



DANIEL LAFFIN
Wounded in Paktia, Afghanistan
Traumatic brain injury, severe muscle damage

Some
wounds you
can't see.

Traumatic brain injuries have left thousands with drastically changed lives. The Wounded Warrior Project offers services that ease the burdens of these returning heroes, along with their fellow troops who have suffered other severe physical and mental injuries.

To learn more about what we do and how you can help, go to woundedwarriorproject.org.



WOUNDED WARRIOR
PROJECT

The greatest casualty is being forgotten.

CFC #11425.

Wounded Warrior Project is a 501(c)(3) non-profit organization.

TRAUMATIC BRAIN INJURY (TBI)

Clayton Chau, MD, PhD

Blast is the signature weapon and TBI is the signature injury of the conflicts in Iraq and Afghanistan.

Lieutenant General Eric Schoomaker, the 42nd Surgeon

General of the US Army

What is TBI

- A blow or jolt to the head or a penetrating head injury that disrupts the function of the brain
- Not all blows or jolts to the head result in a TBI
- The severity may range from ‘mild’ to ‘severe’
- It can result in short or long-term problems with independent function

Severity Scale of TBI

Type	Glasgow Coma Scale	Loss of Consciousness	Post traumatic Amnesia
Mild	13-15	30 min or less (or none)	<24 hours
Moderate	9-12	30 min to 1 week	>24 hours to <1 week
Severe	≤8	>1 week	> 1 week

Glasgow Coma Scale

	1	2	3	4	5	6
Eyes	Does not open	Opens in response to painful stimuli	Opens in response to voice	Opens spontaneously	N/A	N/A
Verbal	Makes no sounds	Incomprehensible sounds	Utters inappropriate words	Confused, disoriented	Oriented, converses normally	N/A
Motor	Makes no movements	Extension to painful stimuli	Abnormal flexion to painful stimuli	Flexion / Withdrawal to painful stimuli	Localizes painful stimuli	Obeys Commands

Classification of TBI

Silver, et al. *Text book of Traumatic Brain Injury*, 2005

Primary	Secondary
<p>Injury to scalp</p> <p>Fracture of skull</p> <p>Surface contusions/lacerations</p> <p>Intracranial hematoma</p> <p>Diffuse axonal injury</p> <p>Diffuse vascular injury</p> <p>Injury to cranial nerves and pituitary stalk</p>	<p>Hypoxia-ischemia</p> <p>Swelling/edema</p> <p>Raised intracranial pressure and associated vascular changes</p> <p>Meningitis/abscess</p>

Classification of damage after TBI

Silver, et al. *Text book of Traumatic Brain Injury*, 2005

Focal	Diffuse (multifocal)
Injury to scalp Fracture of skull Surface contusions/lacerations Intracranial hematoma Raised intracranial pressure and associated vascular changes	Diffuse axonal injury Hypoxic-ischemic damage Meningitis Vascular injury

Mechanisms of brain damage after TBI

Silver, et al. *Text book of Traumatic Brain Injury*, 2005

Contact	Acceleration/deceleration
<p>Injury to scalp</p> <p>Fracture of skull with or without an associated extradural hematomas</p> <p>Surface contusions/lacerations and associated intracerebral hematomas</p>	<p>Tearing of bridging veins with formation of subdural hematoma</p> <p>Diffuse axonal injury, tissue tears, and associated intracerebral hematomas</p> <p>Diffuse vascular injury</p>

What we know

- Blast or explosions is the most common wounding etiology of our returning veterans with 50% to 60% of those exposed sustaining a brain injury; occurs almost daily in Iraq and Afghanistan
- Causes: rocket-propelled grenades, improvised explosive devices, bombs, missiles, mortar/artillery shells and land mines
- These attacks often result in TBI or concussion which may occur simultaneously with other more obvious life threatening injuries. Sometimes, in the case of mild TBI, there may be no outward sign of injury
- Delays in treatment can reduce the chance for optimal recovery or result in significant cognitive, physical and/or psychological impairment

Mechanic of Blast Injury

- The explosion causes an instantaneous rise in pressure over atmospheric pressure that creates a blast overpressurization wave
- Primary blast injury occurs from an interaction of the overpressurization wave and the body with differences occurring from one organ system to another
- The overpressurization wave dissipates quickly, causing the greatest risk of injury to those closest to the explosion
- Air-filled organs such as the ear, lung, and gastrointestinal tract and organs surrounded by fluid-filled cavities such as the brain and spinal are especially susceptible to primary blast injury

Elsayed, N. M. Toxicology of blast overpressure. Toxicology, 121, 1-15, 1997

Mayorga, M. A. The pathology of primary blast overpressure injury. Toxicology, 121, 17-28, 1997

Mechanic of Blast Injury (Con't)

- In a blast, brain injuries can also occur by other means such as impact from blast-energized debris, the individual being physically thrown, burns and/or inhalation of gases and vapors
- Blast injuries can be multiple and complex and therefore can not be assessed in the same manner that other brain injuries might be examined
- Best approach in evaluating a brain injury caused by a blast should be based on the mechanism (cause) of the injury

What is the Problem

- U.S. military doctors who have screened returning (not wounded) soldiers and marines at four military bases, found that about 10 percent suffered at least a minor brain injury during combat
- This injury frequently goes undiagnosed because there is no visible wound
- Individuals are sometimes unaware they've suffered a brain injury
- A complicating factor is that the injuries caused by the pressure wave of blasts from insurgents' homemade bombs and improvised explosive devices (IEDs) differ from those on which much of the existing TBI literature is based—mainly results of auto accidents and athletic injuries

Impairments

Neuropsychological impairments caused by brain injury may be characterized in terms of three functional systems:

- (1) Intellect which is the information-handling aspect of behavior
- (2) Emotionality, which concerns feelings and motivations
- (3) Control, which has to do with how behavior is expressed

Symptoms of mild TBI

- Headaches
- Dizziness
- Excessive fatigue
- Concentration problems
- Memory problems
- Irritability
- Sleep problems
- Balance problems
- Ringing in the ears
- Vision change

Consequences

- inability to return to work
- loss of memory
- inability to maintain relationships
- family breakup
- alcohol and drug abuse
- frustration
- anger
- isolation
- heightened risk of a second brain injury



TREATMENTS

Brain Injury Recovery Kit™

- The kit is an innovative system of education, strategies and tools to begin moving into and through recovery
- It offers a flexible approach to recovery that can be tailored to each individual's needs and used at his or her own pace
- Created by Lisa Keller, who sustained a brain injury in 1993, and developed with Sandra J. Knutson, CRC, CDMS, CCM, a former brain injury caseworker and a thirty-year veteran in the brain injury recovery community
- It contains two comprehensive workbooks that provide Information, exercises, review forms, and checklists that constantly track progress and reinforce the lessons on the DVDs

The background features a warm orange-to-brown gradient. Overlaid on this are several stylized, semi-transparent leaf patterns in various shades of orange and brown, creating a textured, autumnal effect.

Suicide Among Veterans

The issues

- Veterans, especially those who have been exposed to combat, trauma, violence and death, are at an elevated risk for suicide compared to the general population
- This elevated risk for suicide may not always be addressed by VA medical staff focused on physical war injuries
- Veterans may be reluctant to ask for help with mental health issues

Mark Kaplan, J Epidemiology and Community Health, June 2007

What we know

- Depression, PTSD and alcohol use are on the rise and common
- The Simpson & Tate (2002) found among vets with TBI, 23% had significant suicidal ideation and 18% had made a suicide attempt
- A vet's lifetime risk of suicide is 3 to 4 times higher than the general population
- Some 70% of all men in America who end their life by suicide are veterans that have served our country
- The most common causes for thinking about suicide among vets include the onset of the symptoms of depression, PTSD, drinking too heavily and relationship conflicts – especially if these occur together

Resources

- www.avbi.org (American Veterans with Brain Injuries)
- www.woundedwarriorproject.org
- www.dvbic.org (Defense and Veterans Brain Injury Center)

