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DEBATE

MILD TRAUMATIC BRAIN INJURIES AND THEIR SEQUELAE. II: AT RISK OF CLINICAL NEGLECT?

In a letter published in this issue of *Journal of Rehabilitation Medicine*, Sosa et al. (1) comment on a recent publication in *Injury* by Puljula et al. (2) and highlight some issues related to mild traumatic brain injury (MTBI). Puljula et al. demonstrated that MTBI may be missed in patients with craniofacial injuries. We agree that this is an important message. We also agree with the recommendations put forward on the need for the continuing education of doctors who assess patients after traumatic injuries, including education on MTBI.

MILD TRAUMATIC BRAIN INJURY EASILY MISSED WHEN OTHER INJURIES DOMINATE

In the clinical setting, the diagnosis of MTBI is relatively straightforward when there are no other significant injuries, and both the doctor's and the patient's attention are focused on the MTBI. It is, however, understandable that traumatic brain injury (TBI) in general, and MTBI in particular, may be missed during the initial assessment if other major injuries are present requiring immediate intervention. The challenge in these circumstances is to ensure that all injuries, including MTBI, are documented before discharge, and that rehabilitation planning takes into account any TBI/MTBI-related deficits.

EVIDENCE-BASED GUIDELINES

Today, evidence-based recommendations regarding the acute management of patients with MTBI are focused largely on the detection of the small proportion of patients with MTBI who are at risk for serious intracranial complications. These recommendations incorporate head computerized brain tomography (CT) scan as a diagnostic tool (3–6). The safety and cost-effectiveness of CT scanning followed by early discharge in selected patients have been demonstrated (7). However, the appropriate application of guidelines is possible only if there has been an adequate clinical assessment, which is often the responsibility of junior doctors in the emergency department, and who may not have had specific training related to MTBI. Furthermore, these guidelines do not specifically relate to the risk of long-term problems after MTBI.

LONG-TERM PROBLEMS IN A MINORITY OF CASES AFTER MILD TRAUMATIC BRAIN INJURY

The prognosis after MTBI is usually good (8), but a proportion of patients present trauma-related, long-term disability. Despite ongoing research, this remains an area of much confusion, on-going debate and need for more knowledge (9). Issues in focus include some basic requisites for further progress, such as the need for uniform terminology and definitions.

CONCUSSION AND MILD TRAUMATIC BRAIN INJURY: SYNONYMS OR OVERLAPPING CONCEPTS?

The term "concussion" has been used for centuries and is still used in clinical practice, in the World Health Organization (WHO) classification system, and in sports medicine literature. The term MTBI has been used increasingly since the TBI severity grading system, based on the Glasgow Coma Scale (GCS), was introduced in 1974 (10) and now seems to be established in the related medical literature. Although most suggested criteria for both MTBI and brain concussion comprise transient signs and symptoms of altered brain function, definitions differ with regard to both the minimal (e.g. presence of amnesia) and maximal (e.g. GCS score 13 or 14) impairments required for a diagnosis. In addition, modern brain imaging has added questions about how to classify the condition for a patient who fulfils the clinical criteria for MTBI or concussion, but where CT or magnetic resonance tomography demonstrate structural or functional abnormalities. Patients with visible structural abnormalities on brain imaging may be termed "complicated MTBI", and may be associated with a higher risk of long-term symptoms, as demonstrated in studies of children (11). In contrast, some recent studies provide evidence that intracranial pathology on acute CT that does not require neurosurgical intervention may not have an impact on long-term outcome after MTBI (12), and specifically not so in the largest subgroup with the mildest MTBI (13). Further studies utilizing modern MRI will help clarify the possible impact of structural or functional brain disorders on outcome after MTBI.

POST-CONCUSSION SYNDROME: A QUESTIONABLE CONCEPT

While the term "post-concussion syndrome" has been used for many years, evidence-based criteria for such syndrome are lacking. Instead, most recent studies use various definitions of a poor outcome in terms of self-reported symptoms and other disabilities and/or impaired performance at neuropsychological tests. The International Classification of Diseases (ICD)-10 definitions require 3 symptoms or more for a diagnosis of post-concussional syndrome, while a corresponding definition proposed in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (*DSM-IV*) also requires cognitive deficits verified by neuropsychological testing. However, the validity of outcomes in the form of reported symptoms, and also of subtle neuropsychological impairments, is far from clear. Symptoms after MTBI are not specific and, to date, attempts to delineate a specific symptom profile have not offered conclusive results (14, 15). The lack of a universal definition

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of "poor outcome" after MTBI hampers the comparison of studies and impairs the identification and adequate management of these patients.

APPROPRIATE INFORMATION AT DISCHARGE AND FOLLOW-UP

Considering the problems indicated above, it may not be surprising that the evidence on interventions to prevent and treat long-term problems after MTBI is scarce. However, there is some consistent evidence that early, educational information may reduce the risk for long-term problems (16–19). Recent studies indicate that related conditions, such as depression or anxiety (20), may be important targets for intervention, but more evidence is needed. It is hoped that an on-going update of the literature on the prognosis after MTBI will help guide further studies (21).

CONCLUSION

As discussed, there are a number of issues related to the clinical management of patients with MTBI that need attention. Broad-based educational initiatives are necessary to reach the large number of doctors involved in the management of these patients. Such education should cover both acute care and recommendations on follow-up, and support to enable the implementation of evidence-based guidelines. Further studies evaluating new strategies to prevent and treat long-term problems after MTBI are needed.

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Britt-Marie Stålnacke, MD, PhD[1], Catharina Nygren-Deboussard, MD, PhD[2], Alison Godbolt, MD, MRCP[2], Jean-Luc af Geijerstam, MD, PhD[3], Lena Holm, PhD[4] and Jörgen Borg, MD, PhD[2]

[1]Department of Community Medicine and Rehabilitation, Umeå University, Umeå, [2]Department of Clinical Sciences, Karolinska Institute, Danderyd Hospital, [3]Department of Medicine, Clinical Epidemiology Unit, Karolinska University Hospital and [4]Institute of Environmental Medicine, Karolinska Institute, Stockholm, Sweden

E-mail: brittmarie.stalnacke@rehabmed.umu.se