Mouthguards and Head Injuries

Can These Devices Help Reduce the Incidence of Concussions?

Recent dental research has shown that properly fitted mouthguards may help reduce the incidence of severe concussions or sports-related mild traumatic brain injuries (MTBI) in athletes. Richard Knowlton, DMD, MAGD, past president of the Academy for Sports Dentistry, says that the theory that mouthguards can prevent concussions is based on the position of the brain relative to the jaw.

The brain sits directly above the temporomandibular joint, which is formed by the connection between the mandible and the temporal bone. When an athlete is struck in the jaw, the energy from the impact can travel to the brain, causing injury. Some experts believe that a mouthguard with adequate thickness and a proper fit that increases the space in the temporomandibular joint could help dissipate this energy before it reaches the brain, preventing, or at least lessening, damage.

The crucial issue for both oral health and MTBI prevention, Dr. Knowlton says, is "the amount of mouthguard material that is on the top surface, the occlusal surface of the teeth." When fabricated correctly, the guard can provide a cushion and keep the lower teeth from hitting the upper teeth if the jaw is thrust upward.

In addition, Dr. Knowlton says, a properly fitted mouthguard should retain "a space between the end of the jaw, the condyle, and the temporal bone in the temporomandibular joint." If the space and cushioning in that area is inadequate, a hit to the jaw could result in a temporal bone fracture.

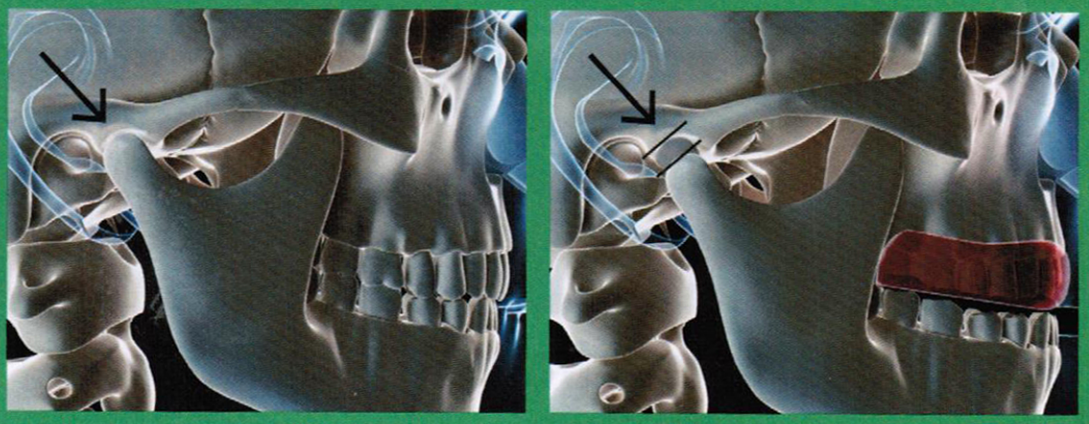
Until recently, evidence supporting the mouthguard's ability to reduce the incidence of concussion was mostly anecdotal. In the *British Journal of Sports Medicine* in 2001, Paul McCrory, MD, wrote, "The ability of mouthguards to protect against head and spinal injuries in sport falls into the realm of 'neuromythology' rather than hard science." A 2011 *Clinical Sports Medicine* study reported that "there [was] not yet significant evidence to advocate [helmets' and mouthguards'] effectiveness in preventing concussion." The paper's authors recommended further study.

However, research published in the May/June 2014 issue of *General Dentistry*, "Role of Mouthguards in Reducing Mild Traumatic Brain Injury/Concussion Incidence in High School Football Athletes," suggests that a custom-made, properly fitted mouthguard may reduce the incidence of sports-related concussions. Authors Jackson Winters, DDS, and Richard DeMont, PhD, CAT(C), ATC, performed a randomized, prospective study of six high school football teams (412 total players). Players on three teams wore over-the-counter (OTC) mouthguards, while players on the other three teams wore custom-made, pressure-laminated mouthguards. All players wore the same helmets.

This study found a "nearly 2-to-1 ratio between the two groups' incidence of MTBI/concussion injury, which was statistically significant." The researchers concluded that "custom-made, properly fitted, pressure-laminated mouthguards with more than 3 mm thicknesses in the posterior occlusal area statistically reduced the incidence of MTBI/concussion injury when compared to OTC mouthguards."

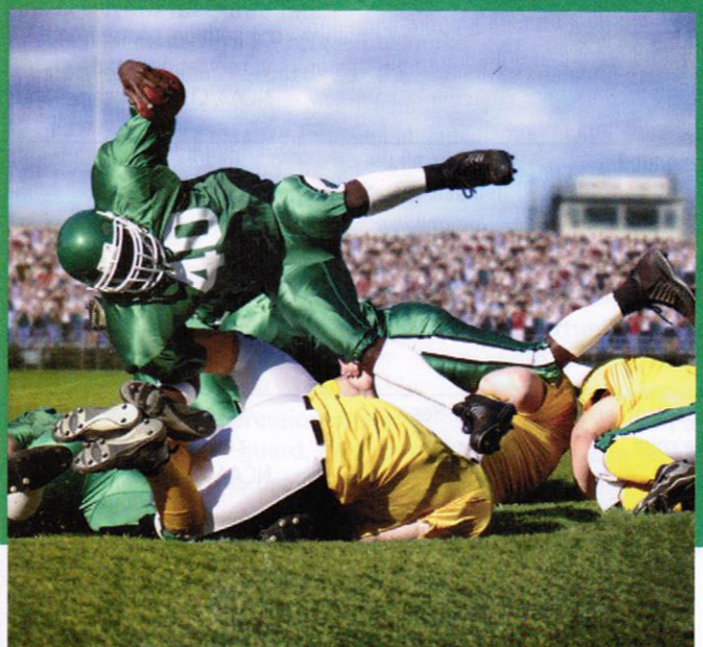
"Previously, the rap was that mouthguards don't make a difference, but I disagree," believes Dr. Winters. Even though properly fitted mouthguards won't prevent all concussions, Dr. Winters says his study shows they can play a role in prevention, and he hopes these results will stimulate further research.

Dr. Knowlton believes additional study is necessary to determine if and how mouthguards can impact concussions. "As time goes on, and we have better and better research, I believe you are going to find that a quality mouthguard can make a difference," he says.



A skull without a pressure-laminated mouthguard in position (left), and a skull with such a mouthguard in place (right). The pressure-laminated mouthguard creates a separation of the condyle that some researchers believe may reposition or align the mandible to better absorb, dissipate, or reduce possible concussion forces.

Source: Adapted from General Dentistry, *May/June 2014; reproduced with permission from the Academy for Sports Dentistry*

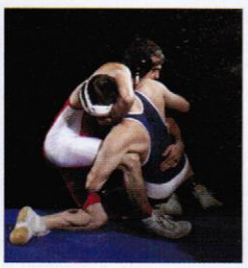


ONLINE EDITION

Read the May/June 2014 *General Dentistry* study on mouthguards.







Mouthguard Requirements for Athletes

High School Athletes

Per the National Federation of State High School Associations (NFSH), mouthguards are currently required for participation in these high school sports:

- Football
- Field hockey
- Ice hockey
- Lacrosse
- Wrestling (for wrestlers wearing braces)

All mouthguards, excluding wrestling devices, must be made with a visible color—not white or clear. Additionally, NFSH rules require all mouthguards used in wrestling (for those with braces) to cover both the upper and lower orthodontic appliances.

Source: NFSH 2011 Position Statement and Recommendations for Mouthguard Use in Sports

College Athletes

The National Collegiate Athletic Association's (NCAA) 2012–2013 NCAA Sports Medicine Handbook requires athletes to use mouthguards when participating in several sports. Stock, mouth-formed, and custom mouthguards are recognized as acceptable devices.

Sport	Position	Intraoral Mouthguard	Color	Covers All Upper Teeth	When
Field Hockey	Field	Mandatory; strongly recommended for goalkeepers	Not specified	Not specified	Regular season competition and NCAA Championships
Football	All	Mandatory	Readily visible color (not white or transparent)	Yes	Regular season competition, postseason competition, and NCAA Championships
Ice Hockey	All	Mandatory	Recommended	Covers all the remaining teeth on one jaw	Regular season competition and NCAA Championships
Women's Lacrosse	All	Mandatory	Not Specified	Yes	Regular season competition and NCAA Championships
Men's Lacrosse	All	Mandatory	Yellow or any other visible color	Yes	Regular season competition and NCAA Championships

Adapted from: 2012-2013 NCAA Sports Medicine Handbook