23

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Dr. David H. Livingston

Dr. Moore, especially now since you have taken over editorship of the *Journal of Trauma,* your career is truly synonymous with trauma, critical care and acute care surgery. When in your career did you decide to go down this pathway?

Dr. Ernest E. Moore

I became interested in medicine as a career because of a family with many physicians, including my father, and surgery in particular largely due to the influence of an uncle who was a cardiac surgeon at UCLA. He was Blalock-trained at Hopkins, and had convinced me to pursue academic cardiac surgery. I was a medical student in Pittsburgh, but went to Vermont for surgical residency. As you can imagine, with John Davis as the chair, my interests were abruptly changed from cardiac surgery to trauma.

Livingston

So with training in Vermont with Dr. Davis at the helm, trauma was an accepted career path on its own?

Moore

Yes, although Dr. Davis was a self-trained vascular surgeon, his true passion was trauma. He was clearly a leader in academic trauma groups and introduced me to many of my long-stand-

ing heroes in trauma. I remember as a resident going to the AAST and meeting inspirational leaders like Curtis Artz, Gerry Shafton, Don Gann, Basil Pruitt, Bill Curreri, and Dave Mulder.

Livingston

So Dr. Davis was obviously a mentor during your residency. Anyone else?

Moore

I was hired at the Denver General by Dr. Ben Eiseman, who had insatiable scientific curiosity. One of his many gifts to me was a trauma research lab. Another exemplary mentor was Alden Harken who became chair at the University of Colorado in the early 1980s. Dr. Harken was a masterful surgical scientist with unending energy and enthusiasm. He melded his productive cardiac lab with our struggling trauma lab in ways that were remarkable and really synergistic. So those three individuals—Dr. Davis, Dr. Eiseman, Dr. Harken—were my trauma mentors.

Livingston

That was really the beginnings of what I think many would see as modern academic trauma care. To put it in perspective, what years were those?

Moore

I started at the Denver General in 1976. Dr. Eiseman, in his typical fashion asked, "What do you want to do?" I said, "Trauma." He said, "Okay, we'll set up a trauma service." They had never had a dedicated service like that before in Denver. He said, "What do you want this to look like?" I said, "Well, I want to do just what Don Trunkey is doing in San Francisco." So that's how it all started.

There are a number of pivotal events that occurred in the mid '70s, but it was clear in the later 1970s that everyone suddenly realized that we needed dedicated trauma centers, and most of these were in the large urban county hospitals

Livingston

Do you think that's when trauma began getting more "respect" as an appropriate career path compared to vascular and cardiac and foregut?

Moore

Yes, the respected centers I remember were Bob Freeark at Cook County, Bill Blaisdell at San Francisco General, R Adams Cowley at Shock Trauma, Carter Nance at Charity, and Lucas and Ledgerwood at Detroit General. When you went to the AAST meetings, not only were these leaders articulate and innovative, but they were friendly and encouraging.

Livingston

Besides going to Denver, what's the best career advice you ever got?

Moore

Well, besides marrying Sarah, my best career advice was probably given by Dr. Eiseman. He said, "I think I understand you better than you understand yourself and I guarantee you that you need to have basic science as an integral part of your career or you won't be happy."

I actually developed basic research interests while in college. The University of Pittsburgh had a unique program where they were attempting to cultivate interest in medicine as a career by offering regional college students summer research positions. I began working in Henry Bahnson's lab developing the intra-aortic balloon device. The next summer I worked in Ted Drapanas's lab doing liver transplants in sheep. The third summer I worked in Larry Carey's lab studying the catecholamine response to acute blood loss. I was the lab tech who spent the night with the pigs in a sling, obtaining frequent blood samples. These surgical investigators clearly thrived on this aspect of their great careers. I did some research in Vermont, but I skipped a year of residency because my chief resident was killed in Vietnam so I was scrambling to survive surgical training. I did patent a retrohepatic ballon shunt with Dave Pilcher during this time.

Livingston

You forget about the timing and chronology of your residency. That was right at the middle to end of the Vietnam War.

Moore

Exactly. In fact, I had my Berry Plan application in my pocket one day when visiting Dr. Davis for a reprimand. I was a frequent visitor to his office, about once a week, for some sort of political insensitivity. He saw the letter and asked, "What's that?" I told him and he said, "I just got back from Washington. The war is ending and they don't need you." So I tore it up.

Livingston

Did you receive any bad career advice?

Moore

No, or perhaps I conveniently forgot. I think most advice was open-ended so I don't think I ever was steered in the wrong direction.

Livingston

If you had to pick out two or three, what are you most proud of and how do you think it influenced thinking in the field of trauma and critical care?

Moore

I think that our early work in the mechanisms of multiple organ failure probably is the most enduring. We were the first to propose the concept of the two-hit model of multiple organ failure, focusing on the role of the gut in systemic neutrophil priming. While clearly the story has

become far more complex, I think the gratification in basic science is incremental, with many small individual contributions ultimately culminating in a conceptual revelation.

In the clinical arena, we made some early contributions in post-injury coagulopathy, describing the so-called "lethal triad" at the AAST in 1981. In fact, in that presentation we recommended a pre-emptive FFP to red cell ratio of 1:4, the first I am aware of. Another gratifying contribution was developing organ injury scaling. That was an interesting story—we were preparing our abstracts for the AAST with my brother John and Ernie Dunn. I was looking through the data and saying, this does not make sense. These patients are not adequately stratified by ISS.

So we developed this abdominal injury score [AIS] that night. It was about 11:30, the deadline was midnight, and I said, "I'm just going to submit this abstract in addition to our others." Well, a lesson I have learned many times subsequently: Our other abstracts that we thought were shoe-ins—one of them was primary colon repair—didn't get on the program, but the AIS did.

Alexander Walt was my discussant. He got up and was very eloquent. So he got up there and said, "This is clearly a love of labor and this boy who is a little wet behind his ears will change his mind in several years when he understands that it is all about experience." The audience all laughed and then he continued. I closed the paper by acquiescing, "Well, thank you very much, Dr. Walt. I wouldn't dare question your wisdom. I appreciate your time reading our manuscript." That was it. I almost got a standing ovation.

I also want to acknowledge my satisfaction with co-editing the textbook *Trauma* through seven editions thus far with Ken Mattox and Dave Feliciano.

Livingston

During your career, anything you thought was a good idea or championed that over time or with more data you realized that maybe it wasn't such a good idea?

Moore

I do remember being enthralled with Leon Pachter's tractotomy for liver injury concept. I probably hung on to being operatively aggressive with liver injuries a little longer than I should have.

Livingston

What do you think have been the big major advances in trauma care during your career?

Moore

I don't think there is any question that, in the early '80s, CT scanning revolutionized how we managed injured patients. We lived through an era when we used to do 10–20 DPLs a night. As the CT technology became more sophisticated, of course, they could search for more.

I think the next major advance was damage control. I'm sad that many don't recognize that it was Harlan Stone in 1983 who really came up with the idea of damage control in his

paper from Emory (*Ann Surg.* 1983 May;197(5):532-5), when I think Rich Mullins was a fellow. I think there have been more lives saved with damage control than any other concept I can recall during my career.

I just remember all those patients in the operating room for many hours with inexorable coagulopathy. As soon as we read the Stone paper in the *Annals* it changed our approach overnight.

I know that Gerry Shafton and Clarence Dennis from Brooklyn and others had been talking about damage control resuscitation in the '60s, and of course the classic Whipple was multi-staged. But I don't think as a group they ever connected the dots like Dr. Stone

LIVINGSTON

Is there anything else?

MOORE

I guess if you go back to the question of what I feel were important contributions at our institution, it would be the creation the acute care surgery concept in Denver over three decades ago. When I took over as chief of surgery I intentionally and progressively eliminated the cardiac, vascular, and transplant surgical contracts so that the "trauma surgeons" could do the acute care thoracic, vascular and hepatic procedures to enhance their trauma capabilities. Unfortunately many skeptics remain vocal at a national level. I just completed a high-risk carotid endarterectomy before this interview, one of my colleagues successfully repaired a ruptured large abdominal aortic aneurysm this weekend, and we continue to repair torn thoracic aortas with partial left heart bypass.

LIVINGSTON

What part of the career have you found the most rewarding?

MOORE

Well, I think deep down anyone would acknowledge that the best part of your career as a trauma surgeon is saving someone's life. Like many of you, every Christmas I am flooded with embarrassing gifts from patients I have managed over the last 35 years. Clearly when you go home at night and you believe you have literally saved someone's life, you never forget it. But I think our academic contributions have also been very gratifying. Our trauma research lab has been funded by the NIH for 25 consecutive years

LIVINGSTON

What's the most challenging part of the job? Well, maybe the job you just retired from?

MOORE

Yes, I was glad to give that one up. I think the most challenging thing for me today is trying to reconcile how trauma surgery has become such a second-class discipline. At the time that

I entered the field in the late 1970s, most of us went into trauma because we thought it was the greatest and most exciting field in surgery. Trauma surgeons were considered master surgeons. They were doing exciting mechanistic research. I think there was a period in the late 1980s when there were five trauma surgeons in a row who were president of SUS [Society of University Surgeons]. Everybody in the hospital respected the clinical expertise of trauma surgeons and when someone came in with a life-threatening problem or a VIP, they called the trauma surgeon.

Unfortunately that has changed, as you well know. My biggest frustration is to get us back on that track again because I think we are uniquely qualified. We're the physicians that can tolerate the stress and are available in the hospital 24 hours per day and on weekends. But it's frustrating because right now we don't have a common vision.

Livingston

What do you think the competing or disparate visions are?

Moore

There are surgeons that spend the day in the ICU running ventilators and doing percutaneous tracheostomies with some appendectomies and cholecystectomies in the middle of the night who believe they are acute care surgeons. Why would any rational individual train intensely for seven or nine years—depending on whether you do the academic track as well—to be relegated to that kind of work? We're trained as surgeons. We want to do challenging surgery. We have to recognize our limitations, clearly, but we've got to figure out how to put us back in the arena of doing complex operative procedures.

There are signs that reassure me that we are on the right track. I did a recent tour with the Florida COT and visited a number of academic trauma centers. Every one of these trauma centers in Florida has a division of acute care surgery and a number of them now have "right of first refusal." When someone comes into the ED, if they want to do the procedure and believe they are capable, it is their prerogative.

Livingston

What advice do you give your residents and junior faculty who want to do academic trauma/critical care?

Moore

First I would tell them it's phenomenally exciting. Two, I would encourage them to obtain specific training in vascular and thoracic in their fellowships. Third, I encourage them that if they're scientifically curious, basic science is a gratifying opportunity. In acute care surgery there are so many mechanisms that we simply don't understand. Additionally I predict endovascular work will become an integral part of our discipline. When we get the squeeze with Obamacare—if there is anything positive about it—I think that health care administrators are going to examine the financial realities and recognize acute care surgery as an invaluable

resource. But we must obtain the appropriate skills to be given some latitude.

Livingston

You mentioned endovascular technologies and opportunities. What other great things do you think are on the horizon for medicine or trauma care that will move us along in the next decade or two?

Moore

I think what we desperately need a better way to resuscitate patients and a better understanding of coagulopathy. I can't imagine that in the next decade we won't come up with something better than what we're doing right now. Not to dismiss the potential benefits of crystalloid, but there has got to be a better way to start the process out in the field.

With coagulation, we're just starting to chip away at the tip of the iceberg in terms of mechanistic knowledge. I think in 10 years we will look back in astonishment that we didn't understand this better.

Livingston

Would you make any changes in your career?

Moore

No. Looking back on it I'm not sure I would change a anything. I guess I might have benefited from more basic science training after my residency in Vermont, but ultimately I was fortunate to work with the right individuals at the right time to learn the obligatory skills. On the other hand, I have climbed the Aconcaqua with Hunter, run the Leadville 100, and completed the Coeur d'Alene Ironman.

Livingston

Anything outside the hospital you wanted to do? Didn't have the opportunity to do?

Moore

I think we all have big ambitions and, to some degree, unrealistic dreams. One of my bigger ambitions was to climb Everest, but I was never exposed to climbing in the East and by the time I realized the opportunities in the West, I had family obligations. But a small price to pay for a great family.

Livingston

You have moved from chief of surgery at Denver to the editor of the *Journal of Trauma and Acute Care Surgery*. What are your plans after this?

Moore

I don't think I have any major changes at this point, and plan to continue trauma call. I hope

to encourage and facilitate both my sons to pursue academic medicine. As you know, Hunter looks to be on track to be a trauma surgeon, while Peter is going to the dark side, probably interventional cardiology. But, nonetheless, we've got some common ground in coagulation.

Livingston

Any parting words for the 75th anniversary of the AAST?

Moore

Well, I think I would just recap by saying that acute care surgery is the only chance we have to solidify our future academic career in trauma surgery. For all of us who have gone through the "Golden Age" and had so much fun, it's frustrating. I think we need to get ourselves back in the operating room, and acute care surgery is the path to get there. I think it's very unique that surgeons who can operate are dedicated to critical care and all the other stressful issues that are a part of trauma care.

I always say to Hunter when he bemoans the long hours of training: "You know, the fact is that acute care surgeons are going to be a valued commodity once we define ourselves appropriately because there aren't going to be many willing to be commit to these long hours and hard work."

I think one regrettable offshoot of all this 80-hour work week and emphasis on psychological stress is that it's permitting a lot of individuals to train as surgeons who just don't have the innate commitment. One of the greatest days in my life was when I got in medical school. And then the next greatest day is when I got into a surgical residency.

Every day in that residency, I was anxious that I wasn't going to make it and probably appropriately so. I can remember my first appendectomy like it was yesterday. Every little milestone meant so much to me. Unfortunately, I don't see that in many of the current generation.

Livingston

Do you think they have the same level of intellectual curiosity? I think that is missing sometimes.

Moore

Yes, I think you're right. What is sad to me is that you can't inculcate that in someone. I think they're fundamentally born with that proclivity that has to be reinforced early in their life. I think that surgeons like you and me who really have genuine curiosity have a much more rewarding career, and I wish I could inspire more people to see that.