation

Presented at TCT2005, October, 2005;

Doyle, Konz, Lennon et al

Mayo Clinic Proceedings; December 2006; 81(12):1537-1540

In this study involving 1,009 patients, manual compression or "c-clamp" was used to apply external compression for 10-15 minutes until hemostasis is achieved. Following 60 minutes of bedrest, each patient was ambulated for 200 feet and observed for an additional 60 minutes. If stable, the patient was then discharged. All patients underwent diagnostic angiography procedures using 5 Fr femoral arterial sheaths. Median time to ambulation for the studied population was 71 minutes. 975 patients (97%) were successfully hemostased without complication. The authors conclude that rapid ambulation after diagnostic catheterization using a 5 Fr catheter and either "c-clamp" or manual compression is "safe and effective".

## **"Simple Clinical Risk Stratification and the Safety of Ambulation Two Hours After 6 French Diagnostic Heart Catheterization"**

- Rosenstein, et al

Journal of Invasive Cardiology 2004; 16(3):126-128

This study found that "most outpatients who undergo elective diagnostic catheterization may benefit from safe early ambulation". From a 98-patient population, 74 were stratified to early (1.5 - 2.0 hours) ambulation and 24 were stratified to conventional (4.0 - 5.0 hours) ambulation based on access site and hemostasis results. External compression was used on all patients. Ecchymosis was the most frequently reported complication in both segments at time of hospital discharge and at one-week follow-up. No large hematomas, retroperitoneal bleeding or blood transfusions occurred in any of the patients, indicating that many patients on whom external compression has been used and who fit clinical criteria may be safely ambulated at 1.5 - 2.0 hours.

## **"Percutaneous Coronary Intervention with Bivalirudin Anticoagulation, Immediate Sheath Removal, and Early Ambulation: A Feasibility Study with Implications for Day-Stay Procedures";**

- Ormiston J, et al;

Catheterization and Cardiovascular Interventions, 2002 (55:3; pp.289-293).

In this study of 100 consecutive percutaneous coronary intervention (PCI) patients, the authors evaluated feasibility and safety of bivalirudin bolus anticoagulation combined with immediate sheath removal and early ambulation. Post-catheterization hemostasis was achieved through manual compression, followed in some cases by use of a femoral compression device; no arteriotomy closure devices were used. The authors found that ambulation was achieved in two and one-half hours in 85% of the patients and same-day discharge in 26%. A total of three access site complications occurred, none involving vascular surgery or transfusion. The authors conclude that "In this preliminary study, the strategy of bivalirudin bolus anticoagulation, immediate sheath removal, and 2-hour ambulation after PCI appeared safe".

## **"Early Ambulation Following 6 French Diagnostic Left Heart Catheterization: A Prospective Randomized Trial";**

- Wood, Lewis, Harber et al;

Catheterization and Cardiovascular Diagnosis, 1997 (42:8-10).

This prospective, randomized trial compares two groups of patients, all of whom were catheterized using 6 French femoral artery sheaths and hemostased using either manual or mechanical compression. Patients in group 1 were ambulated at a mean time of 2.5 hours following release of femoral artery compression. Patients in group 2 were ambulated at a mean time of 4.1 hours following release of femoral artery compression. Three out of 135 patients developed hematoma in group 1 compared with five out of 188 patients in group 2. None of the patients received IV heparin and telephone follow-up occurred within 48 hours. A "c-clamp" was used on 69% of the patients in group 1 and 61% of the patients in group 2. The study concludes that "it is safe to ambulate patients 2.5 hours following 6 French diagnostic heart catheterization". The study further states that "use of a c-clamp for arterial compression does not change the risk for bleeding complications".



## Early Ambulation Without Invasive Vascular Closure Devices (continued)

### **"Reducing Bedrest Following Cardiac Catheterization";**

**- Vlastic and Almond;**

**Canadian Journal of Cardiovascular Nursing, 1999 (10:1-2).**

The study demonstrates the desirability of early ambulation of diagnostic catheterization patients at the London Health Sciences Centre in London, Ontario, Canada. The study references "a compression clamp device used on the majority of patients" in the study, on whom 5F or larger catheters were used. Their study found that "There did not appear to be any increase in vascular complications with 2 hours of bedrest following diagnostic cardiac catheterization, in the initial small group of patients. Expansion of this change in practice {early ambulation} occurred gradually to eventually include all patients undergoing diagnostic cardiac catheterization, except for those assessed at high risk for bleeding complications."

### **"Two hour ambulation after coronary angioplasty and stenting with 6F guiding catheters and low dose heparin";**

**- Koch, Piek, de Winter, et al;**

**Heart, 1999 (81:53-56)**

The study abstract concludes that "Ambulation two hours after elective balloon angioplasty or stent implantation with 6F guiding catheters by the femoral route and low dose heparin is feasible and safe, with a low incidence of puncture site complications." Of 359 consecutive eligible patients at the Academic Medical Centre in Amsterdam, 300 were included for two-hour ambulation, with hemostasis provided by manual compression. Bleeding occurred in 5 patients and hematoma in nine; these patients were treated conservatively without further complication. All patients were given aspirin and a standard dose of heparin 5000 IU; however, those patients with prolonged post-angioplasty heparinization or who received oral anticoagulants or heparin were excluded. Telephone follow-up was provided 48 hours following discharge.

### **"Early ambulation with 4F and 5F diagnostic catheterization";**

**- Letter from CardioVascular Associates, Birmingham, Alabama; June, 2000.**

"We have been successful at ambulating these patients (on whom 4F or 5F catheters have been used for diagnostic catheterization) at approximately one hour and 45 minutes post-sheath-removal, and discharging the patient to their home two hours after sheath removal. We have had few, if any, hematomas or re-bleeds at the wound site, and have observed no unusual complications as a result of ambulating patients at one hour and 45 minutes post-sheath-removal."

### **"Evaluation of 3-hour Ambulation Post Cardiac Catheterization";**

**- Mah, Smith, and Jensen;**

**Canadian Journal of Cardiovascular Nursing, 1999 (10:1-2).**

The article describes an 880-patient study conducted at the Medical Outpatient Unit at the University of Alberta Medical Center in Edmonton, Alberta, Canada. The study abstract states: "Ambulating patients 3 hours post cardiac catheterization with a 7F catheter was found to be safe, and thus has the potential to decrease hospital length of stay, as well as increase patient comfort". The study concludes "Ambulating patients 3 hours post diagnostic cardiac catheterization with a 7F catheter was not found to increase bleeding at the femoral access site, and thus has the potential to increase patient comfort, as well as decrease hospital length of stay."

### **"Early Ambulation after 5 French Diagnostic Cardiac Catheterization";**

**- Kern, Cohen, Talley, et al;**

**Journal of the American College of Cardiology, 1990 (15:1475-83).**

This study used either manual or mechanical compression and concluded that "early ambulation after large lumen 5F femoral left heart catheterization was safe, with minimal postprocedural complications and without compromising angiographic data quality". Of 287 patients on whom routine left heart catheterization was performed, 260 were ambulated at a mean time of 2.6 hours, with a range of 1.8 to 3.1 hours. Of 23 patients who had hematoma, nine had received heparin, eight received aspirin, and six received both heparin and aspirin. Telephone follow-up was provided within 24 to 72 hours. The study noted that "No patient had a cardiac event, unstable angina after discharge or other reasons for readmission within 24 to 48 hours after large lumen 5F cardiac catheterization with early ambulation."



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## Early Ambulation Without Invasive Vascular Closure Devices (continued)

**"Safety of Decreasing Bedrest After Coronary Angiography";**  
- Baum and Gantt;  
**Catheterization and Cardiovascular Diagnosis, 1996 (39:230-233).**

This study evaluated 205 patients randomized to either 2-hour or 4-hour bedrest following hemostasis after angiography. Catheter sizes ranged from 5Fr to 7Fr. The study found that "no significant difference statistically was seen between the two groups {2-hour vs. 4-hour bedrest} with respect to rebleeding or hematoma formation". Follow-up by cath lab staff was provided within 24 hours. The study suggests that "two hours of bedrest following angiography utilizing five or six French catheters is adequate to obtain hemostasis safely in the majority of patients, whereas four hours is suggested when seven French catheters are utilized".

**"Early Ambulation After Diagnostic Cardiac Catheterization: A 4 French Study";**  
- Sola, Pastore and Stein;  
**Journal of Invasive Cardiology, 2001 (13:2, pp.75-78)**

This study evaluated 100 consecutive patients undergoing elective left-heart diagnostic catheterization with 4 French catheters. Following catheterization, sheaths were removed and manual or mechanical "c-clamp" compression was applied for a target time of 15 minutes to achieve hemostasis. Following hemostasis, a bandaid was applied and the head of the bed raised to 30°. Mechanical compression (CompressAR® "c-clamp") was used in 94% of the patients, with the remainder of the patients hemostased using manual compression. Mean compression times were 16.07+3.19 minutes for mechanical compression and 18.3+5.7 minutes for manual compression. Ninety-five percent of the patients were ambulated within two hours, with a mean ambulation time of 2.18+0.71 hours; "no major vascular complications" occurred. The study concludes that "upper body elevation and early ambulation are safe as soon as hemostasis is achieved after 4 Fr cardiac catheterization".

**"Reducing Bedrest Following Arterial Puncture for Coronary Interventional Procedures - Impact on Vascular Complications: The BAC Trial";**  
- Vlastic, Almond and Massel;  
**Journal of Invasive Cardiology, 2001 (13:12, pp. 788-792)**

In this randomized, controlled single-center study, the authors evaluated 299 percutaneous coronary intervention (PCI) patients in three groups based on the amount of each patients bedrest following post-catheterization femoral hemostasis; patients were randomized to receive either two, four or six hours of bedrest. The primary endpoint was the incidence of vascular complications and any resulting interventions or surgeries. The study found no differences in vascular complications between the groups, and a compression clamp was used on all patients. An analysis of a subgroup of patients receiving abciximab found that there were no significant differences in complications between patients who received abciximab and those who did not. The study concludes: "patients undergoing femoral arterial puncture for coronary interventional procedures can ambulate safely 2 hours after hemostasis of the puncture site".

