Journal Club Synopsis Block 12, May 2014

Discussion Leader: Bridget Nestor-Arjun, DO. Host: Timothy Janz, MD.

Topic:

In ED patients presenting in cardiac arrest, does bedside ultrasound help predict survival?

Clinical Scenario:

You are having a typical shift at the slam. You have a patient with flash pulmonary edema in bed 1. High dose nitro was initiated and the patient was placed on BiPAP, but you anticipate the patient may need to be intubated shortly. You have a septic patient in room 2 who is hypotensive with a SBP in the 60s-70s and needs a central line placed sooner rather than later. You just called a stroke alert in room 3. Right then EMS rolls into room 5 with a young appearing female patient in cardiac arrest. EMS states they were called 10-15 minutes earlier when the patient "went down" and state bystander CPR was initiated quickly, no other known history. So far the patient has received Narcan and several rounds of Epinephrine through an IO in the patient's left shoulder. The nurses place the patient on the monitor and you see electricity, but you cannot feel a pulse. The patient's family arrives and her husband, 5 year old and newborn are in the conference room, in shock and tearful, telling nursing she has been healthy until now, so far as they know. You continue CPR and give bicarb, calcium, mag, several more rounds of epi. Total resuscitation time is now around 25-30 minutes. You call for the ultrasound. Patient is still in PEA, no cardiac activity seen when you place the probe in her chest. Are you ready to call it given what you see?

Article 1: Blaivas, Michael, John Christian Fox, *Outcome in Cardiac Arrest Patients Found to Have Cardiac Standstill on the Bedside Emergency Department Echocardiogram,* **Academic Emergency Medicine**. Jun 2001;8(6):616-- 621

This article was a prospective, observational study looking at the predictive value of cardiac standstill on bedside ED echo. 169 patients were enrolled via convenience sampling. No patients with cardiac standstill achieved ROSC. Patients were excluded if cardiac arrest was from trauma or an obvious non-cardiac etiology. 20 of 33 patients (approximately 60%) with cardiac wall motion noted on bedside echo achieved ROSC. Neurologic function and survival to hospital discharge were not evaluated.

Article 2: Blyth, Lacey, et al, *Bedside Focused Echocardiography as Predictor of Survival in Cardiac Arrest Patients: a Systematic Review,* **Academic Emergency Medicine**. Oct 2012;19(10):1119--1126.

This article was a meta-analysis of 8 different studies. There was a large amount of heterogeneity as several of the studies included traumatic arrests, several did not, and they each had different endpoints. In this article 9 patients (2.4%) with standstill achieved ROSC. 5 of these patients were from 1 study which was an outlier and would most likely not be reproducible, given the results of the other 7 studies. Again, 98 patients with wall motion on ultrasound achieved ROSC (51.5% of patients w/ cardiac wall motion). This article showed that standstill is not definitive proof that ROSC cannot be achieved with standstill, but showed it is a strong predictor. Again, neurologic function and survival to hospital discharge were not addressed.

Article 3: Hayhurst, C, et al, *An Evolution of ECHO in Life Support (ELS): is it feasible? What Does it Add?* **Emergency Medicine Journal.** 2011; 28:119-121.

The 3rd article we reviewed did not discuss use of bedside ECHO for use in termination of CPR, but instead discussed what information it could provide in this setting. This study used bedside ECHO during pulse checks in ALS protocols to look for wall motion and potentially reversible causes, especially in PEA. Several interventions were performed after bedside ECHO including fluid/pressor administration, pericardiocentesis and thrombolysis. Ventricular wall motion on ultrasound during cardiac arrest had a PPV of 55% for ROSC. 4 patients with VWM survived to hospital discharge, though neurologic function was not discussed. One patient lacking ventricular wall motion was admitted to the hospital after ROSC but did not survive to hospital discharge. Again, lack of cardiac motion on ultrasound was not definitive, but was a strong predictor of poor outcome.

Bottom line:

Everyone who attended journal club was surveyed and 100% of WSU residents and faculty who responded use ultrasound during cardiac arrest. 80% of us use ultrasound to help determine whether or not to terminate resuscitative efforts. The articles we reviewed showed a strong correlation between lack of ventricular wall motion on ultrasound and poor outcome, though it is not definitive. Running a code in the ED takes a lot of time, resources and emotional turmoil on the physician, staff, and patient's family. We will have to face tough decisions about how long to run a code and the appropriate time to pronounce the patient, especially if you have multiple critical patients in a single coverage ED. When using ultrasound, we may see motion which greatly affects the patient's chance of ROSC in the ED and may change to course of care (especially if the patient is in PEA). However, no studies were able to show that patients with ventricular wall motion on ultrasound have a better neurologic outcome or even if they survive to hospital discharge. The REASON 1 trial is scheduled to finish in December 2014 and is looking at this issue. After reviewing the Hayhurst article, I will probably start using bedside ECHO earlier in a code to look for potentially reversible causes. Given the predictive value of cardiac standstill on bedside ECHO in all 3 articles, it is a useful adjunct. In the end, however what is most important is not necessarily what we see on the screen, it is the entire clinical picture of the patient before us.