



Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro



Review

A review of modifying factors affecting usage of diagnostic rating scales in concussion management



Alexa Dessy^{a,*}, Jonathan Rasouli^a, Alex Gometz^b, Tanvir Choudhri^a

^a Ichan School of Medicine at Mount Sinai, Department of Neurosurgery, New York, USA

^b Concussion Management of New York, New York, USA

ARTICLE INFO

Article history:

Received 17 January 2014

Received in revised form 25 March 2014

Accepted 9 April 2014

Available online 24 April 2014

Keywords:

Sports-related concussion

Return-to-play

Mild traumatic brain injury

Athletes

Neurocognitive testing

ABSTRACT

Sport-related concussion has gained increasing recognition as a result of recent legislation, public health initiatives and media coverage. Moreover, there have been substantial paradigm shifts in the management of concussion. This article will discuss the variables that affect the use of diagnostic rating scales such as ImPACT and SCAT in the current management of concussed individuals. Specifically, patient-specific modifying factors affecting test interpretation, including age, gender, fitness level, psychiatric conditions, learning disorders and other components of medical history will be addressed, as well as methodological concerns with baseline testing.

Published by Elsevier B.V.

Contents

1. Introduction	60
2. Concussion management	60
3. Test interpretation	60
4. Patient-specific modifying factors affecting test interpretation	60
4.1. Age	60
4.2. Gender	60
4.3. Test setting	61
4.4. Fitness level	61
4.5. Sport specific factors	61
4.6. Psychiatric conditions	61
4.7. Learning disability	61
4.8. Medical history	61
5. Baseline testing	62
6. Conclusions	62
References	62

* Corresponding author at: Department of Neurosurgery, The Mount Sinai Medical Center, 1468 Madison Avenue, Annenberg Building A20-225A, New York, NY 10029-6574, USA. Tel.: +1 212 241 3313; fax: +1 212 241 9285.

E-mail address: Alexa.dessy@mountsinai.org (A. Dessy).

1. Introduction

Growing recognition of sports-related concussion through recent legislation, public health initiatives and media coverage has resulted in a national increase in the number of concussions evaluated in the past decade. Reports have suggested that the combination of these factors has led to a 5-fold increase in the number of youth-athletes presenting for concussion at medical centers [1]. Importantly, as many as 3.8 million concussions occur in the U.S. each year during competitive sports and recreational activities [2]. Moreover, these values are likely underestimates, according to evidence that suggests that as many as 50% of concussions may go unreported [2]. Given the mounting number of concussive injuries receiving medical attention, the importance of effective diagnostic and management strategies cannot be underestimated.

Consequently, the medical community faces the challenge of developing guidelines, care systems and tools to evaluate athletes efficiently, follow outcomes, and understand the potential long-term effects of concussion and repetitive head injury. These issues have been addressed in numerous ways by respective institutions and disciplines, resulting in significant variation in the care and management of athletes with concussion. Moreover, there have been substantial paradigm shifts in the management of concussion, which is moving toward an individualized, patient-centered method for assessment and treatment [1,3]. Physicians attending to concussed patients should be familiar with the myriad of changes to guidelines and other current research. Furthermore, consistent and effective administration of tests and supervision of return-to-play may have significant benefits, such as prevention of repeat injury and reduction of institutional resource utilization [1]. This article will elucidate the considerations that should be taken into account when managing concussed individuals and utilizing the currently available evaluation tools, including the testing modality, patient history and other methodological concerns.

2. Concussion management

Concussion is defined by the 2012 Zurich Consensus Statement on Concussion in Sport as “a complex pathophysiological process affecting the brain, induced by biomechanical forces” [4]. Concussion results in rapid onset of short-lived impairment of neurologic function that typically resolves within 7–10 days following injury, though certain factors, such as age, gender and prior history of concussion, may prolong recovery. The foundation of concussion management involves physical and cognitive rest until acute symptoms resolve [4,5]. Though concussive symptoms typically resolve within one week of injury, return-to-play should not be considered unless the athlete is completely asymptomatic [6]. Moreover, return-to-play should not be endorsed unless the athlete has returned to baseline or normative values on neurocognitive and balance testing [7]. Once asymptomatic, a graded program of activity is implemented before medical clearance and return-to-play is granted [4]. Currently, there is no evidence for an effective intervention to increase the rate of recovery of concussion [6]. Furthermore, no randomized, controlled clinical trials have been conducted to examine the effects of rest versus exercise, or other specific intervention [5].

3. Test interpretation

Currently, there is overwhelming evidence that assessment and management of sport-related concussion should involve a multifaceted approach. Indeed, the consequences of concussion, including symptom severity, changes in neuropsychological function and postural instability often appear to be unrelated and

are affected to different degrees after injury [8]. Therefore, the evaluation should include a clinical exam, self-reported symptom checklist, postural assessment and neurocognitive testing [9–11]. In particular, evaluation of cognitive functioning should include intellectual functioning, academic skills, attention and concentration, processing speed and learning, memory, psychomotor function and emotional functioning [12]. To facilitate objective and comprehensive evaluation of concussed individuals, the most commonly used assessment tools include the PCSS, SAC, SCAT2 and ImPACT [5]. However, the sensitivity, specificity, validity and reliability of these standardized tests remain largely undefined, particularly among different age groups, cultural groups and settings. Moreover, no single test has demonstrated sufficient sensitivity to warrant standalone use, though the combination of multiple assessment tools may increase sensitivity and specificity of diagnosis [2,13]. Therefore, the sports-medicine practitioner must not rely on any one tool in managing concussion, and must be aware of the advantages and drawbacks of whichever method is incorporated into the evaluation and management plan [11]. These considerations are of critical importance for reducing the risk of additional injury [13]. Additionally, test interpreters must recognize that the reliable change difference scores serve as a supplement, rather than a substitute to clinical expertise in this area [14].

4. Patient-specific modifying factors affecting test interpretation

Due to the complexity of brain function, concussion is a highly individualized injury, with significant variability in the type and severity of concussion presentations in the acute setting [6,14,15]. The specific symptoms reported by patients are modulated to some degree by the particular regions of the brain affected, as well as the social, educational, occupational and medical histories of the individual [12,16]. In fact, numerous factors have been identified that modify the risk of sustaining a concussion or alter the progression of recovery. Such factors include history of prior concussion, impact location and magnitude, severity or duration of symptoms after concussion, age, gender, genetic predisposition, history of learning disorder, Attention Deficit Disorder (ADD), migraines, mood disorder, fitness, and engaging in sports positions that could potentially involve repeated head trauma (boxer, lineman, hockey, etc.) [8,11,17–19].

4.1. Age

Age has been proposed as the most important factor in recovery time [8]. Evidence indicates that children appear to be more susceptible to concussion from the same amount of force than adults and that they require a longer recovery period [6]. Prolonged recovery on verbal memory, visual memory and reaction time has been observed among younger concussed athletes compared to older concussed athletes [7]. Specifically, athletes aged 13–16 take longer to return to their neurocognitive and symptom baseline than athletes aged 18–22 years [20]. Similarly, Valovich McLeod et al. found that 9th graders scored significantly lower on SCAT2 total score than 11th and 12th graders [21]. The development of Child SCAT3 and the Pediatric ImPACT test reflects the growing recognition of this elevated risk among young athletes and the specific needs of this population.

4.2. Gender

Studies have suggested that the incidence of concussion is higher in male athletes compared to female athletes [5]. This may be attributed to greater male participation in sports in which there is

Download English Version:

<https://daneshyari.com/en/article/3040246>

Download Persian Version:

<https://daneshyari.com/article/3040246>

[Daneshyari.com](https://daneshyari.com)