Description

Acquired or traumatic brain injury (TBI) is a leading cause of death and disability and therefore poses a significant public health challenge. In Australia the incidence of brain trauma is approximately 135,000/year of which 84% display health problems for extended time periods. A 2008 report from "Access Economics" showed that the lifetime costs of brain and spinal cord injuries occurring in 2008 alone was $10.5 billion. In the United States, approximately 1.7 million people sustain a TBI annually; there are approximately 52,000 TBI related deaths and 275,000 hospitalizations annually, with many of these patients suffering permanent disability. An estimated 300,000 American military personnel have suffered head injuries, mainly from blast exposure. Worldwide, brain trauma is most frequently caused by motor vehicle accidents, falls and contact sports.

Trauma progresses over two phases: the first phase or the primary phase constitutes physical damage to brain tissue which occurs within minutes following a mechanical impact to the head. Over the hours, days and weeks following injury the secondary phase ensues. This involves breakdown of the blood-brain barrier leading to bleeding and fluid build-up in the brain, inflammation or swelling of the brain and death of brain cells. System-wide issues such as hypoxia or oxygen starvation and hypotension or low blood pressure also occur during the secondary phase of brain trauma.

Trauma also results in behavioural impairments such as severe depression and/or panic and anxiety attacks and delusional, paranoia, and excessive compulsive disorders. TBI-induced physical impairments include recurrent headaches, coordination problems and mild or moderate seizures. Additionally TBI is the leading environmental risk factor for Alzheimer's disease, as well as other dementias including chronic traumatic encephalopathy.

Treatment

Most therapies for TBI have focussed on the prevention and/or reduction of secondary brain injury because the primary phase, although avoidable, is not preventable. During the initial period after TBI, system-wide complications such as hypotension and hypoxia are targeted in that continuous monitoring of blood pressure and oxygen saturation is carried out together with resuscitation. Intensive care is aimed at maintaining blood flow, oxygen supply and nutrient supply in the brain. Although clinical trials are still ongoing, current pharmacological means to improve recovery following TBI have been modest at best. Unfortunately there are no therapies available to rescue the damaged brain and therefore patients rarely fully recover their motor and cognitive function and most patients require long-term rehabilitation.

Prognosis

Brain trauma is heterogeneous in that no two patients have the same clinical presentation which makes prognosis extremely complex. Prognoses reflect on clinical assessments such as the Glasgow Coma Scale (a measurement of injury severity), neurological abnormalities and imaging studies, as well as measurements of intracranial pressure (pressure within the head), which enable clinicians to decide on the nature of brain injury and its effects on the brain. Age, gender and genetic factors also affect TBI prognosis.