A Plethora of Prognostic Pearls

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“In acute diseases it is not quite safe to prognosticate either death or recovery.”

Hippocrates, Aphorisms, II, 19

The modern cardiologist would probably not agree with Hippocrates’ reluctance to prognosticate about the likely outcome for a patient who presents today with an acute myocardial infarction (AMI). In fact, prognostic indicators have been available for patients with AMI since the earliest days of specialized coronary care. Two of the earliest prognostic instruments were the Killip and Norris indexes, which have been available for patients with AMI since the earliest days of specialized coronary care. Two of the earliest prognostic instruments were the Killip and Norris indexes, which were derived from observations made in the first dedicated coronary care units during the 1960s.1–3 Interestingly, these 2 early prognostic indicators for AMI patients are still useful and have retained their accuracy in the late 20th and early 21st centuries.3–6

The Norris and Killip prognostic indexes for AMI patients were based on clinical signs and symptoms that correlated with the extent of post-MI left ventricular dysfunction. Since their advent, a plethora of additional prognostic indicators have been described for patients with AMI. Indeed, in an in-depth review of risk stratification in the reperfusion era of AMI therapy, Michaels and Goldschlager7 found 42 different variables that independently predicted morbidity and mortality in post-MI patients. These investigators separated prognostic AMI variables into 6 categories related to their source: clinical variables (eg, age, gender, left ventricular dysfunction, and diabetes), physical examination variables (eg, congestive heart failure, S3, and hypotension), exercise test variables (eg, duration of exercise and magnitude of ischemic ST-segment depression), ECG variables (eg, conduction defects, atrioventricular block, and ventricular tachycardia), laboratory data variables (eg, creatinine, brain natriuretic peptide, and C-reactive protein), and angiographic variables (eg, left ventricular ejection fraction and left main coronary artery disease).

Over the years, a number of investigators have combined various components of these post-MI prognostic variables into easily derived calculated indexes that are useful to the busy clinician at the bedside. Most of these calculated indexes were originally derived from computerized statistical models using data from large clinical trials, eg, Thrombolysis in Myocardial Infarction (TIMI), Gruppo Italiano per lo Studio della Sopravivenza nell’Infarto 1 Study (GISSI), Global Utilization of Streptokinase and tPA for Occluded Coronary Arteries (GUSTO), and Canadian Assessment of Myocardial Infarction (CAMI).8–19 The information garnered from each of these indexes gives rather similar prognostic results, although modest differences emerge in different patient populations.20,21 Each calculated index supplies substantial risk information concerning a specific patient or a population of individuals with AMI. The clinical utility of these indexes is seen when the calculated index assists the clinician in identifying high-risk patients who might be candidates for further investigation and/or therapeutic intervention. However, most of these prognostic indexes were derived from populations of younger AMI patients with only modest representation of elderly individuals. Unfortunately, risk scores perform less well in an elderly AMI population, and cardiologists must bear this in mind when dealing with these patients.22 It is hoped that in our current era of advancing patient age, this problem will be addressed in the near future through further investigation and creation of geriatric prognostic indexes for these older AMI patients.

The multiple indexes just described used data obtained at the time of patient admission to the coronary care unit. Few indexes focus on the prognosis of patients after modern reperfusion therapy. Therefore, clinicians will welcome the investigation in the current issue of Circulation that describes a clinically useful risk score index derived from a large cohort of ST-segment elevation AMI patients managed with primary coronary angioplasty (PCI). Buller and associates23 analyzed ECG data before and early after primary PCI performed because of ST-segment elevation AMI in nearly 5000 patients with AMI presenting within 6 hours of symptom onset and participating in the Assessment of Pexelizumab in Acute Myocardial Infarction (APEX AMI) trial.

A simple, straightforward index derived from the ECG lead with the greatest ST-segment elevation at the time of presentation was highly predictive of biomarker infarct size and 90-day prognosis for death and development of heart failure and shock. The investigators were able to identify 3 risk groups within the AMI patient population depending on the percentage resolution of ST-segment elevation compared with baseline pre-PCI values: <30% resolution, >30% but <70% resolution, and >70% resolution. The greatest difference in prognosis occurred between patients in the group with <30% resolution and those AMI patients who demonstrated resolution of >30% but <70%.

The index remained highly predictive even when it was restricted to patients with successful PCI, although the index...
was of greater utility in predicting outcomes for patients with anterior compared with inferior AMI. This was the case because of generally lower mortality in the inferior AMI patients. The authors conclude that this simple, bedside, post-PCI ECG index identifies patients who are at continuing risk for morbid and mortal events; thus, it will assist clinicians in planning further diagnostic and therapeutic strategies for these high-risk individuals. Furthermore, these investigators suggest, on the basis of their observations, that resolution of ST-segment elevation is a reflection of improved microvascular and tissue reperfusion after PCI.

A limitation of the index is that it cannot be applied to patients with ECG conduction disturbances or arrhythmias that render the ST segment difficult to interpret. Patients who died before PCI were, of course, not eligible for calculation of this postprocedural prognostic index.

In conclusion, the authors are to be commended for generating this simple and highly discriminating prognostic index that can readily be calculated at the bedside after PCI in critically ill AMI patients. The eventual clinical utility of this index in the daily care of AMI patients awaits further prospective studies.

Disclosures
None.

References

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