A Systematic Algorithm After Cardiac Arrest Is Feasible and Effective

Written by Wayne Kuznar

A systematic diagnostic and therapeutic algorithm, which includes urgent catheterization, following cardiopulmonary resuscitation is feasible and is associated with improved patient outcome. Hubertus von Korn, MD, Krankenhaus Hetzelstift, Neustadt/Weinstrasse, Germany, presented results from a prospective study assessing a systematic approach to managing patients following resuscitation.

The survival rate after cardiac resuscitation is poor at approximately 8% [Nichol G et al. *JAMA*. 2008]. Current guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death from the American College of Cardiology/American Heart Association/European Society of Cardiology recommend consideration of immediate coronary angiography in patients with postcardiac arrest for whom an acute coronary syndrome (ACS) is suspected [Zipes DP et al. *Circulation.* 2006]. A systematic diagnostic and therapeutic approach, however, has not been tested.

The systematic approach studied consists of an electrocardiogram and echocardiogram performed in the emergency room, urgent cardiac catheterization with coronary angiography and left ventricular (LV) angiography, pulmonary angiography if the cause of arrest is unknown, computed tomography of the chest and the head, predefined laboratory tests (if cause is unknown), establishment of an intra-arterial balloon pump (IABP), hypothermia, and cardiac magnetic resonance imaging (Figure 1).

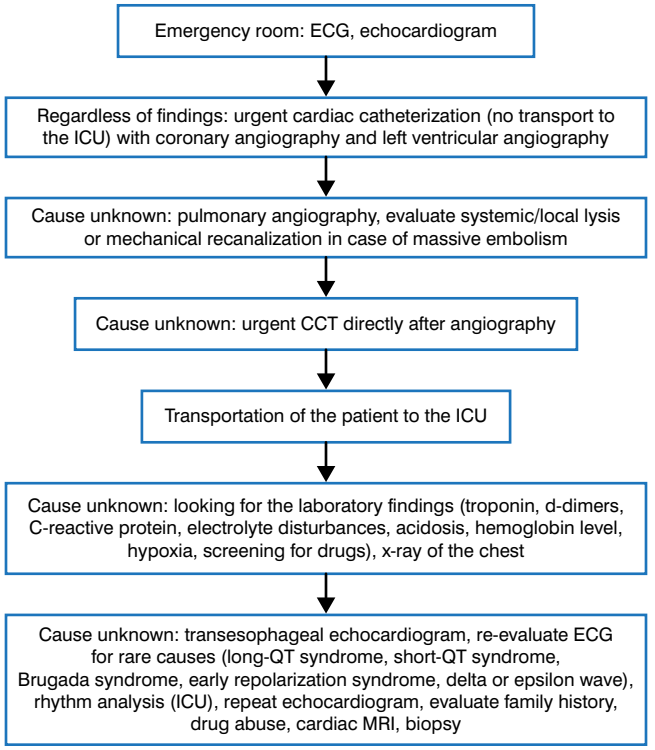
Over 5 years, 212 patients were enrolled in the protocol for the prospective study. The primary end point of the study was the Cerebral Performance Category Scale. The mean patient age was 66.7 years, men comprised 71.2% of the study population, and the mean LV ejection fraction was 42.9%. The mean time from first alert to arrival of the mobile emergency medical unit was 7.7 minutes, the mean time from first alert to time to arrival in the clinic was 50.1 minutes, and the mean time from first alert to cardiac catheterization was 76.6 minutes. The first detected rhythm was ventricular fibrillation in 99 patients (46.7%); critical bradycardia, electromechanical dissociation, or asystole in 96 (45.3%); and ventricular tachycardia in 5 (2.4%). The rhythm was not classified in 12 patients (5.7%).

Ninety percent of patients had a cardiac cause of their event (47.2% with an ACS and 42.9% with other cardiac causes). Other cardiac causes included cardiomyopathy (20.8%), lung embolism (3.8%), Tako-Tsubo cardiomyopathy (3.3%), and others (15.1%), which included coronary artery disease without non-ST or ST elevation (7.1%), and long-QT syndrome or early repolarization (2.8%). The 2 main noncardiac causes were intracerebral bleeding and sepsis. A significant coronary artery stenosis, defined as a percentage of diameter stenosis >60%, was found in 130 (61.3%) and a percutaneous coronary intervention (PCI) was performed in 101 (47.6%) of these patients.

In the intensive care unit, 20 patients (9.4%) had IABP, 55 (25.9%) underwent hypothermia, and 23 (10.9%) had an implantable cardioverter defibrillator or pacemaker implanted. The survival rate was 35.9%, and 67 patients (31.8%) had a cerebral performance category scale of 1 or 2, indicating good cerebral performance or moderate cerebral disability.

In patients treated with PCI, a significant decrease in mortality was found for patients with restoration of TIMI 2 or 3 blood flow compared with TIMI 0 or 1 flow

Figure 1. Diagnostic Algorithm Used Following Cardiopulmonary Resuscitation



CCT, coronary computed tomography; ECG, electrocardiogram; ICU, intensive care unit; MRI, magnetic resonance imaging.

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(65.4% vs 95.7%; $P < .01$). Mortality for patients treated with hypothermia was 52.7% compared with 68.2% for no hypothermia ($P = .04$). There was a trend for neurologic benefit among patients treated with hypothermia: 40% in this group had a cerebral performance category scale of 1 or 2, compared with 28.9% not treated with hypothermia ($P = .05$). Establishment of an IABP had no effect on mortality ($P = .6$), which was 70.0% in those with and 63.6% in those without an IABP established.

Copeptin May Be Useful in Quickly Ruling Out NSTEMI in Some Patients

Written by Maria Vinall

Acute myocardial infarction (AMI) carries a high risk of death, but diagnosis in patients with a pacemaker or a left bundle branch block (LBBB) is difficult through an electrocardiogram alone. While cardiac troponin (cTn) is essential in the diagnosis of AMI, it is possible that other biomarkers may improve diagnosis in patients who present early or may have other causes of troponin elevation [Klimczak A et al. *Cardiol J.* 2007]. Francisco Javier Martin-Sanchez, MD, Hospital Clínico San Carlos, Madrid, Spain, presented results of a study indicating that copeptin may be a useful biomarker to rule out NSTEMI among patients who present to the emergency department (ED) with acute chest pain but have a pacemaker and a normal troponin value at baseline.

The definition of myocardial infarction based on specific cTns has been universally accepted since 2007. A recent meta-analysis of 14 studies that assessed the incremental value of copeptin for rapid rule-out of AMI suggests that copeptin levels can identify patients at risk of all-cause mortality and that, when added to troponin, it improves the sensitivity and negative likelihood ratio for diagnosis of AMI when compared with troponin alone [Lipinski MJ et al. *Am J Cardiol.* 2014].

The multicenter cohort-based COPeptin in ED [COPED] was an observational longitudinal study designed to evaluate the usefulness of copeptin in ruling out NSTEMI in patients who present to the ED with nontraumatic chest pain suspected to be related to myocardial ischemia. Prof Martin-Sanchez provided results of a retrospective subanalysis from COPED that sought to assess the predictive capacity of copeptin to rule out NSTEMI in ED adult patients with acute ischemic chest pain and previous history of pacemaker or LBBB on an electrocardiogram. Patients were excluded if they arrived at the ED ≥ 12 hours after pain onset, had troponin levels first determined to be positive, or had STEMI and noncoronary chest pain according to the current European Society of Cardiology guidelines. Copeptin was determined in all patients upon arrival at the ED. The cutoff for a positive result was ≥ 14 pmol/L. The primary study outcome was diagnosis of NSTEMI by an emergency physician blinded to copeptin value.

Of the 2292 patients in COPED, 119 were eligible for the present study (81 with LBBB; 38 with pacemaker). More than 50% of the patients were men; most were aged ≥ 74 years. More than 80% were hypertensive; > 50% had a diagnosis of dyslipidemia. The time of the current episode ranged from 90 minutes in the pacemaker group to 120 minutes in those with LBBB. Fourteen patients (3 in the pacemaker group; 11 in the group with LBBB) were diagnosed as having NSTEMI. Of these, 11 (78.6%) were copeptin positive at baseline.

The capacity of copeptin to rule out NSTEMI was lower in patients with LBBB than in those with a pacemaker. Using a copeptin cutoff level ≥ 25 pmol/L (vs ≥ 14 pmol/L) improved the specificity, negative predictive value, and negative likelihood ratio.

While these data suggest that copeptin may play a role in excluding AMI in patients who present early after symptom onset (< 12 hours), the results will require further confirmation in setting of emerging higher-sensitivity troponin assays. In addition, the exploratory cut point of 25 pmol/L will require verification in other data sets.

Precipitants of ADHF Affect 90-Day Outcome

Written by Phil Vinall

Patients with acute decompensated heart failure (ADHF) are frequently treated in the emergency department (ED) prior to being admitted to the hospital. Òscar Miró, MD, Hospital Clínic, Barcelona, Catalonia, Spain, reported data from the PAPRICA-2 study showing that, in almost 75% of these patients, it is possible to identify ≥ 1 precipitant of the decompensation, and these factors can be used to predict mortality risk and the probability of ED readmission.

PAPRICA-2 was a retrospective study based on data from the Epidemiology of Acute Heart Failure in the Emergency Departments Registry. The study included 3535 patients (mean age, 80 years; about 58% were women) with ADHF treated in the ED and listed in the registry during 2007, 2009, and 2011 for whom a precipitating event was recorded and an outcome was available. The study end points were 90-day all-cause death and 90-day ED reconsultation for ADHF.