Neurotrauma & Critical Care NEWS
AANS/CNS Section on Neurotrauma & Critical Care
Editor: Roland Torres, MD, FAANS, FACS
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Message from the Chair

Shelly D. Timmons, MD, PhD, FAANS, FACS

At the 2011 American Association of Neurological Surgeons (AANS) Annual Scientific Meeting, the AANS publicized a Position Statement on Traumatic Brain Injury, drafted by the AANS/Congress of Neurological Surgeons (CNS) Section on Neurotrauma and Critical Care. This statement was developed, in part, as a response to the overwhelming attention this subject has gained in the public eye. While neurosurgeons have been at the forefront of treatment, research and public-policy development regarding this issue, it is key at this time to reinforce that role and provide our membership with tools to evolve in this leadership role.

To that end, the position statement has been widely publicized, including through a press release at the AANS meeting. The Section on Neurotrauma and Critical Care also has participated in the development of slide sets for education on concussion to be provided to AANS members and section members, spearheaded by Drs. Gail Rosseau and Martina Stippler, respectively. An afternoon session on concussion in sports is planned for the CNS' upcoming annual meeting. The Council of State Neurosurgical Societies (CSNS) Neurotrauma and Emergency Neurosurgery Committee has sponsored a resolution to develop a toolkit for neurosurgeons regarding this topic, to include reference lists, legislation lists, existing grading scales and evidence-based guidelines. Section members are involved actively with the development of prevention programs such as ThinkFirst and the development of evidence-based guidelines. The fourth International Sport Concussion Consensus (to be held in November of 2012 in Zurich) will address the evidence basis for recommendations. It is clear that more research and surveillance data collection regarding this problem will help to formulate more effective education and prevention strategies in the future.

Another issue that continues to be addressed by the Section, the AANS and the CNS is the provision of neurocritical care by neurosurgeons. It is the position of the Section, the AANS, the CNS, the Society of Neurological Surgeons and the American Board of Neurological Surgery (ABNS), that the performance of neurocritical care by neurosurgeons is integral to the practice of neurosurgery. (Click here to see the full position statement issued on March 3, 2009.) Moreover, neurosurgeons are trained and qualified to provide critical care, although some may choose to limit these activities due to practice considerations. All residency programs accredited by the Accreditation Council on Graduate Medical Education (ACGME) are required to provide substantial training in critical care for matriculating residents, and certification by the American Board of Neurological Surgery includes the provision of neurocritical care. Collaborative approaches with our critical-care colleagues from other disciplines will continue to enhance the care we provide our patients, but neurosurgeons remain uniquely qualified to provide many aspects of critical care to both our surgical and non-surgical patients.

The Section's executive committee has enjoyed active involvement from a number of long-term and new members. Several projects are underway, including the development of transfer guidelines for mild traumatic brain injury patients. Together with the CSNS, we are looking at the evidence basis for transfer, repeat imaging, use of telemedicine, and socioeconomic implications of over-triage and under-triage. Such an examination of the current state of the literature on this ubiquitous population will aid in future directions for research and quality improvement projects, and help to shape the dialogue with our emergency room, trauma surgery and pre-hospital colleagues. The Section remains engaged in disaster and mass casualty preparedness initiatives, led by Dr. Jamie Ullman, and our military colleagues remain engaged in Section activities, for which we certainly are grateful. Several civilian neurosurgeons also have been able to lend support as visiting surgeons in Landstuhl, Germany. Opportunities for involvement abound, and we welcome input from all of our members as we work to further the field of neurotrauma and critical care.

Neurotrauma and Critical Care Web Page Update

As the new editor of the AANS/CNS Section of the Neurotrauma and Critical Care Web page (www.neurotraumasection.org), I would like to draw your attention our site.

In the last month alone, visitors from 43 different countries accessed our website, including the following: Australia, Brazil, Venezuela, India, China, Malaysia and Nigeria. Although most of the visits were from desktops, about 10 percent of our users viewed our website via handheld devices such as mobile phones and the iPad. Communication has shifted from paper to online media. Our Web page is a way for us to keep you informed about our Joint Section activities.

Our section Web page is designed to be a forum for news and updates in neurotrauma and critical care. We especially want to offer an educational platform to young neurosurgeons and residents. You can find direct links to educational opportunities, such as the neurotrauma webinar series, as well as interesting podcasts. We want to make our site a one-stop information hub for anything pertaining to our mission.

The site includes links to trauma guidelines and meeting calendars for national and international conferences, and neurotrauma funding opportunities. We recently added instructions for applying for the 2012 Codman Fellowship in Neurotrauma and Critical Care, as well.

In addition, you may use visit the site to become a member of the Section. Soon, we will add neurotrauma fellowship postings, as well. Don't hesitate to send information about fellowship opportunities as well. Those can be sent to martina@neurotraumasection.org. I look forward to hearing from you soon!

Sincerely,
Martina Stippler, MD

Sports Medicine Committee

Anthony L. Petraglia, MD; and Julian E. Bailes, MD

Over the past few years, increased attention has been focused on the neurological sequelae of sports-related traumatic brain injury (TBI), particularly concussion. One only has to turn on the TV, listen to the radio or pick up any newspaper to catch a glimpse of what has become front and center in medicine and society today. Many consider 2009 the "Year of the Concussion" — a year filled with major cultural and scientific shifts in the way athletes, coaches, parents and physicians viewed concussions. With new research initiatives and skyrocketing levels of public awareness, 2010 marked a year where society came to a better understanding of concussion and mild TBI, while we as a medical community came to learn that we have a long way to go.

An explosion of interest and research regarding the underlying pathophysiology of concussion and the possible long-term effects of repetitive mild TBI (mTBI), coupled with the potential link to the development of chronic neurodegenerative disease such as chronic traumatic encephalopathy (CTE) and possibly amyotrophic lateral sclerosis (ALS), has resulted in increased attention from members of Congress as well as society. In general, people are coming to understand how this is a large public health issue that extends far greater than what we watch on TV every week. Additionally, within the scope of professional sports, there were some notable athletes who sustained concussive injuries. The combination of these numerous events has led to changes in rules, policies and the way we manage concussion, while simultaneously opening up a multitude of avenues for biomedical research.

Football probably has spent more time at the forefront this past year than any other sport, particularly at the professional level. With regards to TBI, the landscape of the National Football League (NFL) underwent many alterations between 2007 and 2010, implementing multiple changes to its concussion policies aimed at better protecting and treating its players. In 2007, the NFL hosted a medical conference consisting of team physicians, athletic trainers, medical experts and even team members to discuss concussions and their effects on the players. After that conference, the NFL released a set of guidelines on return-to-play rules, distributed an informational pamphlet to all players on the causes and effects of concussions, and also created a hotline for reporting situations in which players might feel pressured to play with concussion symptoms. That first set of guidelines in 2007 stated that "a player could not return to a game or practice in

which he [has] lost consciousness and that a player must be asymptomatic and pass his neurological tests normally before returning to play."

In October of 2009, NFL executives and lawmakers joined at the House Judiciary Committee meeting to discuss the effects of head injuries in the sport. At that meeting, critics accused the NFL of not doing enough to protect players from the long-term effects of concussions. Shortly thereafter, the NFL's concussion committee co-chairmen resigned, and the path to a clearer, expanded and stricter set of guidelines was forged. On March 16, 2010, the NFL announced the formation of a new committee (the NFL Head, Neck and Spine Medical Committee) and named two neurosurgeons, Drs. Hunt Batjer and Richard Ellenbogen, the new co-chairmen. Other neurosurgeons also are serving various roles on the committee. A new set of guidelines was formed and implemented this past year:

Once removed for the duration of a practice or game, the player should not be considered for return-to-football activities until he is fully asymptomatic, both at rest and after exertion, has a normal neurological examination, normal neuropsychological testing, and has been cleared to return by both his team physician(s) and the independent neurological consultant. A critical element of managing concussions is candid reporting by players of their symptoms following an injury. Accordingly, players are to be encouraged to be candid with team medical staffs and fully disclose any signs or symptoms that may be associated with a concussion. — National Football League statement on Return-to-Play, 2009

In addition, the NFL Player's Association (NFLPA) has created the Second Opinion Network, which consists of independent board-certified neurosurgeons throughout the U.S., in every NFL city. Also, during the 2010 season, in an effort to crack down on helmet-to-helmet hits and ultimately reduce the amount of concussions suffered by players, the league began to issue larger fines to players, particularly repeat offenders, and mentioned that suspensions would be considered for those who continued to commit illegal hits. Change certainly takes time, but the results thus far have been promising. Also, players seem to be more educated about the issues, and there seemed to be an overall increase in the number of concussions reported during the 2010 season. One of the most important byproducts to come from all of this change has been the effect it has had on the millions of young football players across the country who look up to professional athletes as heroes. Such influence has even trickled down to the Pop Warner youth football programs and other levels of youth football.

The effort to address concussion-management policies in collegiate athletes began more broadly at the end of 2009 through the National Collegiate Athletic Association (NCAA). The Competitive-Safeguard and Medical Aspects of Sports Committee issued a revision to the NCAA Sport's Medicine Handbook guideline advising on appropriate response to concussions and procedures for returning student-athletes to competition of practice. The NCAA also had a conference in April of this past year where certified athletic trainers and physicians met to discuss concussion management practices. A few months later, the organization adopted legislation that required its member institutions to adopt a written concussion management plan to ensure that any athlete who shows symptoms of a concussion will be removed from competition. In addition, member institutions also were required to have a written emergency plan. According to the NCAA's new rules, college athletes now are required to have baseline neuropsychological testing performed, as well. The student-athlete sustaining a concussion should be removed from play for the remainder of that day, evaluated by a proper health-care provider, and returned to play only after following and completing a medically supervised stepwise plan. The NCAA also has collaborated closely with the Centers for Disease Control (CDC) to develop educational materials for distribution to student-athletes, coaches and parents.

The National Federation of State High School Associations (NFHS) is the national leadership organization for high school sports. Among its many tasks, the NFHS writes playing rules for 17 sports for boys and girls at the high-school level. Through its member state associations, the NFHS reaches upwards of 7.5 million high school athletes in more than 19,000 high schools across the country. In keeping with the management changes seen at other levels of athletics, the NFHS Football Rules Committee met in February of last year and accepted a revised concussion rule effective for the 2010 season. The previous rule directed officials to remove an athlete from play if "unconscious or apparently unconscious." Now, officials are charged with removing any player who shows signs, symptoms or behaviors consistent with a concussion and ensuring that a player does not return to play until cleared by an appropriate health-care professional. Such rule changes also are being expanded to cover all high school athletic programs where contact or collision could occur. In May of last year, as a part of the NFHS Coach Education Program, the NFHS began offering an online education course devoted to concussion entitled "Concussion in Sports — What You Need to Know." The 20-minute online course is designed to help educate interscholastic teachers,

coaches, officials, parents and players on the importance of understanding, recognizing and properly managing sports-related concussions.

Neurological injury prevention and control is occurring even at the most junior level. Pop Warner Little Scholars, Inc. is the largest and oldest youth football, cheer and dance organization. In November of 2010, Pop Warner formally announced the formation of the inaugural Pop Warner Medical Advisory Board. This board is led by four physicians with expertise in neurological sports medicine; it includes Dr. Lawrence Lemak (orthopedic surgery), Dr. Stanley Herring (physical medicine & rehabilitation) and two neurosurgeons — Drs. Julian Bailes and Arthur Day, with Dr. Bailes serving as its first chairman. In addition, Pop Warner updated its rules in 2010 to reflect the most safety-conscious and comprehensive approach to concussion prevention and management. These rule changes echo those principles exhibited by the higher organizations, but specifically emphasize and maintain that the return-to-play decision must be made by licensed medical officials, as opposed to parents or guardians.

This important aspect is in alignment with the "Lystedt Law" passed in 2009, in the state of Washington. The law was named after Zackery Lystedt, who was critically injured during a high school football game. He struck his head on the ground after a big play and subsequently grabbed his helmet in obvious pain as he struggled to get up. After making it to the sideline, he sat out for about 15 minutes, and then went back in for the remainder of the game. Another hit late in the game resulted in an intracranial hemorrhage, neurosurgical intervention and a prolonged hospitalization. Ten other states have created similar laws, while many others have them under consideration. Congress now is looking at the Lystedt Law as a template from which to set national standards for recognizing and treating head injuries in young athletes.

These changes are not being made exclusively in the football world. A concussion can occur in just about any sport, and the CDC as well as organized neurosurgery have been instrumental in promoting education to that extent. The CNS has sponsored webinar sessions to promote concussion education (as detailed below), and seminars and talks at the CNS and AANS meetings are increasing awareness. Organized neurosurgery also has stressed the importance not only of awareness and diagnosis, but prevention and preparation, as well. Key steps to ensure the best outcome for athletes includes educating athletes and parents about concussion, first and foremost, and the potential long-term consequences of not allowing the brain to heal following injury. Insisting that safety comes first is paramount.

As evidenced above, many neurosurgeons certainly are on the frontlines in these national changes. However, the work is far from done. There is a continued need for neurosurgeons to be involved from leadership standpoint. We must continue to work with our colleagues from other disciplines of medicine in order to deliver comprehensive care to athletes with neurologic injuries. Concussion care falls within the scope of neurosurgical practice, and neurosurgeons need to become versed in computerized neuropsychological testing and its interpretation. For neurosurgeons, this realm of medicine is by no means foreign territory; however, formal, in-depth training in treating sports-related neurologic injuries is not as commonplace. In an effort to help bridge that gap, the Congress of Neurological Surgeons — as a part of its University of Neurosurgery Webinar series — hosted a webinar in January of 2011 entitled "Football Injuries and Concussion: Assessment, Return to Play, Long-Term Sequelae and the Neurosurgeon’s Role." The following were some of the highlights from that webinar given by Dr. Julian Bailes and Dr. Joseph Maroon:

"While we all have learned the definition of concussion to some degree in our training, the definition has continued to evolve as we have learned more over the recent years. In keeping with the consensus statement on concussion, which was generated from the 3rd International Conference on Concussion in Sport held in Zurich 2008, a concussion can be defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Simply put, it is a temporary disruption of brain function that typically resolves spontaneously. It can be caused either by a direct blow to the head, face or neck, or a blow elsewhere on the body with an “impulsive” force transmitted to the head. While concussion does result in neuropathological changes at the ultra-structural level, the acute clinical symptoms largely are a reflection of a functional disturbance, and typically there is no abnormality on standard neuroimaging studies. It was emphasized that while loss of consciousness can occur, the majority (upwards of 90 percent) do not involve a loss of consciousness."

Acutely, with concussion, there is a disruption of the neurofilaments and microtubules that provide a framework for axonal transport, compromising the anterograde and retrograde transport of molecular proteins to and from somata. This mechanical damage, as well as delayed or progressive ultra-structural injury due to proteolysis, subsequently affects axonal transport. Also, at the cellular level, we have come to

learn that there is neuronal membrane disruption (or mechanoporation) that leads to ionic shifts and an increase in intracellular glutamate and calcium. Glucose metabolism is altered, and mitochondrial injury leads to a failure in ATP and an increase in reactive oxygen species. The brain may try to heal these membrane defects and seal these porations as a part of the repair process; however, cells may ultimately undergo caspase-mediated apoptosis as a result of these cellular changes.

The chronic effects of cumulative concussions have been demonstrated at all levels of athletics. It has been shown that with a concussion, an athlete is at an increased risk for a second concussion in the same season, and that each subsequent concussion requires a longer recovery period. If an athlete were to sustain three concussions, that player has a three-fold increased risk of a future event. Epidemiological studies have suggested an association between repetitive sports concussions during a career and late-life cognitive impairment. Similarly, there has been an increased number of cases where neuropathological evidence of CTE has been observed in retired athletes.

As we progress through 2011 and beyond, we will continue to collect more data and information that will help us manage athletes that sustain neurologic injuries. Most clinical and scientific studies have focused on severe TBI, but concussive and sub-concussive head injuries affect more people, occur more frequently, and are a silent epidemic of increasing importance. Future research should investigate the use of virtual reality tools in the assessment of injury. The role of neuroimaging should be further expanded as we explore novel imaging modalities, in addition to better defining the role of current neuroimaging techniques in clinical assessment. While we likely won't ever eliminate concussions from sports, we can continue to lead the charge for finding ways to reduce their incidence and improve the way in which we manage them

Clinical Research Update: ProTECT III

Roland Torres, MD; and David Wright, MD

Traumatic Brain Injury (TBI) is a significant cause of death and disability worldwide. An estimated 5.3 million Americans (a little more than two percent of the U.S population) currently live with disabilities resulting from brain injury. From 1995 to 2001, nearly two million TBIs occurred in the U.S. each year. Of these, most (70 percent) were emergency department visits, followed by hospitalizations (34 percent) and deaths (3.8 percent).This does not include private-physician office visits, "Doc-in-the-Box," etc.

Yet despite the enormity of the problem presently, we still have no therapeutic agent that improves outcome for our TBI patients. Few drugs have shown promise to treat TBI, and over the past 30 years, all the clinical trials involving therapeutic agents for TBI have failed, with at least two studies halted when the drugs made patients ill. Recently, in a 100-person trial at an Atlanta hospital between 2001 and 2005, TBI patients given progesterone were more than twice as likely to survive as those given a placebo. Patients with moderate brain injuries were more likely to recover if given progesterone. Progesterone has well-understood and limited side effects.

Currently, an impressive body of evidence suggests that progesterone, a neurosteroid more commonly known for its actions in the female menstrual cycle and pregnancy, is neuroprotective. There now are more than 180 preclinical publications reporting the positive effect of progesterone on a wide variety on neuronal injury. In addition, there are two human pilot trials — one that shows a trend toward reduced death and disability (Wright et al.) and another that confirms a significant improvement in progesterone-treated acute TBI patients (Xiou et al.).

The The ProTECT III trial is a phase III multicenter clinical trial designed to definitely determine if progesterone is neuroprotective in acute TBI. The National Institute of Neurological Disorders and Stroke-(NINDS) and National Institutes of Health- (NIH) funded trial is being conducted through the Neurological Emergencies Treatment Trials network. ProTECT III officially opened for enrollment on March 22, 2010, with the first patient enrollment on April 5, 2010. Since this time, 22 sites have been activated; 394 out of the total goal of 1,140 subjects have been enrolled into the trial so far. The trial is exceeding enrollment expectations and meeting all predetermined milestones. Going forward, enrollment is expected to average 24 subjects per month, which would equate to three more years of enrollment. If the trial is positive, progesterone would represent the first real pharmacological treatment to improve functional outcome in acute TBI patients, dramatically changing the lives of patients and their families.

Neuroscientists say this trial to find a drug that can treat traumatic brain injury is the most promising in decades. TBI afflicts one to two million Americans each year, with the cost of long-term care reaching $80 billion annually

When the Cameras All Are On You

Richard B. Rodgers, MD

In January of 2011, U.S. Representative Gabrielle Giffords was spearheading a community event in Tucson, Ariz., when a gunman opened fire on its attendees, killing six and wounding 13 — most notably, Giffords herself. Giffords suffered a gunshot wound to the head; consequently, she was thrust into the media spotlight, as was her neurosurgeon: G. Michael Lemole Jr., MD. Seeing Dr. Lemole speak about the tragedy at subsequent press conferences reminded me of a similar situation I experienced a couple years ago (albeit it on a statewide scale, not a national one). My situation also involved a high-profile victim with a similar injury, and a perpetrator who garnered a lot of public attention. Interestingly enough, about a week after I agreed to write this article, yet another high-profile injury occurred in my city, and I just happened to be on call. Again, I found myself in front of multiple TV cameras.

The press conference is an unfortunate (and, thankfully, rare) side-effect of our occupation, especially for those of us who take care of neurotrauma. In the case of the Tucson shooting, I thought Dr. Lemole did a spectacular job, and many of my non-medical family members and friends agreed. He explained exactly what happened in an understandable way and clearly outlined what could be expected in the coming days. I certainly am no media expert, but I have learned a few things about dealing with the press in acute trauma situations. My friends had less-than-kind things to say about other medical professionals who commented on the events in Tucson, so I figured it would be good to point out the right things to do when the cameras are on you.

Spend a lot of time with the patient and family first.
If there is going to be a press conference, the patient and his or her family likely will know. Due to privacy rules — and, more importantly, out of respect for the patient and the family — it is important to ascertain what information they want released and what details they want withheld. Neither the press nor the public have a right to know anything about the situation; even public figures still have the right to keep their medical affairs private. The press is allowed to know whatever the patient and family deem appropriate. In my experience, hospital administrators have been adept at handling media requests. There also may be special legal circumstances relating to criminal investigations (all of mine have, thus far), so discussing the situation with the appropriate legal representatives prior to a press conference also is wise.

Be brief.
The best acute medical press conferences I have seen have all been short and unedited. It would seem that the easiest thing to do after introducing yourself is to give a brief synopsis of the entire situation as it relates to your involvement, from the first call or encounter to what was happening just prior to your microphone being turned on. Then, answer the anticipated questions before they are asked. For hospitalized patients, the press will want to know what to expect next. Usually, it is inappropriate to speculate on long-term outcomes in an acute situation, so just speak on the immediate goal or concern, for example — survival of the injury, preventing a complication of the injury or the like. Save your ideas on the long-term prognosis for later. "Yes," "no" and "we just don't know yet" are very good answers. "We'll know more in the next 24 to 48 hours" also explains a lot without saying much at all.

Another good reason to be brief is that what you say will be edited for later broadcasts in a cut-and-paste fashion. If you give a long speech, it will be chopped into sound bites and put back together to fill a short slot on the nightly news, possibly by someone who doesn't understand which parts are important. Comments may sound out of context, or even contradictory, when presented this way, so don't give them too much to edit.

Be honest, but choose your words wisely.
Saying the same thing to the press as you say to the family (leaving out whatever details the family asks to keep private) eliminates the possibility of confusion for the family. Remember, they will probably see you on TV — you don't want them to hear something different from you on the news than what you told them in

person. The press and the public are, in general, laypersons like the family. Speak to them in the same terms. If you use too many complicated medical terms, it will generate more questions, more sound bites and more opportunity for misinterpretation.

Also, avoid using terms with negative connotations. At one of the press conferences for the Tucson incident, the word “dead” was used several times to describe some of the victims who had passed away. It was truthful, but my wife cringed every time she heard it. I did, too.

Talk to everyone at once.
Usually in a high-profile incident, all the news networks will know of the story, and hospital administration will assist with getting them all in one place for a press conference. Doing so will allow all the media outlets to hear the exact same message — again, in an effort to avoid confusion. A corollary to this is to avoid being grabbed by one particular reporter or network for a few extra questions after the press conference. Speaking to one media outlet in this fashion provides another opportunity to give information that may appear contradictory after the sound bites have been edited; it also appears as if you’ve given an exclusive interview.

If you handle acute neurosurgery in your city, there is a reasonable chance that someone from the media will call on you at some point to ask about your patient. Whether you have a high-profile patient, such as a congresswoman, or a high-profile event, such as the shooting of a police officer, the press will assert their need to know. For those of you who haven’t had to lead a press conference yet, consider yourselves lucky, thus far. When it does happen, keep the above suggestions in mind; hopefully, they will serve you well.