

Management Approaches in Emergency Department for Post-Concussion Symptoms after Mild Traumatic Brain Injury: An Overview

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Abstract: This review was aiming to provide comprehensive review of the management approaches for those patients with mild brain injury and post-concussion syndrome in Emergency department, in addition to evaluate the roles of emergency room doctors in taking the right decision in such a situation. A comprehensive literature search strategy was performed by an electronic search of the databases (CINAHL, MEDLINE, and the Cochrane Library (The Cochrane Register of Clinical Trials) for relevant studies that were published up to January, 2017 in English language and involving human subjects only, from different population. In addition, bibliographies of included studies, were searched for more studies to be included and clinical trial registries was also performed. This comprehensive evaluation has actually explained the offered emergency and pharmacological treatment options and strategies for concussion based on the most present readily available medical literature, despite the quality of proof. Having the full scope of evidence in the specialist's management armamentarium ought to help in handling intricate post-concussion symptoms. That being stated, it cannot be emphasized enough that treating patients with post-concussive symptoms is not an easy job.

Keywords: provide comprehensive, Cochrane Register of Clinical Trials.

1. INTRODUCTION

Minor head injury, mild traumatic brain injury (TBI, likewise known as MTBI), and concussion are terms that are often utilized interchangeably ⁽¹⁾. No matter the variation in classification, emergency situation clinicians can expect to see a variety of patients each shift who have actually sustained some sort of blunt injury to the head. The medical method to these patients varies extensively, and, despite the accessibility of scientific standards, a lot of patients will undergo computed tomography (CT) imaging, and the majority will be interpreted as typical. The challenge for emergency clinicians is to quickly screen for the little subset of patients who harbor a possibly lethal intracranial lesion while reducing excessive expenses, admissions, and unnecessary diagnostic testing ^(2,3). Emergency clinicians need to precisely record a neurologic standard for serial examinations and offer discharge instructions that inform patients and families about the potential sequelae of head injury no matter how minor the injury may seem ^(1,3). Around 80% of people with a mild traumatic brain injury will experience some physical, cognitive, and behavioral symptoms within 3 months of the injury ⁽⁴⁾. The manifestation of these signs does not show that there is irreversible damage to the brain; instead, the symptoms are considered part of the typical healing procedure. Signs might not develop for days or weeks after the injury and they may vanish without treatment. Recent studies suggest that early intervention following mild distressing brain injury, consisting of education, reassurance, and support for guided resumption of activities, significantly reduces social morbidity and seriousness of post-concussion symptoms ^(5,6). The majority of patients will slowly recover within 3 to 6 months following a moderate distressing brain injury, ⁽⁷⁾ while approximately 10% to 15% continue to experience some symptoms at 12 months. In particular, chronic pain, fatigue, and psychological distress identified by developing stress and anxiety and depression prevail ^(8,9).

Present emergency situation department (ED) evaluation for children concentrates on signs that may forecast problems on computed tomography (CT), but cranial CT exposes regular findings in the majority of patients with mTBI (10). Forecasting Post-Concussion Symptoms (PCS) with intense signs of TBI has actually not been clearly established (11,12). Early administration of injury-specific information (13) and provision of post-injury coping techniques in adults (14) and children8 have been revealed to improve post-mTBI functioning (13,14).

This review was aiming to provide comprehensive review of the management approaches for those patients with mild brain injury and post-concussion syndrome in Emergency department, in addition to evaluate the roles of emergency room doctors in taking the right decision in such a situation.

2. METHODOLOGY

A comprehensive literature search strategy was performed by an electronic search of the databases (CINAHL, MEDLINE, and the Cochrane Library (The Cochrane Register of Clinical Trials) for relevant studies that were published up to January, 2017 in English language and involving human subjects only, from different population. In addition, bibliographies of included studies, were searched for more studies to be included and clinical trial registries was also performed. The citation list was reviewed independently by the authors. Search terms included “mild traumatic brain injury”, “post-concussion syndrome”, “post-concussion symptoms”, and “mild head injury”, which were combined with the terms “treatment”, “intervention”, “therapy” and “emergency medicine”.

3. RESULTS

○ Prevalence and symptoms of Post-Concussion Symptoms (PCS):

There is no universally agreed meaning of PCS, and it is tough to specify clinically given that much of its signs are subjective (15). A number of various sets of diagnostic criteria have been frequently utilized in defining PCS, consisting of that of the American Psychiatric Association, the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), and the International Classification of Diseases (ICD-10). The occurrence rates of PCS might differ in between studies, so it is tough to identify the true prevalence of PCS given the differences in the diagnostic requirements utilized. In general, PCS is a constellation of self-reported symptoms that take place after TBI. As illustrated in (Table 1), the signs are generally grouped into 3 categories: physical/somatic grievances; cognitive complaints; and psychological/affective complaints (15,16,17). Factors associated with the advancement of PCS consist of: (a) organic factors, e.g. positron emission tomography scans have shown minimized rates of glucose usage in those with PCS (18); (b) neuropsychological factors where impaired working memory and spoken memory found at preliminary evaluation were connected with a high risk of PCS (19); (c) mental factors where patients with more powerful beliefs that mTBI will have severe unfavorable effects were related to PCS (20); and (d) lawsuits cases where malingering and overstated signs existed in individuals associated with legal cases (21). No matter the etiology of PCS, there is a need for a treatment design to assist patients in fixing their signs of PCS. Ryan et al (17) showed that post-concussion symptoms regularly resolve within 1 month, but some patients might experience these signs for several years after the mTBI. McAllister et al (16) showed that the signs might continue as much as 6 months after injury. Hall et al. (15) reported that 7-- 15% of patients continue to experience signs 1 year following injury. Willer et al (22) reported that 10% will display signs and symptoms of concussion past the normal period. Emanuelson et al (23) found that those who struggle with post-concussion symptoms have considerably lower health-related quality of life, along with a lower Short Form-36 Health Survey score.

Table 1. Post-concussion symptoms

Physical/somatic	Psychological/affective	Cognitive
Headache Dizziness Noise sensitivity Light sensitivity Tinnitus Visual disturbances Fatigue Lost or altered sense of smell and taste Insomnia	Depression Anxiety Irritability Apathy Emotional lability	Memory deficits Difficulty in learning Difficulty with reasoning Executive function deficits Attention/concentration deficits

Previous studies have actually reported that in between 15% and 30% of mTBI patients fulfill the criteria for PCS at 1 month⁽²⁴⁾ and 3 months^(25,26). Other research studies have approximated that up to 50%⁽²⁷⁾ as well as approximately 80%⁽²⁸⁾ of mTBI patients meet the requirements for PCS after 3 months. One research study⁽²⁹⁾ demonstrated 43% of mTBI patients meet the requirements for PCS around 5-days post-injury. The 36% of mTBI patients developing PCS signs at 1-month follow-up remain in line with these research studies, while the 53% reported at 1-week follow-up are greater. Likely, this higher percentage shows the natural history of head injury, where symptoms are worse early, with lots of solving by 1 month. The study underscores that more than one third of head-injured patients are still symptomatic 1-month post-injury⁽²⁹⁾.

In one identified research study⁽³⁰⁾ performed aiming to determine who gets post-concussion syndrome (PCS) after moderate terrible brain injury or head injury. Showed the information gathered at the time of injury included patient demographics, system of injury, whether alcohol was consumed before the injury, post-symptoms consisting of loss of awareness (LOC), change of awareness (AOC), seizure, throwing up, headache, or post-traumatic amnesia (PTA), whether retrograde or anterograde (**Table 2**). A change in consciousness was defined as having any of the following: looking or feeling stunned, confusion, difficulty believing clearly, difficulty responding to psychological status questions, inability to describe occasions instantly prior to or after the terrible occasion, disorientation, or a reduced level of awareness. and this research study suggest that headache right after the head injury, a modification of consciousness after the head injury, and alcohol usage are considerable predictors of developing PCS, which occurs with equal frequency in men and women. Early recognition of those who are at risk of establishing PCS would lessen the problem of the injury and might potentially reduce the variety of missed work and school days⁽³⁰⁾.

Table 2: Association of symptoms in the ED with PCS at 1 week and 1-month follow-up (30)

Symptom in ED	% of whole cohort with this factor	PCS at 1-week follow-up	PCS at 1-month follow-up
Loss of consciousness (LOC)	4	NS	NS
Alteration of consciousness (AOC)	45	NS	0.0042
Post-traumatic amnesia (PTA)	35	NS	NS
Headache	57	0.0024	0.0001
Vomiting	7	NS	NS
Seizure	1	NS	0.0520
Mechanism of injury is fall	45	0.0014	NS
Mechanism of injury is MVC	49	0.0107	NS
Prior Hx of TBI	41	NS	NS
Alcohol consumption before the event	53	0.0470	NS

○ **Role of Exercise in Management of Persistent Symptoms:**

While there is a series of management strategies for the signs of PCS, the evaluated studies in fact utilized a similar method to manage their mTBI subjects. The interventions utilized in all three research studies generally concentrated on education, support/reassurance, provision of coping strategies, ongoing advice and regular follow-up visits. Education

consisted of supplying oral information, counselling, and motivation⁽³¹⁾. Patients were reassured that issues after injury were common and would probably vanish within a few months. Coping techniques taught included the intro of structured daily activities and keeping a diary. Advice on gradual go back to a typical level of activities and info sheets were provided. The period of intervention in the studies of Ghaffar et al.⁽³²⁾ and Wade et al.⁽³³⁾ was 6 months, while it was 12 months in Andersson et al.'s study⁽³¹⁾. Andersson et al. and Ghaffar et al.^(31,32) emphasized the significance of multidisciplinary treatment and tailormade interventions. Interestingly, these 2 studies obtained the very same outcome of no analytical differences in between the treatment and control groups with regard to the efficiency of the interventions on their outcome steps. On the other hand, Wade et al. used more generic interventions in all individuals in the treatment group, and discovered statistically significant enhancements in the treatment group relating to the intensity of post-concussion symptoms and social impairment. On further in-depth evaluation of the results of each outcome measure in Andersson et al.'s study⁽³¹⁾, it was noted that there was a statistically substantial improvement in the single product "physical health" of the Life Satisfaction Questionnaire, and increased activity for the category "individuals in companies" in the intervention group, which were not found in the control group. There were disparities in the treatment outcomes amongst the 3 studies. Wade et al.⁽³³⁾ discovered that specialist follow-up and early arrangement of information, support and suggestions on handling post-concussion symptoms led to an improvement in day-to-day social performance and a reduction in PCS signs. But in the research studies of Andersson et al.⁽³¹⁾ and Ghaffar et al.⁽³²⁾, no statistically considerable enhancement in functional self-reliance was discovered in the treatment group. Not just was there no statistically considerable improvement in the intervention group of Andersson et al.'s study⁽³¹⁾, there were statistically considerably decreased activities for 7 of the 15 grouped items in the Interest Checklist in the intervention group, but for only 2 products in the control group.

o *Symptoms Management:*

The literature reports numerous interventions for the management of persistent signs of concussion and PCS, although the information to support the effectiveness of these interventions in people, particularly adolescents and children, with sports-related concussions are limited, with practically no data originating from RCTs^(34,35). No RCTs have actually been performed to assess the effectiveness of symptom-specific interventions in managing troubles with sleep, psychological concerns (e.g., depression, stress and anxiety), issues with cognition, or headaches in children and adolescents suffering from relentless signs of concussion or PCS, and therefore there are insufficient information to reveal that any intervention enhances recovery or avoids long-term sequelae⁽³⁶⁾. The evidence base underlying post-concussive symptom management in youth consists of a quasi-experimental research study targeting cognitive signs in concussed adolescents with amantadine⁽³⁷⁾ and open trials in adults with posttraumatic headache following either sports concussion or mTBI⁽³⁸⁾.

There are RCTs for the management of such troubles in non-concussed pediatric populations, but it is presently not known whether these medications and psychotherapeutic interventions would be as efficient in concussed youth. Cognitive behavioral therapy (CBT) and melatonin have actually been shown to be efficacious for the management of insomnia in non-concussed youth^(40,41,42); cognitive behavioral treatment and selective serotonin reuptake inhibitors have been shown to be efficacious for depression and anxiety^(43,44); stimulants have been shown to be useful for attention and concentration difficulties⁽⁴⁵⁾; and modest proof supports the use of particular antiepileptic and calcium channel representatives for pediatric migraine⁽⁴⁶⁾. It is logical to think about these agents for testing in concussed youth who present with post-concussive signs. Medicinal treatment of PCS is summed up in (**Table 3**).

Psychoeducational and cognitive interventions early in the course of mTBI, including in pediatric populations, have been revealed to decrease symptomatology upon follow-up, however no studies have been done in concussed youth. Ponsford and colleagues⁽⁴⁷⁾ randomized youth with mTBI (however with more serious injuries than most sports concussions, due to the fact that their Glasgow Coma Scale ratings were 13 to 15) to either getting an educational pamphlet describing expectable course and coping treatments or treatment as usual. At 3-month follow-up, the youth whose moms and dads got the intervention were less symptomatic than were those in the control group. In adults with mTBI, both unselected and in those considered to be at "high risk" for PCS, those who received CBT intervention delivered quickly after the injury reported a much faster and more complete healing⁽⁴⁸⁾. Diverse approaches to rehab following a concussion might assist in recovery by dealing with the individual's physical, social, and psychological wellness⁽⁴⁹⁾.

Table 3: Pharmacotherapy for Somatic Symptoms: Dizziness, Fatigue, Nausea ⁽³⁸⁾

Symptom	Class	Medication	Brand Names	Dosing	Side Effects
Dizziness	Vestibular suppressants	Meclizine	Antivert, Bonine, Meclivert	12.5-50 mg every 4 to 6 h prn	Hallucinations, blurred vision, dry mouth, constipation, dizziness, drowsiness
		Scopolamine	Scopace, Transderm-Scop Maldemar	0.5-mg patch every 3 d prn	Dry mouth, topical allergy, tachyarrhythmia, drowsiness, dizziness, restlessness, blurred vision, dry or itchy eyes, flushing, nausea, vomiting, headache
		Dimehydrinate	Dramamine, Driminate	50 mg every 4 to 6 h prn	Dizziness, drowsiness, dry mouth/throat
		Benzodiazepines	Lorazepam	Ativan	0.5 mg twice daily
Clonazepam	Ceberclon, Klonopin, Valpax		0.25-0.5 mg twice daily		
Fatigue	Neurostimulants	Diazepam	Valium, Valrelease	2-10 mg daily	Insomnia, decreased appetite, GI upset, headaches, dizziness, motor tics, irritability, anxiousness, tearfulness
		Methylphenidate	Ritalin, Concerta, Metadate	5 mg twice daily; can titrate up total daily dose by 5 mg every 2 wk to a maximum of 20 mg twice daily	
		Dextroamphetamine	Adderall, Dexadrine ProCentra	5 mg daily; can titrate up for effect (maximum daily dose, 40 mg)	
		Modafanil	Provigil	100 mg every morning; can increase by 100 mg, using divided doses (maximum daily dose, 400 mg)	
		Amantadine	Symadine, Symmetrel	100-400 mg daily	
Nausea	Antiemetics	Atomoxetine	Strattera	40 mg daily (single or divided doses); can titrate up for effect (maximum daily dose, 100 mg)	Dizziness, blurred vision, anxiety, insomnia
		Ondansetron	Zofran	4 mg every 4 times daily prn	Dizziness, drowsiness, anxiety, diarrhea, blurred vision, dry mouth, stuffy nose, tinnitus, weight gain, swelling, impotence, constipation, lightheadedness
		Phenergan	Phenergan, Pentazine, Promethagan	12.5 to 25 mg 4 times daily prn	

4. CONCLUSION

This comprehensive evaluation has actually explained the offered emergency and pharmacological treatment options and strategies for concussion based on the most present readily available medical literature, despite the quality of proof. Having the full scope of evidence in the specialist's management armamentarium ought to help in handling intricate post-concussion symptoms. That being stated, it cannot be emphasized enough that treating patients with post-concussive symptoms is not an easy job. We might have a variety of medications at our disposal, at this time, a clear inability exists to exactly treat concussion symptoms pharmacologically in this tough population. The latest studies have actually unlocked to observation of lower-risk patients, however the clinician and patient need to know that observation will not identify all patients with PCS and might miss a rare patient with a medically essential injury. ED Clinicians need to also be aware of their state laws governing return-to-play standards along with the value of discharge instructions in helping the 30% of patients who will experience post-concussive symptoms.

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