THE CCU CORNER

Revascularization in Post-STEMI Cardiogenic Shock

BY GEORGE PHILIPPIDES, M.D., AND ERIC H. AWTRY, M.D.

The Patient

A previously healthy, active 76-year-old man presents to his local hospital 3 hours into an extensive acute anterior ST-elevation MI. He is treated with intravenous fibrinolytic therapy and is admitted to the CCU 90 minutes later, "hemodynamically stable" and pain free. Over the ensuing 6 hours he becomes progressively hypotensive and oliguric. An urgent echocardiogram and right-heart catheterization confirm the diagnosis of severe left-ventricular failure and cardiogenic shock. Before he can be transferred to a percutaneous coronary intervention–capable facility, he arrests and dies.

The Problem

Cardiogenic shock occurs in approximately 7%-8% of all MIs, is the most common cause of death for patients hospitalized with acute MI, and historically is associated with a 70%-80% mortality rate.

The Data

Nonrandomized studies have suggested that reperfusion with PCI, CABG, or thrombolysis with hemodynamic support with an intra-aortic balloon pump (IABP) have been improving survival in such patients. In most of these reports it is clear that restoration of coronary blood flow correlates with in-hospital survival, regardless of how patency is achieved. Thrombolysis alone has shown modest benefit, compared with PCI. This may reflect the relatively low rate of clot lysis and rate of TIMI 3 flow achieved in hypotensive patients treated solely with fibrinolytic agents.

The SHOCK (Should We Emergently Revascularize Occluded Coronaries for Cardiogenic Shock) trial was the first multicenter, prospective study to support this "aggressive" approach. SHOCK randomized 302 patients with predominant LV failure/shock within 36 hours of MI to an early revascularization (ER) strategy (PCI or coronary artery bypass graft as soon as possible) vs. initial medical stabilization (IMS) consisting of thrombolysis unless contraindicated and delayed revascularization, if needed. IABP was strongly recommended and ultimately used in 86% of both treatment arms.

While the 30-day mortality rate for ER therapy and IMS did not differ significantly, the mortality rate at 6 and 12 months was significantly lower in the ER group (N. Engl. J. Med. 1999;341:625-34). Patients younger than 75 years benefited most, exhibiting a 15.4% absolute reduction in mortality at 30 days. Conversely, no benefit was seen in patients aged 75 years and older. However, this finding should not be used to uniformly exclude elderly patients from accessible early revascularization. First, only 56 patients over age 75 were enrolled in the SHOCK trial. Second, the mortality rate for the elderly patients in the initial medical stabilization arm was remarkably low, and the baseline characteristics of the elderly patients assigned to revascularization was remarkably unfavorable (Eur. Heart J. 2003;24:828-37).

Our Experience

At Boston Medical Center, STEMI patients with hemodynamic compromise who are candidates for PCI are preferentially transported directly from the ambulance to the cardiac catheterization lab to reduce door-to-balloon time.

We routinely offer "rescue" PCI to hemodynamically compromised patients transferred to our facility after failed thrombolysis, on the basis of results from the SHOCK trial showing that in patients who underwent emergency PCI, prior thrombolytic administration did not increase the rate of adverse events.

When cardiogenic shock is diagnosed in the catheterization lab by clinical exam and/or right heart catheterization, an IABP is placed in order to support the patient during coronary angiography and future revascularization procedures. In patients with one- or two-vessel coronary artery disease, PCI is the preferred method of revascularization as long as the culprit artery can be opened percutaneously. When left-main or three-vessel disease is encountered, the cardiothoracic surgeon joins us in the cath lab to review the case and to join us in discussing the risks and benefits of urgent bypass surgery with the patient and family. We prefer proceeding to CABG as soon as possible, directly from the cath lab when feasible.

The elderly patient presented above is particularly challenging. We feel it is reasonable to offer invasive therapy to elderly patients who have been active, with a good functional status, strong family support, and few comorbidites who understand the risks and benefits of an aggressive revascularizaton strategy.

The Future

The risk of developing and dying from cardiogenic shock post MI increases with age. Considering that most episodes of cardiogenic shock become clinically apparent after admission to the CCU, and that fewer than 20% of U.S. hospitals have revascularization facilities, it is crucial that future CCU physicians are well trained in recognizing, treating, and triaging these critically ill patients.

Boston Medical Center is a member of the Emergency Medical Services Point of Entry Program in Boston, a coalition of hospitals working to develop a regional system of evidence-based care for STEMI patients in the greater Boston area.

We believe that the continued development and widespread adoption of these regional systems, which aim to increase the number of STEMI patients with timely access to PCI facilities, represent the greatest chance for improving outcomes in STEMI patients with cardiogenic shock.

Recommendations

On the basis of the results from the SHOCK trial and recent nonrandomized studies of combination fibrinolysis and IABP therapy, the American Heart Association and the American College of Cardiology advocate the following approach to patients in cardiogenic shock soon after STEMI:

- ► Emergent transfer to a tertiary care hospital with revascularization facilities for patients who present with or who develop cardiogenic shock within 36 hours of MI.
- ► Early revascularization by either PCI or CABG is strongly recommended for patients younger than age 75 who develop shock within 36 hours of MI, when revascularization can be performed within 18 hours of cardiogenic shock.
- ► Early revascularization should be performed in selected patients over the age of 75 years—namely those with good prior functional status and few comorbidities who are committed to an aggressive invasive approach.
- ► Intra-aortic balloon counterpulsation should be performed when cardiogenic shock is not reversed in a timely fashion with pressors and before interhospital transport, to help stabilize the patient.
- ► Fibrinolytic therapy and IABCP should be initiated in patients who are unsuitable for invasive care and when delays in transport and intervention are expected.

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Elevated Cystatin C Is Harbinger of Adverse Events in ACS

BY DOUG BRUNK
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SAN DIEGO — Elevated baseline cystatin C levels in patients who present with acute coronary syndrome are strongly linked with adverse cardiovascular outcomes, results from a large study showed.

"Cystatin C has been shown to be a strong and independent predictor of cardiovascular events and overall mortality in elderly subjects, but its prognostic performance in patients with acute coronary syndrome is less well studied," reported Dr. Stacy E. Melanson on behalf of coauthor Dr. Steven D. Wiviott and researchers from the Thrombolysis In Myocardial Infarction (TIMI) Group at Brigham and Women's Hospital, Boston.

In a poster presented at the annual meeting of the American Association for Clinical Chemistry, the researchers analyzed levels of cystatin C in blood samples from 3,754 patients that were collected within 10 days of presentation with ACS. The primary end points were death, MI, and heart failure.

The researchers determined cardiovascular outcomes for each quintile of cystatin C. Cut points for cystatin C, in mg/L, were: less than 0.82 for quintile 1; 0.83-0.91 for quintile 2; 0.92-1.00 for quintile 3; 1.01-1.14 for quintile 4; and 1.15 or more for quintile 5.

Patients who had elevated cystatin C levels were more likely to have hypertension, diabetes, and a history of MI. They were also more likely to be older. Specifically, the median age of patients in quintile 5 was 68 years, while the median ages of patients in quintiles 1, 2, 3, and 4, were 52, 54, 57, and 61 years.

Between cystatin C quintiles 1 and 5, the risk of death rose from 0.7% to 4.8%; the risk of MI rose from 5.4% to 10.6%; the risk of heart failure rose from 1.0% to 8.3%; and the risk of a composite of death and heart failure rose from 1.7% to 11.6%.

After the researchers adjusted for clinical variables, they found that cystatin C levels in quintile 5 independently predicted recurrent events, compared with the levels in quintile 1. Specifically, the hazard ratios between quintile 5 and quintile 1 were 2.5 for death, 1.6 for MI, 4.2 for heart failure, and 3.1 for a composite of death and heart failure.

When other markers of hemodynamic stress were added to the model, including C-reactive protein and B-type natriuretic peptide, cystatin C remained a significant predictor of recurrent cardiovascular events.

Dr. Melanson is associate medical director of clinical chemistry at Brigham and Women's Hospital. ■