

Army troops suffering from traumatic brain injury

Since October 2001, more than two million American troops have deployed to fight the Global War on Terror being fought in Iraq and Afghanistan. The War on Terror is not the first war in American history where troops faced unconventional guerilla warfare tactics such as the use of ambushes, suicide bombers, and improvised explosive devices (IED). Due to advances in armor and protective equipment, many are now surviving injuries that that once would have been fatal. Although service members are surviving, many are coming home with injuries to the head and limbs, areas that are not covered by protective gear. One injury that is currently receiving a lot of attention from the medical field and the media is the traumatic brain injury (TBI). According to the Defense and Veterans Brain Injury Center (DVBIC), IED blasts are the primary cause of TBI. It is also noted to be likely that as many as 19% of those who return from war have a probably brain injury. There are different levels of classification for traumatic brain injury from penetrating or severe to mild. Generally, troops who sustain a penetrating or severe brain injury are medically evacuated from the field and promptly begin receiving medical treatment for their wounds. There is a large population of troops whose injuries fit into the category of mild traumatic brain injury, or mTBI. Unfortunately, their injuries are not as easily identifiable. The mTBI has been designated as the trademark injury of the War on Terror. The prevalence of military members coming home with mTBI poses a unique set of challenges for the injured and their families as well as the medical professionals providing treatment.

Defining mTBI

The Center for Disease Control describes mild traumatic brain injury as being “caused by a bump, blow, or jolt to the head or a penetrating head injury that disrupts normal function of the brain. Often, an individual will experience either a brief loss of consciousness or a feeling of being dazed and confused. Loss of consciousness associated with mTBI usually lasts less than one hour. Individuals may also experience amnesia that lasts less than 24 hours. Signs and symptoms of mTBI include headaches, dizziness, tinnitus, photophobia, phonophobia, mood changes, and difficulty sleeping. Many individuals experience cognitive and behavioral changes as well. Cognitive changes can include attention and concentration problems, short-term memory deficits, and trouble with speech and languages components. Behavioral changes can include depression, anxiety, impulsiveness, and numerous other emotional problems. Some of these symptoms manifest immediately while others do not show themselves for days or weeks. When quickly diagnosed and treated, those who suffer from mTBI can often recover within three months. It is believed, however, that 10-15% of those who experience persistent symptoms, often referred to as post-concussive symptoms, can experience difficulties that can last for years. The term mild traumatic brain injury can be deceiving because for some the lingering deficits can be disabling.

Diagnosing mTBI

A physician looks at a combination of factors when diagnosing mTBI. Any loss of consciousness is considered. This could be a change in mental state, such as a feeling of being dazed and confused, a loss of consciousness of less than 30 minutes, or any period of amnesia near the time of the blast event. The physician also considers any neuropsychological or neurological problems. The individual is also assessed using the Glasgow Coma Scale (GCS). The GCS is a scale used to give an accurate assessment of a patient's verbal, motor, and eye responses. The scale ranges from 3-15. A mild TBI usually has a score of 13 or higher. Although physicians will often order diagnostic imaging tests such as magnetic resonance imaging (MRI) or computed tomography (CT) scans, more often than not there are no abnormal findings. Another component often used in diagnosing and understanding mild traumatic brain injury is neuropsychological testing. Properly trained physicians administer a series of tests to determine the level of an individual's cognitive, motor, behavioral, and executive functioning. Executive functioning refers to memory and recall, effort, ability to control emotions, and problem solving skills. Portions of neuropsychological testing include oral and written tests as well as an evaluation of the performance of certain skills.

Challenges in identifying mTBI

Proper and timely diagnosis is the key to the restoration of normal functioning after an individual suffers a mild traumatic brain injury. Challenges in identifying mTBI leave many falling through the cracks undiagnosed. Several factors complicate identifying individuals with mTBI. One factor is that more often than not, individuals who are exposed to blasts are not medically evacuated. Military members who are still in theater, meaning the combat zone, often minimize the effects of blast exposure. This could be due to the fact adrenalin rush at the time of the incident. Also, it often takes time for an individual to experience a full range of symptoms. The most common reason for the delays in recognizing mTBI is that there is no one sign, symptom, or marker of a TBI. This often leads to an mTBI initially being misdiagnosed as other conditions, most commonly post-traumatic stress disorder (PTSD).

Treating mTBI

To date, there is no cure or magic pill to treat mild traumatic brain injury. The goal of physicians is to treat the more persistent post-concussion symptoms such as physical and neuropsychological problems. Medications can help ease headaches, help with mood changes, and assist in establishing a better quality of sleep. One challenge for physicians is to carefully prescribe medications and track the patient's progress while taking them as some medications that are helpful for one issue may actually hinder another. For example, a medication prescribed to ease headaches while exacerbating cognitive deficits. Another component of treatment is therapy. A number of different types of therapies can help an individual regain the highest possible level of functioning. An individual with blast related visual defects can learn compensatory strategies

through a variety of visual rehabilitation therapies. Speech-language and cognitive rehabilitation programs address memory, recall, speech, and executive functioning. Patients can find new ways to learn and retrain their brain how to compensate for areas that have been damaged. Vestibular therapy deals with vertigo (balance) issues and dizziness. Treatment also consists of recreational therapies, patient education, and the utilization of family as a support system.

Literature Review

Prevalence of Traumatic Brain Injury

For several years attempts have been made to gain a better understanding of just how military members are being affected by blast injuries. The largest study to date is the Hoge study. In 2006, 2,714 Army infantry soldiers returning from a one-year deployment to Iraq completed anonymous self-report surveys. After the exclusion of 189 surveys for various reasons, 2,525 soldiers reported on their exposure to blast injuries while deployed. The findings of the report showed 124, or 4.9% of soldiers, reporting exposure associated with a loss of consciousness. There were 260 soldiers, or 10.3%, who reported blast exposure with no loss of consciousness but with the feelings of being dazed and confused. The number of reported head injuries was 384, or 15% of the total number of soldiers surveyed.

The RAND Corporation performed another study using a random sampling method to conduct telephone interviews of 1,938 individuals who previously deployed to either Operation Iraqi Freedom or Operation Enduring Freedom. Their results revealed that in excess of 19% of respondents screened positive for probable TBI.

According to the Congressional Research Service (CRS), as of March 2010, there were 178,876 reported cases of traumatic brain injury. This number reflects roughly 8.9% of the more than two million military members who have deployed in the War on Terror. Of these cases, 137,328 of the reported cases were ultimately deemed mild TBI. The CRS collected their data from the Defense and Veterans Brain Injury Center. As of August 15, 2010, the DVBIC has updated their figures and reports 188,270 reported cases of TBI.

The obvious difference in the findings of the three reports is the method used to collect the data. CRS used numbers reflecting only those cases that were diagnosed with traumatic brain injury per the Armed Forces Health Surveillance Center. Both Hoge and the RAND study used a self-report method. The large discrepancy in figures does not mean that the Hoge or RAND studies are incorrect. Reporting blast exposure on a survey does not mean an individual will actually seek medical treatment. Self-reporting injury also does not indicate the presence of a brain injury.

Co-morbidity with PTSD

The Hoge study also surveyed the 2,525 returning soldiers for PTSD. For those who reported a loss of consciousness, 43.9% also positively met the survey criteria for PTSD symptoms. For those who reported feeling dazed and confused, 27.3% met the PTSD symptom criteria. In the RAND study of those individuals who screened positive for probably TBI, one-third also screened positive for probable PTSD. Another study examined the relationship of memory of the traumatic event on the development of PTSD in TBI patients. The study included 120 participants who were diagnosed with TBI. The method of collecting data was a self-reported questionnaire completed initially after injury and six months later. The findings revealed that 23% of those with memory of the traumatic event developed PTSD. The study also showed that only 6% of those with no memory of the event developed PTSD. The study found that having memory of the traumatic event makes an individual five times more likely to develop PTSD. Although in the past the occurrence TBI and PTSD was rare and did not receive a lot of attention, today it is becoming more and more common due to the nature of injuries sustained due to blast exposure.

The signs and symptoms of PTSD almost mirror TBI. Like TBI, the symptoms of PTSD can include difficulty sleeping, anxiety, depression, and often times cognitive or concentration problems. It is often difficult to diagnose brain injury in combat veterans due to the similarities in symptoms. Physicians often try to distinguish characteristics that are unique to the particular disease. Characteristics unique to PTSD include avoidance, flashbacks, and nightmares while TBI's trademark symptoms are headaches, dizziness, and impaired balance.

Complications of Treatment

Generally, recovery from a mild traumatic brain injury can take days, weeks, or months. For the small percentage of those with persisting post-concussion symptoms, treatment is complicated. Injured military personnel are often in a unique situation when they present with both TBI and PTSD. PTSD is believed to worsen the symptoms, or the perception of symptoms, experienced as residuals to blast injuries. One approach to treatment when a patient has both PTSD and TBI is to treat the underlying psychological issues to lessen the severity of the post-concussive symptoms. Currently, in the military health system, there is not one single set of guidelines to aid physicians in the treatment of a TBI compounded with PTSD. There are many opinions and not a lot of research at this point. The three primary types of therapy believed to be most effective in treating PTSD are Prolonged Exposure Therapy (PE), Cognitive Behavioral Therapy (CBT), and Cognitive Processing Therapy (CPT). All three deal with teaching the patient how to handle the thoughts and feelings they have in regards to the trauma they have been experienced. The goal is to reduce the distress brought on by these thoughts. Another form of therapy that has been effective for treating PTSD is Eye Movement Desensitization and Reprocessing Therapy (EMDR). It combines aspects of CBT with the focus of the eyes on some form of stimuli. It is not thought to be beneficial

in patients with both TBI and PTSD because of the likely visual, concentration, and headache problems TBI patients experience.

DISCUSSION

Social Functioning

In addition to the medical challenges and complications faced by military members diagnosed with mTBI or PTSD and mTBI, they also face difficulties adjusting to their lives when they return home. The cognitive deficits experienced by those with persisting symptoms can make it difficult for the person to complete the same tasks they once did with ease. These problems also hinder the levels of communication and understanding. Mild TBI increases an individual's likelihood of administrative problems or discharge due to behavioral issues. These issues can include conduct unbecoming a service member, problems with motivation, and even criminal behavior. Military members with mTBI are 7.5 times more likely to be discharged from the military as a result of medical disability than those who do not suffer from mTBI. Those with mTBI or mTBI and PTSD also have a higher occurrence of substance abuse problems. Large numbers of medications taken daily and chronic pain can influence the probability of developing a dependency on prescription medications and illegal drugs. After a brain injury, studies show that an individual experiences a general decrease in their overall quality of life.(18)

Changes in Home Life

Mild traumatic brain injury has a huge impact on the family members of the injured and home life in general. One year following injury, distress due to psychosocial and cognitive impairments is found to be greater than physical disabilities. The change in behavior and personality that typically occurs following brain injury often creates a dramatic shift in the roles between spouses. Spouse of injured individuals often find themselves in a position of becoming more or less entirely responsible for the household. This responsibility encompasses everything from managing household finances, maintenance, decision-making, and parenting. With impaired memory and decision-making, a spouse may find it hard to trust the competency of the injured individual to share in the responsibilities. Individuals suffering from mTBI often find themselves lacking the patience needed to cope with the children and tend to forfeit the task to their spouse. The spouse is then managing all of these components of the household and married life alone while at the same time taking on the role of caregiver for the injured. The role of caregiver can include physical aspects of attending to the aspects of daily living. More often than not, it includes other aspects brought on by memory and cognitive defects such as taking medications, attending appointments, and generally attempting to better the quality of life for their injured spouse.

All of these stressors bring about significant marital problems. Spouses of individuals with mTBI many times find that they have isolated themselves from friends and family members. It is recommended that the caregiver spouse be diligent in attending to their

own mental health needs. It could be helpful to attend support group meetings, communicate one on one with other spouses in similar situations, or to attend individual psychotherapy. The caregiver may experience depression or even become burnt out in their responsibilities without an outlet for frustrations and some form of emotional support. It often takes a spouse a long time to acknowledge that they are unable to cope with the enormity of all of the responsibility and pressure. Feelings of guilt often delay them from leaving the marriage. Disintegration of the marriage is most likely to occur 5-6 years after the initial injury. It is a difficult task to keep a marriage afloat when both parties are dealing with their own set of challenges independent of one another. The individual with mTBI is trying to deal with the difficulties they face simply in coping with daily life. The spouse is trying to cope with all of the responsibilities and care giving as well as the fact that the person they married has changed dramatically in so many ways.

Research Efforts

Increased focus on brain injuries has prompted a variety of research efforts in an attempt to find ways to identify the injury, to provide effective treatment, to determine the effects of co-morbidities with other diseases, and to predict the lasting implications of the levels of TBI grouped by severity. Studies are employing the hyperbaric chamber to determine its benefits in easing some of the symptoms of mTBI. The hyperbaric chamber delivers 100% oxygen at high-pressure levels. They are also trying to ascertain if the hyperbaric chamber is more beneficial with early detection and exposure of mTBI versus delayed detection and exposure. Researchers studying animal behavior (usually pigs) after blast injuries are able to learn a great deal regarding physical damages. One obvious limitation is that they are unable to determine the psychological side effects. Studies are also being performed to look at individual risk factors that may make a person more susceptible to developing mTBI or mTBI and PTSD after a blast injury. Research focused on an individual's personal history, intelligence, and social support system prior to injury show that higher susceptibility to psychiatric disorders prior to injury does not cause the occurrence of PTSD in individuals with mTBI. Other researchers are examining the association between genetics and PTSD and TBI. While they have not identified a genetic marker to recognized TBI or PTSD in blast patients, there is evidence to suggest that the presence of a particular gene can influence the timeliness of recovery from TBI.

Researchers are also taking advantage of advances in technology. The Kestrel Corporation conducted a study that suggests that oculomotor dysfunction could be used as an identifier for TBI. Diagnostic imaging advances may prove to have a significant impact on the amount of knowledge physicians have regarding physical damage to the brain. Diffusion tensor imaging (DTI) can help to recognize damage to the white matter of the brain that cannot be seen on MRI or CT scans. This may have a dramatic influence on the detection of mTBI particularly because those who suffer from mTBI generally show no abnormalities on scans. This makes the physicians have to rely solely on the self-report of signs and symptoms from the patient to make the diagnosis.

It may also make a difference in the cases of individuals who suffered mTBI but were misdiagnosed with PTSD and vice versa.

What the government is doing

The Department of Defense (DOD) and the Department of Veterans Affairs (VA) have implemented several initiatives in an attempt to gather more information and aid in the early detection and treatment of mTBI. The DOD has developed a cognitive assessment for service members to complete before and after a deployment. Automated Neuropsychological Assessment Metrics (ANAM) is a computer-based questionnaire geared towards detecting any changes in the cognitive function of an individual. It is a tool used to aid in detection but does not replace diagnostic testing by a physician. The DOD also makes efforts to detect cases of suspected brain injury by using the Military Acute Concussion Evaluation (MACE) screening. The MACE takes into consideration an individual's history and symptoms as well as their neurological and cognitive functioning. A new policy implemented by the DOD requires any military personnel within 165 feet of a blast to be removed from combat for no less than 24 hours. They must also be screened for any signs of concussion, or mTBI. The development of Wounded Warrior regiments across the fields of service allows military members the opportunity detach from their parent unit to recuperate from their wounds and either return to full duty or to transition to civilian life. It is also meant provide support to the injured and their family.

Aside from benefits and compensation, the Department of Veterans Affairs is making great efforts to improve outcomes for those who suffer from the residual symptoms of blast injuries. The VA has set up the TBI Veterans Health Registry to track cases of TBI. Researchers can use the data from the registry to determine the number of individuals diagnosed with a TBI, to compare patient demographics, to evaluate outcomes of care, and to examine the occurrence of TBI with other diseases and disorders. The VA is also performing the MIND study (Markers for Identification, Norming, and Differentiation of TBI and PTSD) in an attempt to make a clear designation between TBI and PTSD and to develop guidelines and criteria to aid physicians in diagnosing. Aside from studies and research, the VA continues to expand their system of care for polytrauma patients, which often includes those suffering from TBI.

Variations in Opinions

There are still a lot of unanswered questions regarding mTBI. While it is reasonable to believe that physicians are doing their absolute best to treat the post concussive symptoms of mTBI, they can only work with the information available to them. In the medical field there is are debates on almost all aspects surrounding mTBI including the basic definition of mTBI and post-concussion symptoms. There are even differences in opinion as to whether terminology of the diagnosis will hinder recovery. Some believe that the brain injury should not be called mTBI because of all of the media attention placed on the term and the perception that it is brain damage. Others believe in fully

educating a patient. If they are diagnosed them with mTBI and post-concussive symptoms, that is exactly what it should be called. Some physicians and researchers even suggest that awarding VA compensation will promote the persistent symptoms and encourage the patient to believe they are permanently impaired.

Conclusion

There is a reason that mTBI is garnering a lot of attention. While it one time it was a well understood condition with clear methods of detection and a predictable prognosis, the nature of the current war has changed that. Mild TBI has become a challenge to identify and is now a condition that is often compounded with other disorders such as PTSD. While there are therapies and medications to aid in restoring normal function and improving the quality of life, treatment for those with persistent symptoms leaves a lot to be desired. The injured military member is often left with physical, cognitive, and behavioral problems that affect all aspects of their life from their families to their level of employability. There is a long road of research, observation, and education ahead before physicians can truly understand the evolving nature of the mTBI that presents due to blast injuries. It may be many years in the future before there are definitive answers to all of the questions, but the process is in motion and thanks to all of the attention TBI is receiving, there should not be any roadblocks to accomplish what is needed.