

## Editorial Comment

# What Would I Want to Know If My Dad Had a Heart Attack?: Good Sense Versus Dollars And Cents\*

SAMUEL M. BUTMAN, MD, FACC

Tucson, Arizona

Evaluating the postinfarction patient before hospital discharge. If my father had a heart attack, what test or combination of tests would I want done as part of his postinfarction evaluation? Without question, I hope that he would agree to undergo coronary angiography and left ventriculography. That is easy for me to say because my father, who has never smoked and is about 80 years old, has a normal blood pressure and serum cholesterol level. Good news for him, and good news for me. However, in this issue of the *Journal*, Candell-Riera et al. (1) reasonably conclude that the most effective noninvasive strategy for the postinfarction patient is a simple exercise test and a two-dimensional echocardiogram. There have been numerous reports (2-5) on prognostication for the survivor of a myocardial infarction and various clinical, noninvasive and invasive strategies have been shown to be useful in this regard. However, invasive cardiologists still favor their (*our*) methods, those with a nuclear or echocardiographic bent use their favorites and various third party payers encourage the least costly approach. Only submaximal stress testing, which reassures the patient before hospital discharge and helps with the exercise prescription, is widely accepted and used, even though its predictive value has not been unquestioned (6). Exercise-provoked ischemia may be difficult to identify in the postinfarction patient. Results of exercise thallium-201 scintigraphy were negative in nearly 50% of the patients treated with recombinant tissue-type plasminogen activator in one recent series (7). Of concern are the characteristics of this potentially overlooked group of patients because they may be relatively young and have anatomic characteristics associated with a high risk of future events during follow-up (in that series [7], 47% had an anterior wall infarction and 39% had documented multivessel disease). The conclusions do confirm what others (7-9) have sug-

gested regarding the limited additional clinical usefulness of expensive concomitant radionuclide imaging, except in specific circumstances.

**The present study.** Four of five patients with acute myocardial infarction survive to hospital discharge and perhaps an even higher proportion will do so with the more widespread availability and use of thrombolytic therapy (10,11). With thousands of patients surviving infarction, which is frequently their initial cardiac event, it is imperative that we do not miss this opportunity to prevent future rehospitalizations, cardiac events and premature death. Event rates after acute myocardial infarction vary from series to series, but even in the study by Candell-Riera et al. (1) of "low risk" patients with a first infarction, there was a 60% complication rate in the 1st year of follow-up after hospital discharge.

The study sample reflects information from <50% of the patients with infarction seen at the investigators' hospital and these patients constituted a relatively low risk group of young patients with a first and uncomplicated infarction. Furthermore, the overwhelming majority were not treated with a thrombolytic agent. This factor alone may have important ramifications because the changing characteristics of these survivors may well change their future event rates (12). Of the study patients, 36% had multivessel disease and 27% had three-vessel disease according to the investigators' definition of a 70% reduction in lumen diameter as significant. The Veterans Administration (13) and European Co-operative (14) studies used a 50% reduction in lumen diameter as the entry criterion and improved survival was shown in those patients with multivessel disease. With use of this definition, one could expect about 45% of the patients in the study of Candell-Riera et al. (1) to have multivessel disease, and >33% to have three-vessel disease (15). Follow-up was limited to 1 year, not 5 years as in these longer trials, and continued crossover to surgical therapy should be expected, despite the inevitable need for invasive study and the occurrence of additional cardiac events in a significant number of patients.

**Clinical clues to increased risk.** General clinical clues that point to a significant increase in risk of events after myocardial infarction include a history of previous myocardial infarction, recurrent myocardial ischemia after hospitalization, congestive heart failure and the presence of complex or frequent ventricular arrhythmias (16). About 50% of all patients with infarction will have one or more of these problems. Is this not enough to suggest that the earliest possible delineation of coronary anatomy is imperative so that more definitive therapy can be addressed and planned if necessary, thereby avoiding future setbacks such as rehospitalization for angina, recurrent infarction and the associated medical costs?

Should we continue to spend money for expensive non-invasive tests aimed at selecting most, but not all, high risk patients and identifying most, but not all, low risk patients

\*Editorials published in *Journal of the American College of Cardiology* reflect the views of the authors and do not necessarily represent the views of JACC or the American College of Cardiology.

From the Section of Cardiology, Department of Internal Medicine, University of Arizona College of Medicine, Tucson, Arizona.  
Address for reprints: Samuel M. Butman, MD, Section of Cardiology, University Medical Center, 1501 North Campbell Avenue, Tucson, Arizona 85724.

not in need of more aggressive therapy? The tests used in this study were aimed at defining ventricular function and residual myocardial ischemia in the hope of identifying patients with multivessel coronary artery disease. Cardiac catheterization and coronary angiography provide definitive and immediate definitions of both variables (17).

Candell-Riera et al. (1) have shown that in the patients studied, the best and most cost-effective noninvasive strategy is an unencumbered exercise study and two-dimensional echocardiography. It seems inevitable that stress echocardiography may provide all the information in one sitting and at the same cost.

The study does provide some reassurance in that I now have a better idea of what to order for those patients in whom angiography is not "indicated" or desirable. For my father, angiography would be desirable. If he has significant (>50% reduction in luminal diameter) three-vessel or left main artery disease, he and I would want to know as soon as possible so that he could undergo surgery to maximize his longevity and functional ability (13-15).

Of course, that approach simply ignores medical costs and risk issues. I confess that I generally dismiss the latter because, as an angiographer, I do not think it is a significant problem relative to its clinical usefulness in a high volume laboratory. Cost, on the other hand, is an important and increasingly relevant problem. My father lives in Canada and although he would not have to pay, his access to this invasive approach would be limited by design in the government's attempt to control health care costs. That is reality.

**Implications.** We do need a uniform and cost-effective strategy that ideally can be applied to all survivors of myocardial infarction. The choices to consider are either to continue to search for the ideal noninvasive strategy, knowing that easily >50% will cross over to an invasive study, or to lower the cost of the initially more expensive strategy. In a more contemporary trial, in its use of thrombolysis, only 4 of 10 patients receiving "conservative" therapy in the Thrombolysis in Myocardial Infarction (TIMI) II trial (18) did not require invasive study in the 1st year after infarction despite a program of routine follow-up exercise testing. Recurrent symptoms with or without rehospitalization were by far the most common reason cited. Can this inevitable need for angiography in the majority be avoided by better patient selection and algorithms? The most expensive strategy may actually be to perform noninvasive tests on all patients and invasive procedures on some, knowing that during follow-up many more will require angiography and that there will be inevitable rehospitalizations before definitive and often predictable therapy has been performed. In a cost analysis of a subgroup of patients enrolled in the National Cooperative Study Group of Unstable Angina (19), the cost for patients who initially received medical therapy and who later underwent surgery was more than twice that for those initially treated surgically. This finding was very important because nearly 50% of those initially randomized

to medical therapy underwent surgery within a relatively short period.

The noninvasive approach described by Candell-Riera et al. (1) should be reserved for patients who do not have any clinical suggestion of intermediate or high risk in the coming months or years, as well as those patients in whom further intervention is undesirable or carries higher risk. The rest should be considered for angiography.

Dad, if you have a heart attack, I do not want you to have another one and I do not want you to die if I can help it. Today, the best way to help you live long and well is to identify the best medical or surgical approach as soon as possible. Angiography does that.

## References

1. Candell-Riera J, Permyer-Miralda G, Castell J, et al. Uncomplicated first myocardial infarction: strategy for comprehensive prognostic studies. *J Am Coll Cardiol* 1991;18:1207-19.
2. Gilpin E, Ricou F, Dittirich H, Nicod P, Henning H, Ross J Jr. Factors associated with recurrent myocardial infarction within one year after myocardial infarction. *Am Heart J* 1991;121:457-65.
3. Sanz G, Castaner A, Berru A, et al. Determinants of prognosis in survivors of myocardial infarction: a prospective clinical angiographic study. *N Engl J Med* 1982;306:1065-70.
4. Gibson RS, Watson DD, Craddock GB, et al. Prediction of cardiac events after uncomplicated myocardial infarction: a prospective study comparing pre-discharge exercise thallium-201 scintigraphy and coronary angiography. *Circulation* 1983;68:321-36.
5. Gilpin E, Ricou F, Dittirich H, Nicod P, Henning H, Ross J Jr. Factors associated with recurrent myocardial infarction within one year after acute myocardial infarction. *Am Heart J* 1991;121:457-65.
6. Froelicher VF, Perdue ST, Atwood JE, Des Pois P, Sivaraman ES. Exercise testing of patients recovering from myocardial infarction. *Curr Probl Cardiol* 1986;11:389-409.
7. Sutton JM, Topol EJ. Significance of a negative exercise thallium test in the presence of a critical residual stenosis after thrombolysis for acute myocardial infarction. *Circulation* 1991;83:1278-86.
8. Abraham RD, Freedman SB, Dunn RF, et al. Prediction of multivessel coronary artery disease and prognosis early after acute myocardial infarction by exercise electrocardiography and thallium-201 myocardial perfusion scintigraphy. *Am J Cardiol* 1986;58:423-7.
9. Van Der Wall EA, van Eenige MJ, Vissers FC, Scholtackers AG, Ross JP. Thallium-201 exercise testing in patients 6-8 weeks after myocardial infarction: limited value for the detection of multivessel disease. *Eur Heart J* 1985;6:29-36.
10. Moss AJ. Prognosis after myocardial infarction. *Am J Cardiol* 1983;52:667-9.
11. Gruppo Italiano per lo Studio della Streptochinasi nell'Infarto Miocardico. GISSI-2: a factorial randomised trial of alteplase versus streptokinase and heparin versus no heparin among 12,490 patients with acute myocardial infarction. *Lancet* 1990;336:65-70.
12. Lavie CJ, Gibbons RJ, Zinsmeister AR, Gersh BJ. Interpreting results of exercise studies after acute myocardial infarction altered by thrombolytic therapy, coronary angioplasty or bypass. *Am J Cardiol* 1991;67:116-20.
13. Takaro T, Hultgren HN, Detre KM, Peduzzi P. The Veterans Administration cooperative study of stable angina: current status. *Circulation* 1982;65(suppl 1):II-60-7.
14. European Cooperative Surgery Study Group. Prospective randomized study of coronary artery bypass surgery in stable angina pectoris. *Lancet* 1980;1:491-5.
15. Muller, DWM, Topol EJ, Ellis SG, et al. Multivessel coronary artery disease: a key predictor of short-term prognosis after reperfusion therapy for acute myocardial infarction. *Am Heart J* 1991;121:1042-9.
16. Dwyer EM, McMaster P, Greenberg H and the Multicenter Post-Infarction Research Group. Nonfatal cardiac events and recurrent infarction

- tion in the year after acute myocardial infarction. *J Am Coll Cardiol* 1984;4:695-702.
17. Kulick DL, Rahimtoola SH. Risk stratification in survivors of acute myocardial infarction. Routine cardiac catheterization and angiography is a reasonable approach in most patients. *Am Heart J* 1991;121:641-56.
18. Roger WJ, Babb JD, Baim DG, et al. Selective versus routine pre-discharge coronary arteriography after therapy with recombinant tissue-type plasminogen activator, heparin and aspirin for acute myocardial infarction. *J Am Coll Cardiol* 1991;17:1007-16.
19. Charles ED, Kronenfeld JJ, Wayne JB, et al. Unstable angina pectoris: a comparison of the costs of medical and surgical treatment. *Am J Cardiol* 1979;44:112-7.