Acute myocardial infarction in Canada: improvement with time

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Apatient hospitalized with acute myocardial infarction (AMI) in the year 2000 has a markedly improved chance of survival than would have been possible 10 or even 5 years ago. A study by Louise Pilote and colleagues[1] in this issue (page 31) is important because it documents this improvement on a population basis. Whereas most clinical studies of treatment outcomes of AMI have been based on selected patient samples,[2–6] the Pilote retrospective study reviewed the cases of all patients in a Quebec government database who had an AMI between 1988 and 1995. All-cause 1-year mortality dropped from 23% in 1988 to 19% in 1994; inhospital mortality declined from 14% to 11% and 30-day mortality from 15% to 12%. This decline in mortality parallels other published reports on AMI patients involved in large multicentre clinical trials.[2–6] Knowing that this improvement has occurred and is likely true, it is important to try to understand what specific changes in management are responsible.

Using the Med-Echo and the Régie de l'Assurance Maladie du Québec databases for hospitalization and procedures and information on prescriptions Pilote and colleagues report an increase in the prescription of drugs known to improve outcome in patients after an AMI. The use of β-blockers after AMI increased from 33% in 1991 to 50% in 1995. Angiotensin-converting enzyme inhibitor use increased from 33% in 1991 to 41% in 1995. These changes are similar to other published reports.[7,8] Although we must be cautious in interpreting the trends reported in this study because the authors described drug use for a only portion of the patients studied, similar patterns of use were likely occurring in the remaining patients and at least some of the improvement reported was likely due to the use of drugs known to improve survival.

The study also reported that the 1-year rate of cardiac catheterization increased from 28% in 1988 to 31% in 1994, coronary angioplasty almost doubled (from 8% in 1998 to 15% in 1994) and coronary bypass surgery increased from 6% to 8%. Unfortunately, the authors did not have data on inhospital drug use. Especially pertinent is the temporal use of thrombolytic agents — these agents have been used increasingly,[3,5] and may have been a factor in the outcomes reported by Pilote and colleagues.

In general, the ubiquitous trend of lower mortality risk in AMI patients may be explained, in part, by the increased use of β-blockers,[7] angiotensin-converting enzyme inhibitors[8] and statin medications.[9] Although more physicians are prescribing β-blockers after AMI it is estimated that only 50% of eligible patients receive them;[7] 50% of the patients surveyed by Pilote and colleagues did not receive β-blockers during the year following their infarction. In addition, angiotensin-converting enzyme inhibitors, initially recommended only for patients with heart failure, have been shown to be of benefit to patients without left ventricular dysfunction who are considered at risk for cardiovascular events;[2,11] 59% of the AMI patients from Quebec did not receive angiotensin-converting enzyme inhibitors. With increased use of β-blockers and angiotensin-converting enzyme inhibitors post-AMI there may be further reductions in all-cause mortality. In addition to the established recommendation[12] to treat elevated lipids in patients with AMI, there is evidence that the treatment of borderline lipid abnormalities may reduce the risk of recurrent coronary events.[9] Thirteen percent of patients surveyed by Pilote and colleagues received lipid-lowering agents in 1995 in the Quebec study, but there is undoubtedly room for more aggressive drug utilization.

However, I believe that the increased use of thrombolytic agents and, more importantly, the increased use of angiography and revascularization procedures are the major factors associated with improved outcomes in AMI patients.[3,5,6,10] Most of the evidence for this comes from multicentre clinical trials conducted in Canada and the United States. Several papers[2,6,13,14] have used this information to compare outcomes of patients in Canada with those in the United States. Generally, the use of angioplasty and coronary bypass surgery is less frequent in Canada, but does this affect mortality?

The Global Utilization of Streptokinase and t-PA for Occluded Coronary Arteries trial (GUSTO)[3] reported that Canadian patients had lower rates of cardiac catheterization (25% v. 72%), coronary angioplasty (11% v. 29%) and coronary bypass surgery (3% v. 14%) than US patients. After adjustment for baseline prognostic factors, the US cohort had higher survival rates, less chest pain and a better quality of life than Canadian patients. Moreover, Selby and colleagues[13] reported that patients treated in the US for AMI at hospitals with higher rates of angiography had more favourable outcomes than those treated at hospitals with lower rates.

The Thrombolysis in Myocardial Ischemia (TIMI) III

registry[14] reported that Canadian patients paradoxically underwent more frequent coronary angioplasty than American patients (28% v. 22%) and experienced less mortality, infarction or recurrent ischemia (14% v. 18%) at 6 months post-AMI. These data support the hypothesis that superior outcomes correlate with increased use of revascularization procedures and are that they are not country specific.

Contrary evidence may be found in the Survival and Ventricular Enlargement (SAVE) study.[2] The SAVE study reported that 1573 post-AMI patients from the US with ejection fractions under 40% had double the coronary angiography rate of 658 Canadian patients, and there was no difference in mortality or reinfarction over 42 months. However, more Canadian patients had activity-limiting angina pectoris. Conversely, the Coumadin/Aspirin Reinfarction Study (CARS), which enrolled more patients than the SAVE study (7029 US and 1774 Canadian patients), reported a higher angiography and angioplasty rate in the US and demonstrated a reduction in all-cause mortality in the American patients.[6]

Primary coronary angioplasty may be the optimal treatment of AMI, even when compared with thrombolysis.[5,15] Primary angioplasty reduced hospital stay, recurrent ischemia, reinfarction, intracranial bleeding and mortality rates when compared with thrombolytic therapy and was associated with better clinical outcomes over 5 years.[15] However, in reality only 10% of hospitals in Canada are able to provide this sophisticated treatment for AMI.

Whether patients with AMI are in a small prairie town or a large city hospital, the following therapeutic points are important in improving their short- and long-term outcome. Time is muscle. It is important that patients and professionals promptly recognize symptoms and signs of AMI so that thrombolytic therapy can be initiated immediately.[5] Management of the patient post-AMI must include treatment with β-blockers[7,12] and angiotensin-converting enzyme inhibitors.[8,11] For the patient with elevated lipids and for borderline elevation of cholesterol or low-density lipoproteins, a statin should be prescribed.[9,12] If the patient has recurrent ischemia, is stratified as high risk or is under the age of 75 with cardiogenic shock, referral should be made to a tertiary cardiac center that has angioplasty and heart surgery options.[10,12]

With the current Canadian health care crises — nursing shortages, bed closures, budget shortfalls and emergency room overcrowding — all the above may be simply "academic" unless the patient with AMI enters our health care system *promptly*. However, if the patient with AMI receives contemporary specialized cardiology care the outcome may be as good as it gets.[6,10,14]

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