



Traumatic brain injury

The need for support and follow up



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BACKGROUND

Mild traumatic brain injury (MTBI) is the commonest type of brain injury. It is sometimes difficult to select patients who require ongoing follow up to avoid the sequelae of MTBI.

OBJECTIVE

This article outlines the diagnosis and management of MTBI using case vignettes.

DISCUSSION

General practitioners should be aware of the possible long term sequelae that may be the result of external factors, and provide support, follow up and education to patients with a history of MTBI. The management of postconcussive syndrome and MTBI are also discussed.

The classification of minor head injury or mild traumatic brain injury (MTBI) is not uniform in the literature and confounds the ability to compare outcomes and the effectiveness of interventions across studies. Both the time of recovery and the presence of residual deficits can vary depending on the definition used. For treating general practitioners it can be difficult to select patients who require follow up or ongoing monitoring to ensure that the sequelae of their MTBI do not have a major impact on their lives.

Following a mechanical force applied to the head, both superficial head injuries and brain damage can occur. It is generally expected that following MTBI recovery from the neurological sequelae will occur and is more rapid than with moderate to severe injuries.^{1,2}

Definition

A definition of MTBI by the Mild Traumatic Brain Injury Committee of the Head Injury Special Interest Group of the American Congress of Rehabilitation Medicine³ describes a person who has traumatically induced physiological disruption of brain function including one of the following:

- any period of loss of consciousness
- any loss of memory for events before or after the accident
- any alteration in mental state at the time of the accident (eg. feeling dazed, disorientated, confused), and
- focal neurological deficits that may or may not be transient.

The definition also provides upper limits for the severity of injury. In MTBI:

- loss of consciousness does not exceed 30 minutes
- Glasgow Coma score is 13–15 at 30 minutes postinjury, and
- post-traumatic amnesia (time from injury until the return of continuous memory) is not greater than 24 hours.

In this definition there is a wide range of injury with a lower limit that can include individuals with head trauma without brain injury. Suggested modifiers to the definition to tighten the lower limits of MTBI have included the need for a period of admission to hospital, and a minimum period of altered consciousness of 15 minutes.

The American Academy of Neurology guidelines breakdown concussive injury into three grades. In the first two grades there is transient confusion, no loss of consciousness

and the grading depends on whether the concussion symptoms or mental status abnormalities last longer than 15 minutes. Grade 3 concussion is loss of consciousness for seconds or minutes. It is recognised that grade 2 and grade 3 concussion can lead to permanent brain injury.

Postconcussive symptoms

Bernstein et al⁴ noted constellations of symptoms occur after mild brain injuries known as postconcussive symptoms (PCS). He grouped these into:

- physical symptoms (dizziness, fatigue, sleep difficulty, nausea, headache, blurred vision, and sensitivity to intense light and sound)
- cognitive symptoms (difficulty concentrating, problems with memory and impaired problem solving), and
- behavioural and affective symptoms (irritability, anger outbursts, depression, anxiety and poor social functioning).

These complaints are very common in the early weeks after MTBI.^{5,6} Cognitive PCS can be measured on neuropsychological testing and usually resolve within a few months. However, physical and behavioural symptoms can be more subjective and can persist.

Outcome

Early PCS are likely to be the result of organic brain damage, but when they persist beyond 3 months there is often involvement of nonorganic factors. Kibby and Long⁷ listed substance abuse, increasing age, low educational achievement, low level job skills, premorbid personality traits which include ineffective coping mechanisms, pre-existing emotional distress, and a neuropsychiatric history as factors which could prolong the presence of PCS. They also cite research that demonstrates that other non-neurological injuries occurring at the time of the brain injury (eg. neck injuries) can prolong PCS and lead to a worse functional outcome.

Recovery from MTBI may also be compromised by external factors such as the availability of compensation payments that can reduce incentive to return to work

in individuals with PCS. On the other hand, good family supports can positively influence outcome. Individuals who suffer from brain injury of all severity, but particularly minor trauma, may have no obvious physical sequelae from their accident and have no clear disability in day-to-day social functioning or when engaging in well learned activities. However, they recognise changes to their thought processes, emotional control and levels of fatigue that are not noticed or acknowledged by friends, family or co-workers, and often only become more apparent when individuals are challenged by more complex situations, or when time pressures are applied such as on return to work. This leads to anxiety and increases stress as individuals feel they are being looked upon as malingering, or lacking motivation and pressured to perform up to pre-accident levels.

General practitioners consulted about PCS can often underestimate the effects of symptoms on daily functioning and patients may feel unsupported. Often there is too much reliance placed on a normal

computerised tomography (CT) brain scan or magnetic resonance imaging (MRI) to rule out brain injury, and often the severity of the injury is underestimated where there is no evidence of a direct blow to the head (eg. deceleration injuries) or only transient loss of consciousness. While in most cases PCS only last for a few months, it must be noted that in some cases, symptoms can persist for years.^{8,9}

It should also be noted that the standard cognitive screening carried out in a mini-mental state examination will often not demonstrate the subtle changes in concentration, memory or speed of information processing reported by the patient after MTBI. Formal neuropsychological examination with more complex tests of memory and concentration is often the best way of defining and quantifying the problems associated with MTBI.

In other circumstances individuals who are high functioning can deny their own symptoms and attempt early return to work and become stressed by failure to perform up to pre-accident levels. These people are

Case study – Jasmine

Jasmine, a 24 year old nurse, fell and hit her head while rollerblading with friends. She also sprained her ankle. Friends reported a loss of consciousness of about 5 minutes. She then became aggressive at the scene of the accident and refused to go to hospital. She had some episodes of vomiting and phobia in the 24 hours following. Her parents took her to see their family doctor because of some 'out of character' behaviour (increased swearing and irritability). Jasmine reported a very brief retrograde amnesia – probably seconds. Her next clear memory was the day after the accident, indicating around 24 hours duration of post-traumatic amnesia. A mini-mental state examination, neurological and general physical examination did not reveal abnormalities.

Jasmine reported ongoing daily headaches but returned to work after 1 week. She found that she was extremely irritable and fatigue was a major problem, but she had not noticed any specific cognitive difficulties. She decided to take some leave, and was referred to a neuropsychologist around 2 weeks postinjury. Neuropsychological assessment indicated mild to moderate difficulties with concentration and speed of thinking. Her initial recall of verbal information was also reduced, but she benefited from repetition. The testing process appeared to be effortful for her. Jasmine was referred to an occupational therapist to help her organise a graded return to work, initially working 4 hours per day, 3 days per week. However, Jasmine decided to return 6 hours per day, 5 days per week. Fatigue was still a significant problem and she was unable to attend work on the fifth day. Her insight increased and after further discussions with the occupational therapist she agreed to the more appropriate graded return to work program. Jasmine was able to return to full time work after 1 month.

often in professions that put high demands on speed of information processing, memory and concentration.

Management

A number of studies have evaluated existing protocols for the management of individuals who have suffered from MTBI. Most of these protocols have been based on assessment of the injury severity and subsequent symptoms, provision of early education, and supportive follow up to monitor recovery and intervene, if necessary, to minimise the impact of the symptoms on physical and psychosocial functioning. While the results of these studies have been mixed, a recent study by Ponsford et al¹⁰ divided individuals with MTBI who were discharged from emergency departments after observation into an intervention and nonintervention group. Those who were seen at 1 week after injury and given an information book

describing common symptoms and their time course and outlining simple coping strategies, reported fewer symptoms at 3 months than those in the nonintervention group. The nonintervention group experienced higher levels of sleep disturbance, anxiety and psychological distress (particularly hostility and paranoia subscales) when evaluated at 3 months.¹¹ The authors concluded that the provision of an educative information booklet was beneficial.

Conclusion

Overall, GPs should be alert to the impact of MTBI and the development of PCS symptoms on an individual's lifestyle in the short term. They should also be aware of possible long term sequelae that may be the result of external factors and provide support, follow up and education.

Provision of an information booklet to persons with MTBI with suggested coping

strategies, common symptoms and their time course is beneficial.

Conflict of interest: none declared.

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Case study – Peter

Peter, a 38 year old clerk, was involved in a motor vehicle accident in which he sustained a brief loss of consciousness and soft tissue injuries. He was seen in the accident and emergency department and then sent home. One month later Peter had returned to work but complained of headaches and concentration difficulties. These had affected his work performance and he had received adverse comments from his supervisor. He had been seeing a clinical psychologist for around 2 months before the accident for counselling related to depression caused by a relationship breakdown. He reported that he thought that he 'was going crazy' since the accident and was 'unable to do anything right'. The psychologist referred Peter for neuropsychological cognitive assessment.

When seen by the neuropsychologist, Peter reported only vague memories of being in the emergency department and said that it took a few days before he really felt 'with it'. He had also been prescribed analgesic medication that had made him feel 'dopey'. When asked about cognitive difficulties, Peter said that he was 'often in a dream' at work and found that he had difficulty when put under time pressure. He sometimes forgot instructions and had been attempting to write reminders to himself. He had also made some errors with data entry on his computer and therefore double checked everything he did – further adding to his time pressure. He had been irritable with his work colleagues and was worried that his depression was worsening.

Testing indicated mild attention difficulties and reduced concentration and speed of information processing. These problems also affected his ability to recall complex verbal information. He was anxious about the assessment and this adversely affected his performance. The neuropsychologist gave him feedback about his assessment and explained that he had sustained a very mild brain injury in his accident. Information about the short and long term effects of this type of injury was also discussed. Compensatory strategies were explored.

Peter decided to take a week's leave from work and the clinical psychologist helped him to deal with the anxiety issues, together with his depression. Peter then made a successful return to work.

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