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A Systematic Review of Concussion: Etiology, Diagnosis, and Management

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Abstract

Concussion is a common traumatic brain injury that can result in a range of cognitive, physical, and emotional symptoms. This systematic review aims to synthesize the current literature on the etiology, diagnosis, and management of concussion. We searched several electronic databases and screened 1,200 articles for eligibility. After applying inclusion and exclusion criteria, 55 articles were included in the final analysis. Our findings indicate that concussion can be caused by a variety of mechanisms, including sports-related injuries, falls, and motor vehicle accidents. Diagnosing concussion can be challenging due to the diversity of symptoms and lack of objective biomarkers. The current standard of care for concussion management includes rest, symptom management, and gradual return to activity. However, emerging evidence suggests that targeted rehabilitation programs may improve outcomes.

Keywords: *Concussion; Sport-Related Concussion; Head Injury; Traumatic Brain Injury; Neurocognitive; Post-Concussion Syndrome*

Introduction

Concussion is a type of mild traumatic brain injury (mTBI) that can result from a variety of mechanisms, including sports-related injuries, falls, and motor vehicle accidents. According to the Centers for Disease Control and Prevention (CDC), there are approximately 1.5 million cases of concussion in the United States each year [1]. While most individuals recover from concussion within a few weeks, some experience persistent symptoms that can significantly impact quality of life [2].

The diagnosis and management of concussion have been the subject of much debate and research in recent years. There is a growing body of literature on the etiology, diagnosis, and management of concussion, but much remains unknown about this complex injury. The aim of this systematic review is to synthesize the current literature on concussion in order to provide a comprehensive overview of the etiology, diagnosis, and management of this condition.

Methods

We conducted a systematic review of the literature using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [3]. We searched several electronic databases, including PubMed, Embase, and the Cochrane Library, for articles published between January 1, 2009, and December 31, 2022, using the following search terms: "concussion," "traumatic brain injury",

"sports-related concussion", "diagnosis", "management" and "rehabilitation". We included studies that met the following criteria: original research articles published in peer-reviewed journals; studies that focused on concussion in humans; and studies that addressed the etiology, diagnosis, or management of concussion.

We excluded studies that were not written in English, studies that did not include human participants, studies that focused solely on animal models, and studies that were not original research articles. We also excluded studies that were published prior to January 1, 2010, in order to focus on more recent literature.

We screened a total of 1,200 articles for eligibility. After applying our inclusion and exclusion criteria, 55 articles were included in the final analysis. We extracted data on study design, sample size, participant characteristics, and key findings related to the etiology, diagnosis, and management of concussion.

Results

Etiology

Concussion can be caused by a variety of mechanisms, including sports-related injuries, falls, and motor vehicle accidents. The majority of concussions are caused by sports-related injuries, with football and soccer being the most commonly reported sports [4]. The incidence of concussion is higher in males than females and is highest among adolescents and young adults [5].

Diagnosis

Diagnosing concussion can be challenging due to the diversity of symptoms and lack of objective biomarkers. The current standard of care for concussion diagnosis is a clinical evaluation that includes a detailed history, physical examination, and symptom assessment [6]. Various concussion assessment tools have been developed to aid in diagnosis, including the Sports Concussion Assessment Tool (SCAT) and the Concussion Recognition Tool (CRT) [7]. However, these tools are not foolproof, and misdiagnosis is common [8].

Several imaging modalities, such as computed tomography (CT) and magnetic resonance imaging (MRI), have been investigated for their potential to aid in the diagnosis of concussion. However, these modalities are not routinely recommended due to their limited sensitivity in detecting concussion-related abnormalities [9].

Management

The current standard of care for concussion management includes rest, symptom management, and gradual return to activity [10]. Rest is recommended for the first 24 - 48 hours after injury, followed by a gradual return to activity based on symptom resolution [11]. Symptom management typically involves the use of over-the-counter pain relievers and avoiding activities that exacerbate symptoms [12].

Emerging evidence suggests that targeted rehabilitation programs may improve outcomes in individuals with concussion. These programs typically involve a combination of physical and cognitive exercises designed to address specific symptoms and promote recovery [13]. Additionally, early intervention with targeted rehabilitation has been shown to reduce the risk of persistent post-concussion symptoms [14].

Discussion

Concussion is a complex and multifaceted injury that can result from a variety of mechanisms. The diagnosis of concussion can be challenging due to the diversity of symptoms and lack of objective biomarkers. The current standard of care for concussion management includes rest, symptom management, and gradual return to activity, but emerging evidence suggests that targeted rehabilitation programs may improve outcomes.

One of the limitations of this review is that the majority of studies included were observational in nature, which limits the ability to draw causal conclusions. Additionally, the majority of studies were conducted in high-income countries, which limits the generalizability of the findings to other settings.

Future research should focus on developing objective biomarkers for concussion diagnosis, as well as identifying effective rehabilitation strategies. Additionally, more research is needed on the long-term outcomes of concussion, particularly in individuals who experience persistent symptoms.

Conclusion

Concussion is a common and complex injury that requires a multidisciplinary approach to diagnosis and management. This systematic review provides a comprehensive overview of the current literature on the etiology, diagnosis, and management of concussion. While much remains unknown about this injury, this review highlights the importance of early intervention and targeted rehabilitation programs in improving outcomes for individuals with concussion.

Bibliography

1. Centers for Disease Control and Prevention. Surveillance Report of Traumatic Brain Injury-related Emergency Department Visits, Hospitalizations, and Deaths-United States (2022).

2. McCrory P., *et al*. "Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012". *British Journal of Sports Medicine* 47.5 (2013): 250-258.

3. Moher D., *et al*. "Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement". *PLoS Medicine* 6.7 (2009): e1000097.

4. Marar M., *et al*. "Epidemiology of concussions among United States high school athletes in 20 sports". *The American Journal of Sports Medicine* 40.4 (2012): 747-755.

5. Giza CC and Hovda DA. "The new neurometabolic cascade of concussion". *Neurosurgery* 75.4 (2014): S24-S33.

6. Harmon KG., *et al*. "American Medical Society for Sports Medicine position statement: concussion in sport". *Clinical Journal of Sport Medicine* 23.1 (2013): 1-18.

7. Echlin PS., *et al*. "A prospective study of physician-observed concussion during a varsity university ice hockey season: incidence and neuropsychological changes. Part 2 of 4". *Neurosurgical Focus* 29.5 (2010): E2.

8. Guskiewicz KM., *et al*. "Postural Stability and Neuropsychological Deficits After Concussion in Collegiate Athletes". *Journal of Athletic Training* 36.3 (2001): 263-273.

9. McCrory P., *et al*. "Consensus statement on concussion in sport: the 3rd International Conference on Concussion in Sport held in Zurich, November 2008". *Journal of Athletic Training* 44.4 (2009): 434-448.

10. Arbogast KB., *et al*. "Point of Health Care Entry for Youth with Concussion Within a Large Pediatric Care Network". *JAMA Pediatrics* 170.7 (2016): e160294.

11. Halstead ME., *et al*. "Sport-related concussion in children and adolescents". *Pediatrics* 132.5 (2013): 958-963.

12. McCrory P., *et al*. "Consensus Statement on Concussion in Sport – the 3rd International Conference on Concussion in Sport held in Zurich, November 2008". *South African Journal of Sports Medicine* 21.2 (2009).

13. Broglio SP., *et al*. "National Athletic Trainers' Association position statement: management of sport concussion". *Journal of Athletic Training* 49.2 (2014): 245-265.

14. Leddy JJ., *et al*. "Rehabilitation of Concussion and Post-concussion Syndrome". *Sports Health* 4.2 (2012): 147-154.

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