

Implications for Acute Traumatic Brain Damage Dementia

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Abstract

In light of growing evidence that TBI increases risk for Alzheimer's disease and other dementias, traumatic brain injury (TBI) is recognized as a significant risk factor for the long-term cognitive health of military personnel. This article examines the neurocognitive and neuropathologic changes that can occur following a traumatic brain injury (TBI), with a focus on the potential for military personnel to develop cognitive decline throughout their lives. The aging military population's implications for cognition monitoring and surveillance are discussed. The mechanistic link between these factors and dementia and the provision of empirically supported interventions to lessen the impact of traumatic brain injury (TBI) on cognition across the lifespan require additional research.

Keywords: Alzheimer's disease; Traumatic brain injury; Risk factors; Military medicine; Dementia

Introduction

There is increasing evidence that people with a history of traumatic brain injury (TBI) are more likely to develop neurodegenerative diseases like Alzheimer's disease and other forms of dementia throughout their lives. Emerging evidence suggests that mild head injuries, particularly repeated mild injuries, may also serve as a risk factor. A lot of research has focused on the increased risk of moderate-to-severe brain injuries [1]. Given the growing evidence of dementia risk after TBI, emotional disorders, and other nonspecific factors, and concern for the implications of these factors on the aging service member, both the Department of Defense (DoD) and the Department of Veterans Affairs (VA) have recognized the importance of better understanding this relationship. This article examines neurocognitive and neuropathologic changes following a traumatic brain injury, focusing on the potential for cognitive decline across the lifespan in military personnel with a TBI history. We will begin by defining TBI and describing the anticipated cognitive and behavioral short- and long-term outcomes. After that, we will go over the evidence that having a history of TBI increases the risk of dementia, particularly DAT and chronic traumatic encephalopathy (CTE) [2]. We'll go over military TBI assessment protocols, results, and lessons learned. Finally, we'll talk about the implications for cognition monitoring in the aging military population.

The VA/DoD defined TBI as a traumatically induced structural injury and/or physiological disruption of brain function resulting from an external force that is indicated by new onset or worsening of at least one of the following clinical signs immediately following the event, which is similar to the definition of TBI provided by the Centers for Disease Control and Prevention. any time when consciousness is lost or reduced [3]; any memory loss for events that took place immediately before or after the injury; any mental state change at the time of the injury (for example, confusion, disorientation, slowed thinking); deficits in the brain (weakness, balance loss, vision change, praxis, paresis/plegia, sensory loss, aphasia, etc.) that might or might not be temporary; or an injury inside the skull. This definition adds that external forces may include the head striking an object, the brain experiencing acceleration and deceleration movement without external trauma to the head, a foreign body penetrating the brain, or forces generated by events such as a blast or explosion. This is relevant to the military and veteran populations [4].

Methods

Cognitive, behavioral, emotional, or physical functioning may be

affected in some way by a TBI, which can be mild, moderate, or severe. Depending on the characteristics of the injury and its severity, these effects may be brief, long-lasting, or permanent. The initial symptoms of TBI vary greatly; Consequently, injury severity classification is one of the most significant immediate and long-term outcome predictors [5]. The Glasgow Coma Score (GCS), duration of unconsciousness following injury (e.g., loss of consciousness [LOC] or time to follow commands), or duration of confusion following injury (e.g., length of post-traumatic amnesia [PTA]) are the most common ways to determine the severity of a TBI. Post-injury GCS scores of 8, which indicate a severe injury, and GCS scores between 9 and 12, which indicate a moderate injury, are both commonly used to define injury severity. The majority of definitions require GCS scores of at least 13 for a TBI to be considered mild; To be brief, if LOC and PTA are present (30 minutes and 24 hours, respectively); and neurological studies to produce no abnormal results. An injury that meets the definition of mTBI and has abnormal neuroimaging findings has been referred to as complicated mild TBI (mTBI). Despite the fact that traumatic brain injury (TBI) affects people of all ages, certain risk factors for TBI include being male, having a lower socioeconomic status, coming from a minority racial or ethnic group, having a history of alcohol or other substance abuse, and having a history of TBI. Additionally, military personnel are particularly susceptible to TBI, with prevalence rates estimated to range from 10% to 20% among current military personnel [6].

Results

In the United States, traumatic brain injuries (TBIs) account for approximately 1.7 million TBI-related deaths and disabilities annually. However, military personnel who sustained a TBI abroad or who received treatment in federal, military, or VA hospitals are not included in these rates. Between January 2000 and the first quarter of 2013, more than 270,000 TBIs were recorded in military medical records, according to the Defense and Veterans Brain Injury Center. TBI in the

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Received: 2-Jan-2023, Manuscript No: dementia-23-86434, **Editor assigned:** 4-Jan-2023, Pre QC No: dementia-23-86434 (PQ), **Reviewed:** 18-Jan-2023, QC No: dementia-23-86434, **Revised:** 23-Jan-2023, Manuscript No: dementia-23-86434 (R), **Published:** 30-Jan-2023, DOI: 10.4172/dementia.1000145

Citation: Luis C (2023) Implications for Acute Traumatic Brain Damage Dementia. J Dement 7: 145.

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nondeployed population actually exceeds that of combat-related TBI, despite the fact that TBI caused by combat or a weapon is frequently regarded as the most common injury among service members deployed to Iraq and Afghanistan since 2001. The majority of TBIs that are diagnosed in the DoD and VA are consistent with mTBI (82%), with blast-related causes being the primary cause. Similar to the civilian population, motor vehicle or land transport accidents, falls, injuries sustained in sports and recreation, and TBI are the other major causes. The four most common causes of severe and penetrating TBI are blast, motor vehicle accident, falls, and head or neck gunshots. The impact of a traumatic brain injury (TBI) on cognition and recovery varies depending on the severity of the injury [7]. As shown in Fig., individuals who sustain a mTBI typically experience transient cognitive (such as mild confusion, difficulty maintaining attention, and forgetfulness), emotional (such as tearfulness, irritability), and physical symptoms (such as headaches, sensitivity to light, and blurred vision) that begin immediately following the injury and improve over the course of days or weeks. 1. The majority of research demonstrates that individuals with straightforward mTBI typically return to their pre-injury cognitive functioning within one to three months and are anticipated to have a favorable long-term outcome.

Discussion

There is evidence that repeated mTBI or complicated mTBI may also put individuals at risk for a prolonged or atypical recovery course, and prolonged recovery course has been associated with more severe acute injury indicators such as unconsciousness, PTA, or initially more severe symptoms. Evidence suggests that incomplete recovery from mTBI may be linked to or complicated by preexisting or comorbid psychiatric, medical, psychosocial, or litigation factors in a small number of individuals outside of this window. Section 5 will go into greater depth about the poorly understood etiology of persistent complaints among some military service members following mTBI. In contrast, individuals with moderate-to-severe TBI may be unable to return to their previous levels of functioning due to persistent or even chronic impairments [8]. These individuals are significantly more likely than those with mTBI to require acute hospitalization, inpatient or post-acute rehabilitation, and outpatient care for their injuries. During the early recovery period following moderate-to-severe TBI, there are a number of predictable phases. Even though these stages appear in the same order, some may not appear at all and their lengths may vary. The most severe forms of coma and persistent vegetative state (PVS) are the most common signs of impaired consciousness immediately following an injury. A period of pre-sent PTA, in which the patient is responsive but markedly confused and amnesic, typically follows the resolution of coma and PVS. Most people with moderate-to-severe TBI continue to have cognitive and neurobehavioral impairments after PTA is over. These impairments vary depending on factors like the severity of the injury, premorbid functioning, comorbid neurologic and psychiatric status, and time since the injury. Impairments in fine motor speed are typical of cognitive impairments; attention; speed of cognitive processing, memory, and learning complex discourse and language; as well as executive duties.

Conclusion

Individuals with focal injuries may exhibit circumscribed or localized cognitive impairments, such as language or visual spatial impairment, but these impairments typically occur overlaid on global cognitive dysfunction caused by diffuse injury. In addition to these cognitive changes, moderate-to-severe TBI may cause a number of neurobehavioral changes, which this article does not go into detail about. These changes include, but are not limited to, decreased awareness, inhibition, impulsivity, impaired social pragmatics, and decreased judgment. With moderate-to-severe injuries, cognitive and neurobehavioral functioning typically improves, with the greatest recovery occurring within the first six months and lasting for at least 18 months.

Improvement in more complex cognitive skills like problem-solving and executive functioning occurs before improvement in basic cognitive skills like immediate attention and orientation. At one month after injury, almost all patients with moderate or severe TBI have measurable cognitive impairments in large prospective studies. By one year, most people with very severe injuries have cognitive impairment, and more than half of people with moderate to severe impairment still have some deficits. Cognitive function recovery typically reaches a plateau after 18 to 24 months; however, some subgroups will continue to improve after this point, while others may show late decline. An increased risk of late decline may be linked to higher levels of depression and older age at the time of injury.

Declaration of Interest

The authors declared that there is no conflict of interest.

Acknowledgement

None

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