DOGMA DETECTIVES CASE #09-09-13-01: TO BE BLUNT, SHOULD I WORK THIS ARREST?

A patient presents in blunt trauma arrest. There are no obvious signs of death (decapitation, rigor mortis, lividity). It is not an MCI scenario -- this is your only patient. Should you attempt resuscitation? Does this patient have any chance of survival?

Traditional teaching is that patients that are in cardiac arrest at the scene of a traumatic injury have no chance of survival.

A study published in Trauma and Acute Care Surgery in 1993 reviewed the care of over 12,000 trauma patients, of which 138 were in cardiac arrest during care by EMS. 70% of these patients were blunt trauma arrests, 30% were penetrating trauma. None survived. The conclusion of the authors was, "Trauma patients who require CPR at the scene or in transport die. Infrequent organ procurement does not seem to justify the cost (primarily borne by hospitals), consumption of resources, and exposure of health care providers to occupational health hazards. The wisdom of transporting trauma victims suffering cardiopulmonary arrest at the scene or during transport must be questioned. Allocation of resources to these patients is not an insular medical issue, but a broad concern for our society, and society should decide if the 'cost of futility' is excessive."
http://journals.lww.com/jtrauma/Abstract/1993/09000/Prehospital_Traumatic_Cardiac_Arrest__the_Cost_of.22.aspx

An article published in Annals of Emergency Medicine in 1989 reviewed 67 patients in traumatic cardiac arrest, cared for by an aeromedical EMS service with active physician participation. The results and conclusion are stated as follows: "Fifty-eight patients were victims of blunt trauma, and nine sustained penetrating trauma. Forty-seven patients were transported to the base hospital; 20 were pronounced dead at the scene after resuscitation attempts were made. Six patients developed a pulse and blood pressure and were hospitalized; none survived to hospital discharge. Review of autopsy data revealed that the majority of patients had head or thoracoabdominal injuries or both that were incompatible with life. We conclude that physician intervention at the scene and rapid aeromedical transport are not likely to improve mortality after traumatic cardiac arrest."
http://www.annemergmed.com/article/S0196-0644(89)80003-4/abstract

So does the support the notion that patients in traumatic cardiac arrest have no chance of survival?

In an article published in Injury in 2006, state trauma registry data from Victoria, Australia was reviewed over a period of four years and was examined for survivors of traumatic cardiac arrest. 89 patients had traumatic cardiac arrests. "Eighty percent of these were blunt trauma victims, with a mortality rate of 97%, while penetrating trauma patients had a mortality rate of 89%. The overall mortality rate was 95%... Four patients survived to discharge, of which two were penetrating and two were blunt injuries. Hypoxia and electrical injury were probable associated causes of two cardiac arrests seen in survivors of blunt injury."
http://www.injuryjournal.com/article/PIIS002013830500464X/abstract

These findings were similar to the survival findings in an article published in Annals of Emergency Medicine in 2006. The article reviewed the experiences of the London Helicopter Emergency Medical Service, at the Royal London Hospital in the United Kingdom. A retrospective review over 10 years identified 999 patients that had traumatic cardiac arrests. 68 of these patients survived to hospital discharge. Eight underwent on scene thoracotomy by flight physicians for penetrating trauma --- which

is not a common practice in most systems. Thirty patients had hypoxic or asphyxial events that were reversed with oxygenation. Six recovered after decompression of a tension pneumothorax. Eleven appeared to have "medical" cardiac arrests that precipitated the traumatic injury. Six had isolated head injuries, six had spinal injuries, and one survived a hypovolemic cardiac arrest. Patients with reversible hypoxic events had the best chance of neurologic recovery.
http://www.annemergmed.com/article/S0196-0644(06)00412-4/abstract

So should ACLS be initiated on patients in traumatic cardiac arrest? The most recent study published on this concludes "yes." From the February 2013 edition of the Journal of Trauma and Acute Care Surgery, it reviewed 167 traumatic cardiac arrests that occurred in a Spanish EMS system over a 4 year period. Of these, nearly half had return of spontaneous circulation (49.1%) and 6.6% had complete neurologic recovery. Children had the highest rate of survival (23.1%). There was a greater chance of neurologic recovery if an ALS ambulance arrived first (ALS in this system included a physician). Quicker response times were associated with better outcomes. "Of the patients, 67.5% were in asystole, 25.9% in pulseless electrical activity (PEA), and 6.6% in VF. [Return of spontaneous circulation] was achieved in 90.9% of VFs, 60.5% of PEAs, and 40.2% of those in asystole… and [complete neurologic recovery] was achieved in 36.4% of VFs, 7% of PEAs, and 2.7% of those in asystole." Fluid resuscitation with crystalloid therapy also trended towards greater survival in the study.
http://www.ncbi.nlm.nih.gov/pubmed/23354262

So where does this leave us? Is the notion that survival is zero for patients of a pre-hospital traumatic cardiac arrest a myth or a fact? The Dogma Detectives conclusion for this case is that is a MYTH. However --- we must also be realistic about these findings. There is a very small subset of patients that may survive traumatic cardiac arrest --- not zero, but only a few percent. These tend to be patients that are young, that experience an anoxic / hypoxic or electrocution type event, or present in V-Fib as the initial rhythm. If resources allow, then resuscitative efforts should be initiated for these patients.

Most systems do not have the resources of London Helicopter EMS which has physicians performing thoracotomy in the field. However, there are sensible steps that should be taken when approaching a traumatic cardiac arrest scenario. If it is a multiple casualty incident then resources should be initially directed to the living (with the exception of a lightning strike or electrocution event --- then the patients in cardiac arrest are addressed first). Obvious signs of death (decapitation, open head injuries, massive chest trauma, rigor, lividity) preclude resuscitative efforts. Consider if a medical event preceded the traumatic one – in which case work the code like a medical code. Reverse all causes of hypoxia / anoxia. Assess the presenting rhythm --- if it is V-Fib or PEA then start ACLS resuscitation. Asystole is a judgment call based on presentation. Decompress the chest if there is a possibility of tension pneumothorax. Start fluid resuscitation if there is possibility of hypovolemia. These efforts, while a long-shot, are not futile in the right circumstances. There is adequate data from different EMS systems across the world that would support resuscitation of a subset of these patients based on clinical presentation and on-scene resources.