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### History of Trauma Surgery

How and when in history did the most important advancements take place in trauma surgeries and how do our modern day trauma systems rate. You are listening to ReachMD XM 157, the channel for medical professionals. Welcome to the clinician's roundtable. I am your host Dr. Mark Nolan Hill, Professor of Surgery at Chicago Medical School and with me today is Dr. Donald Trunkey, Professor of Surgery and the former chair of surgery at Oregon Health and Science University. Dr. Trunkey is an internationally renowned trauma surgeon and considered the father of modern trauma systems.

#### DR. MARK NOLAN HILL:

Welcome Dr. Trunkey.

#### DR. DONALD TRUNKEY:

Thank you.

#### DR. MARK NOLAN HILL:

Today we are discussing the history of trauma surgery. Dr. Trunkey how do you define trauma care?

#### DR. DONALD TRUNKEY:

Trauma care is the care of the injured and the history of trauma systems is inextricably linked to war and the early trauma systems were basically for management of casualties in a war situation. The earliest trauma systems were developed by the Greeks. Their medicine was fairly primitive, but they had special barracks called Kliasi that the wounded were taken to and the wounds were dressed. The < \_\_\_\_ > mentions a number of injuries including one involving the heart, but (01:30) most of those patients died of course.

#### DR. MARK NOLAN HILL:

And what did the surgeons do in these cases?

**DR. DONALD TRUNKEY:**

Greek surgeons basically bandaged the wounds, they had a <\_\_\_\_> wine and the wounds were also treated with ephedrine, which was obviously one of the precursors of our ephedrine and that made the blood vessels constrict and in some ways would control some of the hemorrhage, but the Chinese had the same medicine and that probably was passed back and forth along the silk route, whoever passed it on to the other culture it is hard to say.

**DR. MARK NOLAN HILL:**

What were most of the common injuries of that time Dr. Trunkey?

**DR. DONALD TRUNKEY:**

Most of the wounds that survived were wounds of the extremities. Galland who was one of the most famous Roman surgeons took care of the gladiators at Pergamon and what is now Eastern Turkey and we know that he practiced dissection on animals and it is possible he also did the same on some of the gladiators. He did treat wounds of the lung and also observed wounds of the heart, but of course did not really know how best to control the hemorrhage.

**DR. MARK NOLAN HILL:**

Well at this time, what are major sources of trauma that we see?

**DR. DONALD TRUNKEY:**

In modern society the most common trauma we see is blunt injuries and most often particularly in the European market economies such as the United States or Canada, it would be mostly motor vehicle accidents. (03:00) I think industrial accidents would be second and almost all of these involve blunt injuries to the torso, extremities, and unfortunately the head as well. We do have violence in our cities in the United States and Latin America in particular. Violence usually involves penetrating the injuries and is really associated with drug trafficking.

**DR. MARK NOLAN HILL:**

Dr. Trunkey what are the greatest challenges of trauma care at this time?

**DR. DONALD TRUNKEY:**

The greatest challenge is the shortage of surgeons, orthopedic surgeons, neurosurgeons, and general surgeons and of course nurses. We are looking at a shortage of surgeons somewhere around 200,000 by the year 2020 and we currently have a shortage of nurses that is approaching 800,000 so just getting health care workers is very, very problematic.

**DR. MARK NOLAN HILL:**

When did trauma centers begin?

**DR. DONALD TRUNKEY:**

Trauma centers began back in 1925 in Austria. Lawrence Buhler founded the first system there, it was designed primarily for industrial accidents, but eventually involved road traffic accidents. The first 2 trauma centers in the United States were in 1966. One in Chicago that was founded by Bob Freeark and the other one in San Francisco by William Blasdel.

**DR. MARK NOLLEN HILL:**

What was the impetus to increase the number of trauma centers since that time?

**DR. DONALD TRUNKEY:**

Well, there are several features. I think the first 2 trauma centers came about for 2 reasons, (04:30) one titles 18 and 19, Medicare and Medicaid came about and so many of the public hospitals such as San Francisco General and Cook County Hospital in Chicago were basically empty and the 2 founders recognized that trauma was a major problem due to the increase of drug trafficking and also blunt trauma and they said well why don't we specialize in trauma care, care of the injured and they did so. Then following that it was a matter of time, 1976 precisely when the American College of Surgeons said as a body that we need trauma centers and trauma systems and the first statewide trauma system came about in about 1969 in the state of Maryland and that was under the administrative genius of R. A. Cowley.

**DR. MARK NOLAN HILL:**

If you have just joined us, you are listening to ReachMD XM 157, the channel for medical professionals. I am your host, Dr. Mark Nolan Hill, Professor of Surgery at the Chicago Medical School and we are speaking with Dr. Donald Trunkey, Professor of Surgery and the former chair of surgery at Oregon Health and Science University. Dr. Trunkey is an internationally renowned trauma surgeon and considered the father of modern trauma systems. Today, we are discussing the history of trauma surgery.

Dr. Trunkey, (06:00) what are some of the major milestones that have occurred in trauma surgery over the past 20 years or so?

**DR. DONALD TRUNKEY:**

Initially it was the fact that we documented that there was a major problem because of preventable death studies. Now these are fairly crude at least in the eyes of the public health people, but from a surgeon standpoint it is pretty easy to examine an autopsy and determine that the patient either got appropriate care or not and some of the preventable death rates in very large studies range from say 25% up to as much as 50%. In other words, patients arrived alive in an emergency room with a spleen injury and died without any appropriate surgical care and of course that is inappropriate. More recently with incomplete trauma systems in the United States we have been able to show a population studies that trauma centers and trauma systems reduce mortality by over 25% and in one

statewide system in Florida 50% reduction in trauma deaths.

**DR. MARK NOLAN HILL:**

Now, do these trauma center surgeons follow algorithms laid out by the American College of Surgeons and other organizations?

**DR. DONALD TRUNKEY:**

I think that they do to the sense that we have advanced trauma life support courses, which is basically the resuscitation of the trauma patient and then we also have the definitive trauma surgery course, which (07:30) gets surgeons who are inexperienced in trauma up-to-date in regards to how to approach hemorrhage in the massively injured patient. The areas that we need more research are in the management of head injuries. More recently, the studies coming out of Iraq and Afghanistan show that we are going to probably change the way we do blood banking and how we do blood administration.

**DR. MARK NOLAN HILL:**

How is that Sir?

**DR. DONALD TRUNKEY:**

We are getting very experienced with what is the ratio of packed red blood cells to plasma and we have one study that suggests that whole blood would be the very best way to resuscitate a patient. Furthermore, we have now excellent experience with factor VII in Iraq and this also helps the surgeon gain control of the bleeding.

**DR. MARK NOLAN HILL:**

Now that is very curious because if in the emergency room or even in the operating room if I would ever ask for whole blood, the blood bank would say absolutely not.

**DR. DONALD TRUNKEY:**

That's correct and unfortunately you know, the original blood banks were run by general surgeons and it was easy to get whole blood. We were able to get whole blood in San Francisco because the blood bank was run by the San Francisco Medical Society and they saved 1/3 of every day's procurement for the trauma center in San Francisco General.

**DR. MARK NOLAN HILL:**

Well, that's an interesting point. Why would whole blood as opposed to giving components of the blood when needed be superior?  
(09:00)

**DR. DONALD TRUNKEY:**

I think it is complicated, but basically the blood is fresh, it is usually less than 3 days of age and furthermore, it has all of the coagulation factors. That is factor V and VII, it has fibrinogen, it has the platelets, the things that are necessary for clotting the blood. If we use old blood, particularly packed red blood cells, that unfortunately does not contain those and so you have to add these various components. The old blood also will lyse earlier and that may contribute to what we call the systemic inflammatory response syndrome.

**DR. MARK NOLAN HILL:**

Dr. Trunkey what is the difference between a trauma center and a big hospital with a busy emergency room, are those centers equivalent?

**DR. DONALD TRUNKEY:**

No, they are not really. The trauma center has focused on providing emergency care, emergency resuscitation involving emergency physicians and general surgeons and then you have the backup of all of the specialty surgeons, neurosurgery, orthopedics, plastic, maxillofacial, urology, and they come together as a team to address the various issues. I think the most incredible difference between say a very-well established trauma center and a hospital that takes care of emergencies on an ad hoc basis would be the intensive care, that really can make a difference in the postinjury period.(10:30)

**DR. MARK NOLAN HILL:**

Now if a patient is injured and there is a hospital a mile away that's not a trauma center, but there is a trauma center lets say 10 miles away where should that patient go?

**DR. DONALD TRUNKEY:**

The patient should go to the trauma center because the team will be waiting whereas in the hospital that does not have a trauma team by the time you activate them It may be 30 to 45 minutes before they would even arrive at the hospital that can be the critical difference in some body who is bleeding to death.

**DR. MARK NOLAN HILL:**

You mentioned that head injuries are an area where we need improvement. Could you expand upon that?

**DR. DONALD TRUNKEY:**

Traumatic brain injury is turning out to be one of the big problems coming out of Iraq and it is clearly a problem in civilian trauma systems and the reason is because the brain is injured it is inside a compartment, the brain swells and this leads to further brain damage. In any patient who does not have an airway, that hypoxia is also going to compound the brain injury, the so called second hit and very honestly we just don't know how to medically control this edema in the brain. The neurosurgeons can help eventually by removing clot from the

brain, epidural, or subdural hematomas and even decompressing the cranial wall by taking off half of the skull and leaving it out, but that is very crude and what we really need is a medical way to manage that swelling or in some way alter it.

**DR. MARK NOLAN HILL:**

And finally, what other areas do you think needs improvement?(12:00)

**DR. DONALD TRUNKEY:**

Clearly rehabilitation. I think one of the big problems in American Medicine today is that we do not get enough rehabilitation for these patients. Those with amputations, traumatic brain injury, the General Accounting Office did a study and showed that only 1 in 8 patients with traumatic brain injury get appropriate rehabilitation and if we could address paraplegia and quadriplegia, possibly with stem cell research, I think that would be an incredible advance.

**DR. MARK NOLAN HILL:**

I want to thank Dr. Donald Trunkey who has been our guest. We have been discussing the history of trauma surgery.

I am Dr. Mark Nolan Hill and you have been listening to the clinician's roundtable on ReachMD XM 157, the channel for medical professionals. For comments and questions, please send your e-mail to [xm@reachmd.com](mailto:xm@reachmd.com). Thank you for listening.