

Trauma MedEd

Emphasis: History

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Why History Is Important

As trauma professionals, we are exposed to some history every time we read a textbook or attend a presentation. It's commonplace to start an article, book chapter, or talk with a short history of the topic.

Sometimes, this is just fluff. It's just a way of killing time or taking up space. But if done properly, it can actually make the material more interesting. Where did the concept come from when it was new? Was it readily accepted, or was it an uphill battle? How has it evolved through the current day? Why exactly do we do things we do?

This month I'll look at some key articles from issues of the Journal of Trauma from 20-25 years ago. They deal with topics and practices that we take for granted today. It's interesting to get a glimpse of what trauma professionals were thinking about at the time, and what has happened to the concepts over the past two decades.

Trauma And Critical Care

For those of you who read the Journal of Trauma, you probably noted a major change in its cover (and website) at the beginning of 2012. Both sported a new design *and* a title change. For many years, it was just The Journal of Trauma. Then, after 20 years under the

TRAUMA CALENDAR OF EVENTS

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DATE: DECEMBER 8-11, 2015

EASTERN ASSOCIATION FOR THE SURGERY OF TRAUMA

LOCATION: JW MARRIOTT, SAN ANTONIO, TEXAS

DATE: JANUARY 12-16, 2015

editorship of John H. Davis, the name changed to The Journal of Trauma, Injury, Infection, and Critical Care in 1995. This occurred as Basil Pruitt became the new editor.

Then, after 17 years under Dr. Pruitt the Journal gained a new editor (Gene Moore) and a new title: The Journal of Trauma and Acute Care Surgery. According to the instructions to authors, the journal continues its focus on trauma, emergency surgery, and the care of critically ill patients.

These days, the relationship between trauma and surgical critical care seems self-apparent. The two truly go hand in hand, and most Level I and many Level II trauma centers in the States boast trauma surgeons who are deeply involved with and certified in surgical critical care.

But it wasn't always this way. An editorial written 23 years ago in the Journal by a group of well-known trauma surgeons at Kings County Hospital in Brooklyn lamented the controversy about the two disciplines at that time. There was substantial debate then regarding whether there was even a role for surgical critical care in the world of academic surgery.

Two major trauma organizations, EAST and AAST, stepped up and provided a home for research and education in the field. One of the intriguing questions back then was the etiology of organ failure.

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Unfortunately, the study of critically ill medical patients was not able to answer this question easily, since the exact onset of the inciting factor was not easily recognized. But in trauma, we know exactly when the physiologic insult occurs, making research projects much more productive.

January 1992 marked the beginning of a time when we stopped trying to define what separates trauma and critical care. It was the beginning of a period where trauma surgeons reasserted their commitment to total care, including critical care, and were not limited to only technical accomplishments in the operating room.

The new focus and title of the Journal recognizes that acute care surgery embodies many of the same operative and nonoperative management principles as trauma and critical care surgery. But I'm sure that we'll see a new debate brewing soon that will be very similar to what occurred 20 years ago.

Reference: Trauma versus critical care: it is time to end the debate. J Trauma 32(1):1, 1992.

Seatbelt Injuries

Seatbelt use has increased from 58% in 1994 to a high of 87% in 2013. It ranges from 69% to 98% among various states in the US. We know that seatbelt use saves lives, but trauma professionals are also aware that they can create their own injuries as well. This is a positive trade-off, because belt use prevents injuries that are difficult to treat (e.g. severe brain injury) and produces a higher number of intra-abdominal injuries that are relatively easy to treat.

The spectrum of injuries attributed to seat belt use was finally appreciated in a journal article published 20 years ago this month. The authors wanted to catalog the various injuries seen in belted and unbelted motor vehicle occupants. They reviewed data from the North Carolina Trauma Registry, one of the most sophisticated state registries at the time. Although there were over 21,000 records in the database, only 3,901 involved motor vehicle crashes and had complete data on seatbelt use.

Here are the factoids:

- **Mortality was higher** in those not wearing their seat belts (7% vs 3.2%)
- **Unbelted occupants had a much higher incidence of severe head injury** (50% vs 33%)
- Overall incidence of any abdominal injury was the same for both (14%)
- **GI tract injuries were more common in the belted group** (3.4% vs 1.8%)
- **Solid organ injury incidence was the same**

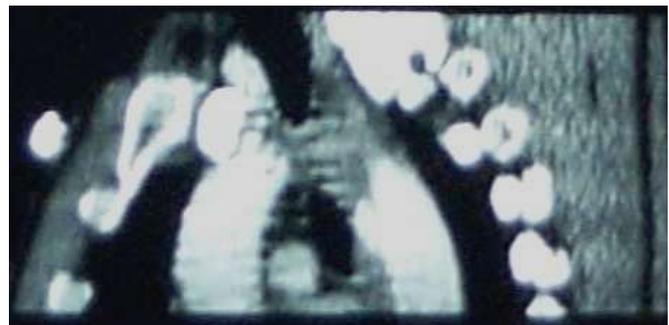
Bottom line: This study sparked the recognition that seatbelts reduce severe head injury but increase the incidence of some hollow viscus injuries. About 514 severe head injuries were prevented in exchange for 21 additional abdominal injuries that were generally easily repaired. Good tradeoff!

Reference: The spectrum of abdominal injuries associated with the use of seat belts. J Trauma 31(6):821-826, 1991.

CT Imaging Of The Thoracic Aorta

CT scan is now the standard screening test for injury to the thoracic aorta. But 20 years ago, we were still gnashing our teeth about how to detect this injury.

An interesting paper was published in the Journal of Trauma nearly 25 years ago on this topic. Over a 2 year period, the Medical College of Wisconsin at Milwaukee looked at all patients who underwent imaging for aortic injury. At the time the gold standard was aortogram. They looked at patients who underwent this study and CT, which was not very common at the time.



Furthermore, as you can see from the image above, CT resolution was not very good.

The authors studied 50 patients who underwent aortography alone and 17 who underwent both tests. Of the 17, 5 had the injury, but only three were seen on CT. There were also two false positives. Sensitivity was 83%, specificity was 23%, with 53% accuracy.

The authors concluded that any patients with strong clinical suspicion of aortic injury should proceed directly to aortogram.

Why the difference today? Scan technology and resolution has increased immensely. Also, the timing of IV contrast administration has been refined so that even subtle intimal injuries can be detected. CT scan is now so good that we have progressed from the CV surgeon requiring an aortogram before they would even consider going to the OR, to the vascular surgeon / interventional radiologist proceeding directly to the interventional suite for endograft insertion.

Reference: Computed tomography in the evaluation of the aorta in patients sustaining blunt chest trauma. J Trauma 31(2):254-256, 1991.

ED Intubation For Severe TBI

How far we have come! It's now commonplace to intubate trauma patients in the ED using rapid sequence induction followed by orotracheal tube placement. However, nearly 25 years ago we were still gnashing our teeth about safety.

In 1991, the group at UMDNJ Newark looked at 100 consecutive trauma patients with suspected head injury who were paralyzed and intubated in the ED. Half of the intubations were performed by a surgeon, the other half by an anesthesiologist. Fifty-seven patients were intubated orally and 40 nasally(!). Three required cricothyroidotomy after failure to intubate due to facial fractures.

The majority of these patients had head scans performed; 59% were positive and 15 required emergent neurosurgical procedures. No patients were found to have a neurologic deficit from the intubation even though seven were eventually found to have cervical spine injuries. Only one patient developed an aspiration pneumonia.

The authors concluded that paralysis and intubation in the ED was safe. It helped facilitate the diagnostic workup because they could control combative patients. Up to that time, the only alternative was heavy sedation, which carried its own risks.

Interesting points on how far we have advanced:

- Intubation in the ED did not used to be routine. There was a great deal of anxiety before this procedure
- Nasal intubation was still fairly commonplace
- The cricothyroidotomy rate was high
- Intubation was usually performed by a surgeon or anesthesiologist

Reference: The value of intubating and paralyzing patients with suspected head injury in the emergency department. J Trauma 31(3):371-375, 1991.

Early vs Delayed Femur Fracture Fixation

Today, we take for granted that fixing fractures early is a good thing. However, this topic was still under debate 20 years ago. Trauma care has always been prioritized, with life-threatening injuries taking precedence. It was very common for major trauma patients to undergo operation for their torso injuries, and then be deemed "too unstable" to undergo repair of their extremities.

Weigelt et al reported decreased pulmonary complications with early fixation in 1989. A study published in July 1990 looked at 121 early vs 218 late femur fixations with respect to more concrete outcomes. The patients were similar with respect to hypotension, transfusions and associated injuries.

They found that **delayed fixation increased pulmonary shunt, especially in patients with more severe injuries, and increased the incidence of pneumonia in older patients.** It also resulted in more ICU days and a significantly longer hospital stay in the more severely injured group.

This paper was a valuable addition that began to shape our appreciation for the importance of early fixation of most fractures. Major trauma makes patients sick, but **they are in the best condition they will be**

in for weeks at the time they arrive at the hospital.
 This makes it the ideal time to take care of injuries that may otherwise contribute to morbidity and mortality.

Reference: Improved outcome with femur fractures: early vs delayed fixation. J Trauma 30(7):792, 1990.

CAVR For Treatment Of Hypothermia

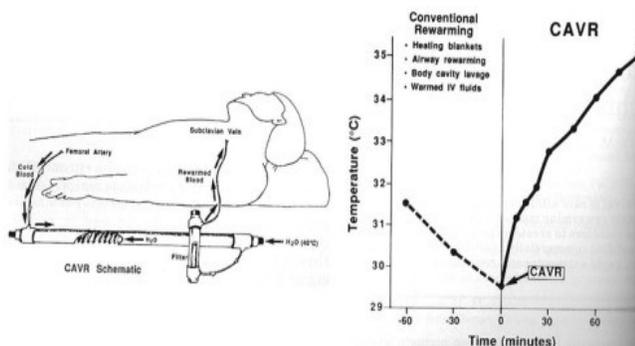
Hypothermia is the bane of major trauma resuscitation, causing mortality to skyrocket. A number of rewarming techniques have been developed over the years. These are classified as **passive** (the patient generates their own heat) or **active** (we deliver calories to them), and **noninvasive** vs **invasive**. Rewarming speed increases as we move from passive to active and from noninvasive to invasive.

Continuous arteriovenous rewarming (CAVR) is one of the invasive techniques used today. Its use in humans was first reported 24 years ago. Larry Gentilello at Harborview in Seattle had experimented with this technique in animals, and reported one case of use in a human who had crashed his car into icy water. After a 20 minute extrication, the patient was pulseless with fixed and dilated pupils, but he regained pulse and blood pressure at the hospital.

The initial core temperature was 31.5C. Peritoneal, bladder and gastric lavage were carried out for warming, as was delivery of warm inspired gas via the ventilator. However, after an hour the temperature had dropped to 29.5C. CAVR was initiated as a last-ditch effort using a jerry-rigged Rapid Fluid Warmer from Level 1 Technologies. The core temperature was raised to 35C after 85 minutes.

The patient did have typical complications (ARDS, acute renal failure), but survived with recovery of his renal and pulmonary function, and a normal neurologic exam. At the time, the authors were unsure whether the complications were due to the near-drowning or the rapid rewarming.

Reference: Continuous arteriovenous rewarming: report of a new technique for treating hypothermia. J Trauma 31(8):1151-1154, 1991.



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