



## Original Contributions

# Implementing ACC/AHA Guidelines for the Preoperative Management of Patients With Coronary Artery Disease Scheduled for Noncardiac Surgery: Effect on Perioperative Outcome

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*Study Objective:* To review the new consensus guidelines for cardiac testing for the patient with cardiac disease scheduled for elective, noncardiac surgery, and their impact on cardiac functional testing.

*Design:* Retrospective chart review study.

*Setting:* Tertiary care medical center.

*Patients:* 181 patients scheduled for elective, major surgery who met American College of Cardiology/American Heart Association (ACC/AHA) criteria for a preoperative stress test.

*Interventions:* A variety of tests were ordered, including treadmill stress testing, persantine-thallium imaging, dobutamine echocardiography, and exercise stress echocardiography.

*Measurements:* The numbers of and outcome of the stress tests and the cardiac outcome of the patients who underwent cardiac testing and surgery were recorded.

*Main Results :* Abnormal tests occurred in 27 patients. Two patients declined treatment, eight patients had primary medical management, and the remainder (17) had cardiac catheterization. Results included no lesion (2 patients), angioplasty (4 patients), angioplasty plus stenting (1 patient), coronary artery bypass grafting (CABG) (4 patients), and delineated lesions treated with medical optimization (6 patients). One patient had CABG and declined further surgery. One patient had myocardial infarction 6 months after surgery that was treated by medical management after cardiac catheterization. The other 23 patients had surgery without cardiac complication within 1 year of surgery. Only 15% (27/180) of the patients with indications for a stress test had a positive result. Even fewer patients had any alteration of the perioperative period. Despite this finding, cardiac morbidity was very low.

*Conclusions:* The guidelines for stress test may be over-sensitive, and further prospective clinical studies are indicated. © 2002 by Elsevier Science Inc.

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## Introduction

Coronary artery disease (CAD) is the most common serious disease in elective surgical patients, and is the cause of the most serious consequences and highest costs during the perioperative period.<sup>1</sup> Because the population at highest risk is increasing in number,<sup>2</sup> the problem is increasing in significance for preparation of patients for surgery.

To address this issue, a consensus group of internists, cardiologists, surgeons, and anesthesiologists were assembled to evaluate this issue in a multidisciplinary manner. The result was a consensus management protocol that was designed to guide preoperative cardiac evaluation in patients with known or suspected CAD, who are scheduled for elective, noncardiac surgery.<sup>3</sup>

Because our practice involves a large number of patients with coexisting diseases who are scheduled for elective surgery, we designed a unique system of preoperative assessment using a computerized health-screening tool, a dedicated internal medicine clinic focused on perioperative medicine, and a preanesthesia testing clinic designed to integrate all components.<sup>4</sup> Because of the multidisciplinary nature of the American College of Cardiology/American Heart Association (ACC/AHA) guidelines,<sup>5</sup> we decided to fully implement the guidelines in our practice. The result has been a standardized approach to determining the indication for functional cardiac studies for patients with known CAD for elective, noncardiac surgery. With this approach, approximately 2% of our patients require cardiac stress testing.

Because this protocol represents a significant change in our approach to patient management, we felt it was important to systematically review the consequences of the change. We report the results of 181 consecutive patients with known or suspected CAD, scheduled for elective noncardiac surgery, who were managed using these practice guidelines, and we speculate on the significance of the results.

## Materials and Methods

Data collection was based on chart review. Institutional guidelines for review of patient care were satisfied. Between January 1, 1997 and June 30, 1998, 9,500 Cleveland Clinic patients were evaluated. Of those, 181 patients were determined to have indications for a functional cardiac assessment using ACC/AHA guidelines. The proposed surgery included major vascular, reconstructive orthopedics of the lower extremity, craniotomy, radical neck dissections, major abdominal, or major urologic oncology procedures. Based on the guidelines, the tests selected included dobutamine stress echocardiography (44%), persantine thallium (PET) imaging (38%), exercise stress thallium imaging (13%), and exercise stress echocardiography (5%), chosen at the preference of the evaluating

internist. For all of these patients, postoperative evaluation was performed with serial electrocardiography (ECG) and cardiac isoenzymes.

## Results

Of the 181 patients tested, signs of active ischemia were identified by test criteria in 27 patients. The results were disclosed to all of the patients. Two patients declined further treatment at our institution. Of the remaining patients, eight were evaluated by a cardiologist and were managed medically. The remaining 17 patients had cardiac catheterization. Management was based on the preference of the interventional cardiologist. In the catheterization group, four patients had angioplasty, one had angioplasty plus coronary artery stenting, four had coronary artery bypass grafting (CABG), six had coronary artery lesions treated with medical management, and two patients had no lesion identified. One orthopedic surgery was delayed to perform CABG, and not rescheduled.

Immediate postoperative electrocardiographic analysis and cardiac isoenzymes were evaluated in all patients, and no abnormalities were detected. One-year follow up was obtained *via* chart review. All patients who remained in the study (25) received some form of health care in our system 1 year postoperatively. Myocardial infarction occurred in one patient 6 months after surgery, who had been treated with medical management of a lesion detected at catheterization. The remaining 23 patients had surgery within 1 year without any adverse cardiac events.

## Discussion

We were surprised that only 15% of patients who satisfied the criteria for a stress test had any abnormality. We were also surprised by the even smaller number who required intervention before surgery, especially in the context of the low rate of adverse events. Still more remarkable was the limited extent to which cardiac functional assessment changed the outcome of the care of these patients, with only 9 requiring coronary revascularization.

It cannot be inferred from these observations that there was no benefit from the application of the ACC/AHA guidelines. Because application of these guidelines involves risk assessment and optimization, the outcome of these elective surgeries may have been altered either by accurate diagnosis or by therapeutic changes in the perioperative period. When combined with surgical risk assessment, these guidelines have been shown to be both sensitive and specific in predicting cardiac adverse outcomes.<sup>5,6</sup> The collection of these data did not involve any attempt to compare these patients with any control group, but rather to observe the consequences of a systematic change in practice.

Another element that limits the ability to extrapolate from these observations is the variety of options used for management of lesions detected. The management choices are consistent with ACC/AHA guidelines, and have been reported previously.<sup>5</sup> In particular, interventional revascularization or medical optimization are both

options.<sup>7,8</sup> There is no consensus as to ways to establish the efficacy of either option at this time.

Some elements of our data are difficult to evaluate. Although we followed the guidelines, the indications for intervention can be driven by coexisting medical diseases, or by the severity of the proposed surgery. This information was not available for our review. Surgical severity is less sensitive<sup>5</sup> and clinical predictors are invariably more sensitive.<sup>9</sup> We also cannot control for the influence of the patient, although advancing age certainly increases the risk of events<sup>2</sup> and combinations of low and intermediate risk<sup>10</sup> factors can be an indication for testing by the ACC/AHA guidelines. Since this approach to patient management results from a consensus guideline, it is not ethically acceptable to generate a control group that is not managed by the guidelines. A randomized study that focuses on indications for functional studies would be required.

From these data, we conclude that the sensitivity of ACC/AHA guidelines to detect manageable risk is low, and that their influence on the outcome of major elective surgery is even lower. Randomized trials are indicated to determine if other clinical features can be added to the algorithms to increase the predictive value of the testing and decrease the considerable cost of the interventional procedures.

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