

Blast injuries

Why are blast injuries an important issue?

Diggers are sustaining attacks from explosions or blasts by rocket-propelled grenades, improvised explosive devices (IEDs), and land mines almost daily in deployed settings. Civilian workers and military personnel working in these combat zones are at increased risk of blast-related trauma, particularly blast-related traumatic brain injury (TBI).

Some of the traumatic brain injury (TBI) injuries associated with significant blasts may not be identified acutely for several reasons. Initially, the blast-related TBI or concussion may have occurred simultaneously with other more obvious life threatening injuries. Initially, the focus of medical care providers must be on the most life threatening injuries. Sometimes, in the case of a concussion/mild TBI (mTBI) resulting from a blast, there may be no outward sign of injury. Service members may also be reluctant to endorse acute symptoms because they do not want to be medically evacuated and separated from their unit. Because blast exposure is so common in the combat zones and almost everyone has had some of the acute symptoms of concussion, it may not be identified as problematic until the service member returns home from deployment.

Finally, concussion and TBI related to significant blast exposure are also likely to have other important co-morbid conditions present. For example, the patient may also have combat stress or depression associated with a return from deployment; it is very challenging for the medical providers in these situations to determine what symptoms are due to the concussion and which symptoms are due to the combat stress or depression.

How does blast exposure cause a concussion or a TBI?

A TBI is caused by a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain. Exposure to blast events can affect the body in a number of ways; in addition, these different injury mechanisms can interact and result in more impairments or prolonged periods of recovery.

- Primary blast injury is the result of exposure to the over-pressurisation wave or the complex pressure wave that is generated by the blast itself. This blast over-pressurisation wave travels at a high velocity and is affected by the surrounding environment; for example, the effects of the blast wave may be increased in a close environment such as a vehicle. Air-filled organs such as the ear, lung and gastrointestinal tract and organs surrounded by fluid filled cavities, such as the brain and spinal cord are especially susceptible to primary blast injury. The over-pressurisation wave dissipates quickly, causing the greatest risk of injury to those closest to the explosion.
- Secondary blast injury is the result of energised fragments flying through the air, these fragments may cause penetrating brain injury.
- Tertiary blast injury may occur when the individual is thrown from the blast into a solid object such as an adjacent wall or even a steering wheel. These types of injuries are associated with acceleration/deceleration forces and blunt force trauma to the brain similar to that observed following high speed motor vehicle accidents.
- Finally, quaternary blast injury can occur in the presence of severe blast related trauma resulting from significant blood loss associated with traumatic amputations, or even from inhalation of toxic gases resulting from the explosion.

In summary, TBI resulting from blast exposure can be much more complex compared to TBI from other causes. As such, it is challenging to differentiate blast-related TBI and/or concussion from other conditions.

Finally, it is also difficult to estimate the course of recovery in these cases, as it may vary widely depending on various types of blast injury and other injury variables, such as the size of the blast, distance from the blast, etc. Because of these issues, it may be difficult to assess blast-related TBI and concussion in the same manner that other brain injuries are examined.



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