Traumatic Brain Injury and Suicide
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ABSTRACT
A number of psychiatric and neurological problems may occur following traumatic brain injury (TBI). Anxiety and depression are common. There is evidence that there may be a correlation between TBI and increased risk of suicide. This article will explore current literature on the risk of suicidal behavior in people who have experienced TBI. Risk factors for suicide, recognition and assessment of suicidal behavior, and treatment issues will be discussed.

This article explores current literature on the risk of suicide in individuals who have experienced traumatic brain injury (TBI). TBI may be defined as any extracranial mechanical force to the brain that results in any period of loss of consciousness, any loss of memory for events immediately before or after the event, or any alteration in mental status at the time of the event (Kim et al., 2007). TBI is a leading cause of death and disability (Coronado et al., 2011). In the United States, approximately 230,000 people experience TBI annually, making the disorder a serious health problem (Coronado et al., 2011).

Major causes of TBI include automobile accidents, falls, sporting injuries, and assaults. Many soldiers returning from military combat have also experienced TBI. The incidence of combat-related TBI appears to be increasing. The reason is likely because with improved synthetic body armor, the thorax and abdomen are better protected, and soldiers often survive explosive injuries that would have been fatal in earlier eras of combat. However, similar advances have not been made in protecting the head, and the brain is still vulnerable to injury. Fiber tracts in the central nervous system may be damaged by concussive force with resultant functional impairment, while the brain may still appear grossly normal structurally.
TBI may affect many aspects of neurological functioning, including causing problems with motor, sensory, and autonomic functioning; cognition; concentration; problem solving; and memory; as well as possibly leading to problems with psychological functions, such as disinhibition, aggressiveness and impulsivity, and poor emotional control (Khan, Baguley, & Cameron, 2003). TBI is associated with a wide range of psychiatric disorders, including depression and anxiety, which may complicate recovery from cerebral injury (Hesdorffer, Rauch, & Tammenga, 2009). There may also be an association between TBI and increased risk of suicide.

Although several classification systems for suicidal thoughts and behavior have recently been formulated, for this discussion, we will use the Self-Directed Violence Classification System (SDVCS) adopted by the U.S. Department of Veterans Affairs in collaboration with the Centers for Disease Control and Prevention (Brenner, Breshers, et al., 2011). The SDVCS defines suicide as any death caused by self-inflicted injurious behavior performed with any intent to die as a result of that behavior. The term suicide attempt refers to any nonfatal self-inflicted injurious behavior performed with the intent to die as a result of that behavior. Suicidal ideations are defined as thoughts of engaging in suicidal behavior where the individual has thoughts of suicide (a) without suicidal intent, (b) with an undetermined degree of suicidal intent, or (c) with some suicidal intent.

HOW COMMON IS SUICIDALITY IN PEOPLE WITH TBI?

Some TBI outcome studies, especially those with small samples, have not shown an increased risk of suicide in TBI patients. Two large studies—one involving 2,320 people with TBI in California (Shavelle, Strauss, Whyte, Day, & Yu, 2001) and another involving 2,178 patients in the TBI Model Systems National Database (Harrison-Felix, Whiteneck, DeVivo, Hammond, & Jha, 2006)—did not find a significant difference between the observed rates of death and the rate expected from normal population data. However, a number of investigations have reported evidence of increased suicide-related behavior in those with TBI. Simpson and Tate (2002) reported that 35% of outpatients with TBI had significant levels of hopelessness, 23% had had suicidal ideation, and 18% had made a suicide attempt post injury. Silver, Kramer, Greenwald, and Weissman (2001) found that individuals with a history of TBI reported a higher frequency of suicide attempts than those who had not had TBI (8.1% versus 1.9%). Thus, some evidence suggests there may be a correlation between TBI and increased risk of suicide, and there is certainly enough evidence to warrant clinicians being alert to this potential problem.

RISK FACTORS FOR SUICIDALITY IN PEOPLE WITH TBI

TBI and suicide share many of the same antecedent risk factors. These include younger age (usually mid-adolescence to mid-20s), male sex, lower socioeconomic status, psychological disturbances, aggressiveness, and the presence of alcohol or drug abuse. In many cases, it may be difficult to determine how much antecedent factors contribute to suicide compared with the TBI itself. Additional factors that may adversely influence a person with TBI toward suicide include cognitive and motor disturbances due to brain injury; increased impulsivity; personality changes; post-injury changes in capacity (both mental and physical); changes in work status, income, and quality of life; and psychiatric problems (Kuipers & Lancaster, 2000).

Severity of TBI

The risk of suicide may be influenced by the severity of TBI. Teasdale and Engberg (2001) found that patients who had experienced traumatic intracerebral hemorrhages had a significantly greater risk of suicide than those with a concussion or an uncomplicated cranial fracture. (Notably, there was some increase in risk even among those who had only a concussion.) However, it should be noted that Simpson and Tate (2002) found no relationship between severity of head injury and suicidal ideation and hopelessness in a study of 172 outpatients with TBI, so this effect may be evident only when large numbers of TBI patients are considered. A later systematic review of the literature by the same authors (Simpson & Tate, 2007a) found an elevated risk of suicide for people with severe TBI compared with those with cerebral concussion.

Depression

Depression is known to be a risk factor for suicide. Individuals with TBI are at substantially greater risk for depression than people in the general population; this includes increased risk even among those with mild TBI (Oquendo et al., 2004). Major depression following TBI is often associated with executive dysfunction, negative affect, and prominent anxiety symptoms, which may hinder a person’s recovery from the injury. Depression and related symptoms may persist for years after the TBI. In addition to mood disturbance due to the psychological devastation that may occur with losses associated with head trauma, a neurophysiological basis has been postulated to explain depression subsequent to TBI. The hypothesis has been advanced that depression may occur with deactivation of lateral and dorsal prefrontal cortices and increased activation of ventral limbic and paralimbic structures, including the amygdala (Jorge et al., 2004). This phenomenon could be compared with the development of depression, which sometimes follows a stroke involving the left frontal region.

Depression appears to be related to the severity of TBI. A significant association has been demonstrated between TBI severity and symptoms of depression at 6 months post injury (Satz et al., 1998). Persistence of disability 5 to 7 years post injury may be associated with depression, anxiety, and low self-esteem (Whitnall, McMillan, Murray, & Teasdale, 2006). Thus, a patient’s
perception of his or her degree of post-injury impairment of functioning could lead to increased depression and risk of suicidality independent of physiological mechanisms related to head injury producing depression.

Substance Abuse

Substance abuse is a risk factor for both suicide and TBI. Alcohol abuse occurs at greater frequency among TBI patients who commit suicide, and the presence of substance abuse may markedly raise the risk of suicide for TBI patients (Teasdale & Engberg, 2001). The literature suggests that abuse of drugs or alcohol prior to TBI puts patients at a higher risk for suicide after TBI occurs (Wasserman et al., 2008). In one study, patients with comorbid post-TBI psychiatric disturbances and substance abuse were 21 times more likely to have made a post-injury suicide attempt than individuals without such a history (Simpson & Tate, 2005). Thus, a history of substance abuse should alert the clinician that a TBI patient may be at higher risk for suicide. This is an even greater problem if the substance abuse is ongoing post injury.

Posttraumatic Stress Disorder

An event that causes a TBI may also result in posttraumatic stress disorder (PTSD); for example, a combat-acquired head wound may produce TBI, with the events surrounding the head wound resulting in PTSD. Thus, some patients with TBI will also have PTSD. Mental rehearsal of painful and provocative experiences may have an undesired impact on suicide risk (Bryan & Anestis, 2011). Brenner, Betthauser, et al. (2011) studied veterans with PTSD and/or TBI. PTSD was associated with increased risk of suicide for individuals with and without a history of TBI, supporting exploration of PTSD history when assessing suicide risk among veterans with and without TBI. It is not known whether PTSD independent of the event that caused the traumatic injury is a risk factor for suicide in people with TBI. The presence of major depression comorbid with PTSD may further increase the risk of suicide-related behavior (Oquendo et al., 2003).

Aggressiveness and Impulsivity

Individuals with aggression and impulsivity are at increased risk for TBI. In TBI patients, impulsivity and aggressiveness may be pre-injury traits or may be symptoms occurring secondary to frontal lobe damage during TBI, resulting in disinhibition. In a TBI patient, it may be difficult to ascertain to what degree these symptoms are due to preexisting traits or to the head injury. However, regardless of the etiology, TBI patients who exhibit impulsivity or aggression are at increased risk for suicide.

Other Risk Factors

Other risk factors that increase the risk of suicide in the general population could conceivably increase the risk in people with TBI. Although not definitely established, these could include family history of suicide, poor social environment support (e.g., homelessness, unmarried status), possession of firearms, presence of medical conditions such as seizures, and other factors. However, the relationship between these factors and the risk of suicide in people with TBI has not been established, and further research is needed before their contribution can be stated unequivocally.

WHEN IS SUICIDE MOST LIKELY TO OCCUR FOLLOWING TBI?

Prediction of the time period in which suicide is most likely to occur following TBI is difficult. One study found the interval between injury and suicide to be 8 years for people with identifiable brain lesions and 11 years for those with a concussion (Mainio et al., 2007). Another investigation found the highest incidence to be 3 to 3.5 years post injury for all TBI patients, with no difference among diagnostic groups (Teasdale & Engberg, 2001). In that study, the researchers concluded that overall, there is no evidence of a specific risk period for suicide after injury and that the risk is relatively constant for 15 years (Teasdale & Engberg, 2001). One investigation showed occurrence of suicidal ideation up to 33 years after TBI (Anstey et al., 2004). Thus, no definite conclusions can be drawn as to higher times of risk of suicide following TBI. The safest approach to treatment is to maintain vigilance for the potential for suicide in TBI patients throughout their clinical course.

CLINICAL ISSUES

Management of the risk of suicide in patients with TBI is in many ways similar to management of the same issue in the general population but may also include factors specific to the TBI population (Kuipers & Lancaster, 2000; Reeves & Brister, 2009; Simpson & Tate, 2007b). Clinical issues that should be considered include detection, reduction, and management of suicidal ideation or behavior; treatment of concurrent mental health, substance abuse, medical, or neurological problems; counseling and psychotherapy; and improvement of social functioning.

Detection of Symptoms of Suicidality in TBI Patients

Simpson and Tate (2007b) noted three factors that are of specific importance in the detection of suicide risk in people with TBI. First, most people with TBI seek help initially for medical reasons and may not mention psychological distress or suicidality if not queried about these issues. Thus, the first practitioners to have an opportunity to detect psychiatric problems in TBI patients may not be mental health professionals but primary care clinicians. Questioning TBI patients about suicidal ideation on a periodic basis, even in nonpsychiatric settings, is important. Screening tools for depression, such as the Patient Health Questionnaire-2 (PHQ-2) (Kroenke, Spitzer, & Williams, 2003) or the PHQ-9 (Kroenke et al., 2001), may be performed quickly and help detect unrecognized depression (Thibault & Steiner, 2004). The Suicide Potential Index (SPI) and Suicide Ideation scales of the Personality Assessment Inventory (PAI, Morey &
Patients with a history of traumatic brain injury (TBI) are at increased risk of suicide, and risk of suicidality in some TBI patients may not decrease with time.

2. Psychotherapy may need to be directed more toward helping patients develop effective coping skills and compensatory strategies to deal with the impact of the TBI, rather than focusing on self-insight and feelings.

3. Because many suicides in TBI patients involve self-poisoning, close attention should be given to how medications are prescribed, dispensed, and administered.

4. Improving and maintaining social functioning is particularly important for TBI patients. Also, their family members often need education to improve problem solving and behavioral coping skills.

It is important to recognize warning signs of suicide in TBI patients, some of which may not be obvious. Direct self-reported symptoms of depression or hopelessness may often be easily recognized, but clinicians must also be alert to more subtle comments indicating hopelessness (e.g., “I’m tired of being this way”) and to nonspecific global references to the impact of the TBI (e.g., “Nothing can be done to treat brain injuries”). Reports of relationship conflicts (especially new ones), such as arguments with formerly close friends or family, may suggest increased risk of suicide. Similarly, difficulties with work, financial stressors, social isolation, and loss of people close to the patient may portend increased risk in the suicidal patient (Simpson & Tate, 2007b).

Reduction and Management of Suicidality in Patients with TBI

Practice guidelines for the reduction and management of suicidal ideations and behavior in people with TBI are not fully defined. Several strategies for the general population are useful for patients with TBI (Simpson & Tate, 2007b). Kuipers and Lancaster (2000) suggested approaches for the general population with modifications for TBI patients.

It should first be noted that if a suicide attempt is considered imminent or likely, the situation should be treated urgently. Patients with active suicidal ideations should be sent to a psychiatric emergency service and hospitalized to assure safety. Such patients should not be left alone or unobserved during transfer or assessment. In some cases, involuntary hospitalization may be warranted. Careful assessment and treatment on a psychiatric unit is often necessary (Wasserman et al., 2008).

Treatment of suicidal ideations and behavior in patients with TBI should be multifaceted and include consideration of neurological, psychological, and psychosocial factors. A multidisciplinary team approach should be used. Proactive assessment of suicidal ideation and reducing the lethality of the environment (e.g., removing firearms) are important first steps. Patients should be provided appropriate pharmacotherapy in conjunction with neuropsychosocial treatment and psychosocial support.

Treatment approaches need to take into account the chronic nature of suicide risk in patients with TBI. Because most suicide deaths and attempts involve self-poisoning, management should include close attention to how medications are prescribed, dispensed, and administered (Simpson & Tate, 2007b). Monitoring the patient during the months after discharge from a psychiatric hospitalization is indicated. Close monitoring and support should occur for at least 12 months after a suicide attempt, and making additional provision for the availability of long-term support is important (Kuipers & Lancaster, 2000).

Treatment of Concurrent Mental Health and Medical Problems

Proactive management of mental health problems is an important clinical priority and strategic component.
of suicide prevention efforts. Mental health issues such as depression and other mood disorders, anxiety, cognitive impairment, and other post-TBI psychiatric issues affect TBI patients profoundly and should be given attention early in the course of treatment. Similarly, issues related to substance abuse must receive prompt recognition, including addressing ongoing substance abuse and initiating preventive measures against development of abuse in non-users. Medical and neuropsychological problems may negatively affect TBI patients, and appropriate referral to address these issues is warranted (Anstey et al., 2004; Simpson & Tate, 2007b).

Counseling and Psychotherapy

For certain TBI patients with suicidal ideations or behavior, counseling may help address comorbid issues, and psychotherapy may help prevent mood problems. Counseling may include caring and listening, emotional support, coping strategies, educational interventions, and even telephone interventions. Psychotherapeutic techniques may range from psychosocial support to more intense psychological and neuropsychological programs, such as cognitive-behavioral therapy and cognitive remediation (Snell, Surgenor, Hay-Smith, & Siegert, 2009).

Treatment approaches may require modification for patients with TBI. Effects of cognitive impairment, personality changes, and psychosocial difficulties that are consequences of TBI may limit effectiveness for significantly impaired patients. However, treatment may be helpful for individuals with mild TBI if they have adequate cognitive awareness to communicate with and understand information communicated by the therapist. Interventions for patients with TBI often focus on ways to deal with the consequences of the brain injury. The approach is directive and attempts to help patients and their families develop effective coping and compensatory strategies to cope with emotional problems resulting from brain injury. Other issues that could be addressed include altered peer and family relationships, issues of learned dependency, and achieving long-term adjustment in the face of persisting cognitive difficulties (Snell et al., 2009).

Improvement of Social Functioning

Strategies aimed at improving psychosocial functioning are vitally important for TBI patients, perhaps more so than for the general population. Because of the severe social impairment and depression that often follow the occurrence of TBI, early and ongoing social intervention is needed in TBI patients with poor social support. Preventing the patient from becoming isolative from the rest of society is important. Social impairment, fear of job loss, and diminished interpersonal relationships are associated with major depression throughout the first year after TBI. These factors may continue to contribute to depression throughout the course of the illness. Functional outcome after TBI is to some degree dependent on effective social support and avoidance of depressive episodes (Gomez-Hernandez, Max, Kosier, Paradiso, & Robinson, 1997).

TBI may make a profound impact on the patient’s family, and the effect of the family on patient welfare should not be overlooked. Education aimed at improving problem solving and behavioral coping skills of family members in response to TBI is often helpful for both the patient and his or her family members (Coco, Tossavainen, Jääskeläinen, & Turunen, 2011).

AVAILABLE RESOURCES

Several reviews and resources are available to help clinicians address suicidal behavior in patients with TBI. An approach to preventing suicide in patients with TBI, written in a concise, easy-to-understand format, has been developed by Simpson and Tate (2007b). A helpful compilation of clinical information on care of people with TBI is available free online (Trevina, Cameron, & Porwal, 2004) and includes links to a number of valuable resources on a variety of TBI topics. A staff education workshop that provides suicide prevention training for clinicians caring for patients with TBI has also been developed (Simpson, Winstanley, & Bertapelle, 2003).

CONCLUSION

Clinicians should be aware that there may be an increased risk of suicide and take this factor into account when treating TBI patients. It is important for not only mental health professionals but also primary care clinicians to be aware of the possibility of increased risk. Patients with TBI should be periodically assessed for suicidal ideations, and those with risk factors such as substance abuse, aggressiveness and impulsivity, comorbid psychiatric disorders, poor social environment, and presence of medical disorders associated with suicide should be monitored closely. Risk factors should be minimized as much as possible. The treatment approach to people with TBI at risk for suicide should be individualized and multifaceted and involve a physical, emotional, and cognitive approach. In addition, it is imperative that comorbid mental health issues, such as depression, PTSD, and substance abuse, be recognized and addressed.

REFERENCES


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Received: September 1, 2011
Accepted: January 12, 2012
Posted: February 15, 2012
doi:10.3928/02793695-20120207-02

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