Statistical Considerations and Medical Treatment for Severe Head Injuries

Victoria Wilson*

Editorial office, Journal of Neurology & Neurophysiology, Brussels, Belgium

Corresponding Author*

Victoria Wilson
Editorial office, Journal of Neurology & Neurophysiology, Brussels, Belgium
E-mail: Wilson8989@gmail.com

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Abstract

High morbidity rates are linked to head injuries, which happen often. In the past, severe injury has gotten greater attention. The purpose of this study was to describe a large group of adult patients, older than 14 years, who had suffered severe head injuries and were treated at the University Hospital of Getafe between 1993 and 2015 (n=86), to study the epidemiological profile, to analyse the most appropriate diagnosis and course of action, and to identify the key prognostic factors that affect the outcome.

Keywords: Intracranial pressure • Coma • Severe head injury

Introduction

Brain injury significantly contributes to the fatal outcome in more than half of deaths, which makes traumatic injuries the top cause of death for people under 45 in industrialized nations. The severity of the shock is the key factor affecting the eventual evolution. Based on the countries and epidemiological parameters utilized, head injury incidence rates range from 50 to 4,500 per 100,000 people per year. The average is 200 to 300 per 100,000 people every year if data on brain injury (such as memory loss, post-traumatic amnesia, or other symptoms) are excluded [1].

Traumatic Brain Injury (TBI) is a disruption of the brain's normal function that can be brought on by a blow, bump, or jolt to the head, by the head violently slamming into something, or by an object piercing the skull and entering the brain tissue. Any one of the following clinical symptoms indicates a change from how the brain normally functions:

- Diminished or lost consciousness.
- Memory loss for the events leading up to or following the incident (amnesia).
- Focal neurological impairments include muscular weakness, visual loss, and speech changes.
- Change in mental state, such as confusion, sluggish thinking, or trouble focusing.

Between 75% and 90% of all cranial trauma, cases correspond to mild injury, 5% and 25% to moderate injury, and 5% and 20% to severe injury. This means that for every 100,000 people, there are between 150 cases and 270 cases of mild injury, 5 cases to 60 cases of moderate injury, and 5 cases to 50 cases of severe injury each year. The fact that the criteria for including and categorizing patients adopted in the various works significantly impact these statistics helps explain why these numbers vary so greatly. Knowing the pathophysiology of cranial trauma is crucial for establishing prognostic standards, predicting clinical progression, and proposing an appropriate course of treatment.

Head injury prognostic variables

Age and prior diseases are clinical prognostic factors: With increasing patient age, the outlook is unquestionably poorer. Though younger children die more frequently than older children or young adults, youngsters have a better prognosis overall. Although it is obvious that the risk rises in the presence of conditions like hypertension, aortic stenosis, and cardiovascular, renal, or pulmonary disorders, which are processes that are more common in the elderly, it is unclear how ageing negatively affects health [2]. Furthermore, localised lesions, which often have a worse prognosis, are more common in the elderly (subdural hematomas brought on by falls or aggressive behaviour) than in young persons (diffuse lesions or epidural hematoma, due to traffic accidents). It is clear that this type of lesion is more likely to occur in older people due to cerebral atrophy, altered cerebral elasticity, and arteries.

Economic and social variables: Patients with higher levels of education, income, or professional experience are more likely to return to work, and the IQ previous to the trauma has a demonstrable influence on the final cognitive results. After an injury, psychiatric issues are more likely to develop if there has been past emotional instability.

Conscience level scores on the Glasgow scale for comas achieved by the ill: The duration of the altered state of consciousness as well as the extent of the injury are without a doubt the primary determinants of the final progression. Patients with scores of 3 and 4 in severe cranial damage had much higher mortality than patients with scores of 7 and 8 and those with scores of 5 and 6 exhibit a great deal of variability, therefore additional information is required for this last subgroup in order to make prognostic predictions [3]. In this section, it is important to note that between 10% and 38% of patients with severe injuries are thought to experience lucid periods during which their physical examinations are normal, which can be deemed mild and later deteriorate into a coma.

Explicit cranial problems caused by injuries: It is thought that up to 50% of severe injuries are accompanied by systemic injuries, which are extremely common with cranial trauma. The prognosis is logically worsened, especially if hypotension (16% of significant traumas have hypotension) and hypoxemia (37% of serious traumas) are present [4]. The systemic ailment that has the most impact on the patient's eventual course is the thoracic trauma. Hypotension, pneumonia, coagulopathy, and septicemia are extracranial consequences that have a noticeably larger impact on the prognosis.

Physical prognostic indicators

Cranial pressure: A bad prognosis is associated with an ICP increase above 20 mmHg. This is a very dependable indicator that is closely related to blood pressure readings, along with age, Glasgow scale score, and pupillary abnormalities. Additionally, intracranial hypertension results in significant memory changes in people who survive.

Brain metabolism and blood flow: According to measurements of cerebral blood flow, hyperemia and/or ischemia are linked to a poor prognosis. Additionally, studies have been done to measure the oxygen or glucose consumption index, and the variations from the expected values imply a worse progression.

Development of a head injury: From death rates to complex techniques for evaluating biological and psychological consequences, a variety of systems have been employed to show the progression of brain injury. Due to their

simplicity of calculation and the fact that the majority of fatalities occur soon after an accident, it is not essential to evaluate extended stretches of time when calculating mortality rates. According to estimates, up to 60% of patients with severe injuries pass away at the scene of the event. Although the estimates range from 30% to 76%, with an average of 40%, the first indices published at the start of the XX century indicated a 70% death rate for severe injuries in the hospital environment [5].

Conclusion

The Glasgow Outcome Scale is one of the most often used systems to categorise results from head injuries (GOS). Patients who have had a moderate brain injury, often indicated by a GCS score between 13 and 15, typically recover successfully. Headaches, vertigo, irritability, and other symptoms are possible, but they often subside over time. Patients who suffer mild head traumas do less well. An estimated 25% of patients will have a moderate degree of disability, whereas approximately 60% will recover well. In roughly 7% to 10% of cases, the conclusion will be death or a chronic vegetative state. The remaining patients will all have profound disabilities. It was crucial and challenging to evaluate the prognosis following traumatic brain injury. Numerous prognostic factors that were associated to the outcome were available and could be useful. The strongest independent factors were: age, Glasgow Coma Scale motor score, pupil response, Marshall CT categorization, and traumatic subarachnoid haemorrrhage. Hypotension, hypoxia, hypoglycemia, coagulopathy, haemoglobin, and categories of CT characteristics, such as mid-line shift, mass lesion, and basal cistern, were also significant predictive markers.

There was no prognostic value for gender or intraventricular haemorrhage. There are two TBI Prognosis Calculators on the Internet that can be used to estimate outcomes, but they should only be used with care. New prognostic indicators that are better related with outcomes following traumatic brain injury are needed to be studied in great detail for this topic.

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