

THE CCU CORNER

Clinical Hypothermia for Anoxic Brain Injury After Out-of-Hospital Cardiac Arrest

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

Editor's Note



THOMAS J. RYAN, M.D.

In this issue we introduce a new column, *The CCU Corner*, that will attempt to recapture some of the excitement many of us recall from hearing about "new things" on morning rounds in the coronary care unit. Dr. Eric Awtry and Dr. George Philippides, both assistant professors and leading attendings in the CCU at Boston Medical Center, will begin the series discussing a variety of topics that represent emerging trends in the care of CCU patients entering today's up-to-date unit that is striving to remain at the cutting edge.

Thomas J. Ryan, M.D.
Professor of Medicine, Cardiology
Boston Medical Center

The Patient

In December 2002, a 19-year-old college hockey player was admitted to the Boston Medical Center Coronary Care Unit in a coma after suffering commotio cordis during a hockey game. We covered the patient with ice packs for 24 hours, cooled to a body temperature of 34° C. He walked out of the hospital with no discernible neurologic deficit. Following this experience, BMC instituted a formal clinical protocol for the use of hypothermia after out-of-hospital cardiac arrest.

The Problem

Of the estimated 400,000 people in the United States who suffer an out-of-hospital cardiac arrest each year, less than half survive to hospital discharge, and recovery without significant neurologic and cognitive deficits is rare.

The Theory

Anoxic brain injury results from severe initial cerebral ischemia and subsequent cerebral reperfusion injury. In animal models, hypothermia has been shown to improve neurologic outcomes after resuscitation. In humans, it is speculated that hypothermia decreases cerebral oxygen consumption, reduces oxygen free radical production, and lowers intracranial pressure.

Two prospective, multicenter randomized trials published in early 2002

compared mild hypothermia with normothermia in comatose survivors of out-of-hospital cardiac arrest secondary to ventricular fibrillation (*N. Engl. J. Med.* 2002;346:557-63 and 346:549-56). Both studies found that reducing the body temperature to 32-34° C for 12-24 hours (using ice packs in one study and circulating cool air in the other) resulted in significant improvement in neurologic function, and in one, the reduction in mortality was significant.

The Advanced Life Support Task Force of the International Liaison Committee on Resuscitation (ILCOR) soon recommended that unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest should be cooled to 32-34° C for 12-24 hours when the initial rhythm was ventricular fibrillation, and that such cooling may be beneficial for other rhythms or in-hospital cardiac arrest. ILCOR further recommended that hypothermia be started as soon as possible (ideally within 4-6 hours), but recognized that it may be beneficial as late as 16 hours after arrest (*Circulation* 2003;108:118-21).

Clinical Experience

We have used therapeutic hypothermia for about 30 victims of sudden cardiac death by using a percutaneous intravascular cooling catheter inserted into the inferior vena cava via the

femoral vein in a manner similar to other central venous catheters. The cooling catheter has three polyurethane bladders through which cold saline is circulated, and results in cooling of the patient through heat exchange with the blood. With this device, target temperature can usually be attained within 1-2 hours, and can be very tightly controlled (to within 0.3° C).

Because hypothermia must be initiated within 6 hours of cardiac arrest, it is important that it be considered early in the patient's course. Inserting the cooling catheter in the emergency department, or in the cath lab in patients with cardiac arrest who undergo emergency percutaneous coronary intervention, may significantly reduce the time to initiation of cooling.

We have encountered few complications of hypothermia. Mean arterial pressure should be maintained greater than 90 mm Hg to ensure adequate cerebral perfusion; low-dose vasopressors are occasionally required. Mild hypotension resulting from vasodilation frequently occurs upon passive rewarming, and usually responds to intravenous fluids or low-dose vasopressors.

Electrolytes, glucose, cardiac enzymes, and blood gas analysis should be performed every 6 hours, and a complete blood count, coagulation profile, liver function, blood urea nitrogen, creatinine, and amylase should be assessed daily. We draw blood cultures 12 hours after cooling starts as signs of infection are masked by hypothermia, and have a low threshold for initiating antibiotics in patients with evidence of aspiration. Medications are reviewed and adjusted frequently, as hypothermic patients require lower doses than their normothermic counterparts.

Conclusion

Hypothermic therapy for survivors of sudden cardiac death is safe and effective, and is relatively easy to administer. It should be considered in all patients meeting the criteria outlined, and in the future it may be applied to a broader array of patients.

The Protocol

Indications:

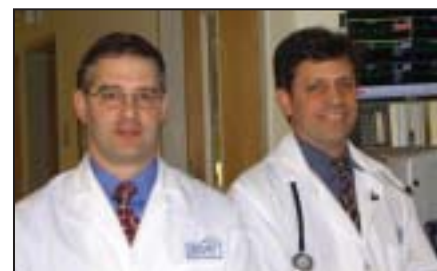
In post-ventricular tachycardia/ventricular fibrillation arrest patients when:

- ▶ Hypothermia can be initiated within 6 hours of arrest
- ▶ Estimated time interval from arrest to onset of resuscitation 5-15 minutes
- ▶ Estimated interval from arrest to restoration of circulation less than 60 minutes

Exclusion criteria include:

- ▶ Recent trauma
- ▶ Systemic infection
- ▶ Predisposition to major bleeding
- ▶ Core temperature less than 30° C on admission
- ▶ Purposeful response to verbal commands
- ▶ Hypotension

All patients receive intravenous sedation and neuromuscular blockade to prevent discomfort and shivering during the cooling and rewarming process. Since hypothermia can cause hypotension, coagulopathy, and electrolyte shifts, patient's vital signs, cardiac rhythms, urine output, and metabolic panels and blood gas measurements are monitored closely.



DR. AWTRY is assistant professor of medicine and director of education at Boston Medical Center. DR. PHILIPPIDES is assistant professor of medicine and director of the Coronary Care Unit at BMC. To respond to this column or suggest topics for consideration, write to editorial offices or e-mail us at cardnews@elsevier.com.

One-Quarter of Black MI Patients Skip Regular Checkups

BY MARY ELLEN SCHNEIDER
New York Bureau

More than two-thirds of African American patients who have suffered a myocardial infarction say the event was a "wake-up call," but a quarter of patients also report that they did not see their physician regularly after the attack, according to a survey released by the National Medical Association.

"Obviously, there's a disconnect here," said Dr. Clyde W. Yancy, medical director of the Heart and Vascular Institute at Baylor University Medical Center in Dallas.

Physicians and researchers need to bet-

ter understand this contradiction because it's an opportunity to improve outcomes among African American patients, Dr. Yancy said during a teleconference sponsored by the National Medical Association (NMA) and supported by GlaxoSmithKline.

The survey, which was commissioned by the NMA and supported by GlaxoSmithKline, was conducted online among 502 African American adults aged 18 and older who had experienced MI.

African Americans have a significantly higher risk for virtually every cardiovascular disease than their white counterparts, Dr. Yancy said. And when it comes to MI, African American men have the

highest incidence of first heart attacks, followed by white men, and closely followed by African American women.

But despite the increased risk, there is a lack of awareness, Dr. Yancy said. "Awareness needs to be elevated in a major way."

The NMA survey showed that most respondents saw their MI as a significant event, with 64% saying they felt that they had been given a second chance at life, and 46% saying that they were significantly worried about having another heart attack.

However, the survey also found that they were not taking steps to avoid another cardiac event. For example, 22% of respondents reported not taking medication

exactly as prescribed and 21% said that they do not monitor their eating habits.

The survey results also revealed that African American patients are in need of increased support in the period following a myocardial infarction. Fewer than half of respondents (47%) said they had family and friends who remind them to take their medications and 27% said they did not feel knowledgeable about how to manage their health after an attack.

Part of the problem may come down to socioeconomic factors, Dr. Yancy said. Patients may be neglecting their medications and physician visits because they lack the resources and support. ■