

Guarding the Precious Smile: Incidence and Prevention of Injury in Sports: A Review

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Abstract:

The paper provides a review about the orofacial injuries sustained during sports and the options available to the athletes for their prevention. It was done with a purpose to determine three different aspects: incidence of dental injury during sporting activities, role of mouthguards in preventing sports injury, types of mouthguards and their properties. From this review, it is clear that sports carry a considerable risk of injury, this is not only true for the contact sports such as rugby or kickboxing, but also for seemingly less dangerous sports such as football. Amongst the different types of mouthguards, the most acceptable and safe ones are the custom-fabricated mouthguards, in particular the pressure-laminated ones. In general, mouthguard usage is less than the dental profession would recommend. As much of progress has been made in this area, need for the use of mouthguard needs to be emphasized and promoted by the dental profession.

Key Words: Contact sports, mouthguard, sports injury

Introduction

This paper provides a review of literature pertaining to the injuries sustained during participation in sporting activities and the implication of mouth guard in preventing such injuries. All over the world, sports are capturing the attention of adolescents and young adults. Sporting activities contribute to nearly one-third of all dental injuries.^{1,2} Contact sports are defined as the sports in which players physically interact with each other, trying to prevent the opposing team or person from winning.³ Unlike some other injuries, a single traumatic injury to the dentition may never heal completely and it can create a lifetime of expensive, long-term problems.⁴

Several authors showed that wearing a mouth guard can significantly reduce the frequency and severity of oro-facial injuries in sports.^{5,6} Sports dentistry is the treatment and prevention of oral/facial athletic injuries and related oral diseases and manifestations. Mouth guards were recommended by the American Dental Association (ADA) in 1950. Mouth guard is a resilient device placed in the mouth to prevent and reduce possible oral injuries, in particular of the teeth and surrounding structures.⁶ It acts on absorbing, distributing and dissipating the transmitted forces in the impact zone.^{6,7} Before the second world war, Jack Dempsey and Gene Tuney, were probably the last of the heavyweight champions to fight without a mouthpiece.⁸

Different types of mouth guards are available. The most popular among them is self-adapted "Boil-and-bite" and custom-made mouth guards. Custom-made mouth guards have been shown to be the most efficient in preventing dental injury during sporting activities and should therefore be recommended to those participating in contact sports.⁹ Besides their role in preventing injury, some authors have shown that mouth guards help in improving performance in sports.^{10,11}

The purpose of this review study was to determine: Incidence of dental injury during sporting activities, role of mouth guards in preventing sports injury, types of mouth guards and their properties.

Injury Incidence

According to ADA one-half of the injuries sustained while playing soccer were pertaining to the mouth, and that majority of these injuries could have been prevented by wearing a night guard. Furthermore, it has been widely reported that participation in sports exposes a person to risk of sustaining dental injury.^{12,13} The frequency and intensity of the contact during competitions can sometimes be the main cause of dental injury. The type of contact can be classified as direct contact with competitors (taekwondo, jiu-jitsu, kickboxing, boxing, etc.) Figure 1 indirect contact with rival competitors (handball, basketball, football, soccer, ice-hockey, etc.) and no contact with rival competitors (volleyball, badminton, etc.) during the activity.¹⁴

Prevalence of injury during contact sports like rugby and American football has been addressed considerably by the dental literature.^{15,16} It has been estimated that players of such



Figure 1: Dental injury sustained due to kickboxing.

sports have 10% chance of injury during a playing season and 50% chance of injury in their playing career.^{15,16} Oral trauma is just as common, in basketball, soccer, basketball, bicycling, in-line skating, gymnastics, and other sports.¹⁷ A universal finding is that the injury to the central incisors accounts to 80% of the injuries affecting maxillary jaw.^{18,19}

In children, the incidence of injuries from sports accidents is the maximum in the age group of 8-11 years.^{20,21} Boys are more likely than girls to be injured; with the ratio being 1.5:3.1.²² Adding significance to the above mentioned figures is the fact that most of the school teachers are not aware about the adequate measures to be taken to deal with such injuries.²³

Role of mouth guard in preventing injury due to sporting activity

There are sufficient number of articles supporting the protective significance of mouthguard,^{16,24,25} though one study could not find a statistically significant difference in the injuries in the head and neck region in general and oral region in particular between players wearing mouth guard and those not wearing them.²⁶

With innumerable injuries occurring to baseball players in the oral region and even more number of injuries observed in basketball players, mouth guards can offer significant protection and reduction in the number of athletes getting injured in these as well as other non-contact sports.^{27,28} Mouth guards have been found out to be the most efficient way of preventing traumatic dental injuries.²⁹ However, not all contact sports recommend the use of mouth guard to prevent injury. Maxén *et al.* showed that floorball, having a high risk of injury, did not recommend the use of mouthguard.³⁰

Despite of this, mouth guard has been instituted as an effective protective measure against sporting injuries. Heintz reported that two million people participating in sports in U.S. were

made to wear mouth guard and this reduced the rate of injury of face and mouth to 50% and of all injuries to more than 0.5%.³¹

Types of mouth guards

Mouth guard is defined as a resilient device or appliance placed inside the mouth to reduce oral injuries, particularly to teeth and surrounding structures.³² A properly fitted mouth guard should be protective, comfortable, resilient, tear-resistant, odourless, tasteless, inexpensive, easy to fabricate and should not interfere with speech.⁹ There are three types of athletic mouth guards according to American Society for Testing and Materials:³³

- Type I: Stock mouth guards, purchased over the counter and require modifications. These are no longer sold widely (Figure 2)
- Type II: Mouth-formed “boil-and-bite” mouth guards. They are available commercially. Made of thermoplastic resin, they need to be immersed in hot water and adapted in the mouth using tongue, finger and biting pressure (Figure 3)
- Type III: Custom made on a model in patient’s mouth (Figure 4).

A wide variety of materials is currently being used for fabricating mouth guards, most common among them being polyvinyl-acetate-polyethylene copolymer and polyvinyl chloride. Silicone rubber, natural rubber, polyurethane, and soft acrylic resin are less widely used.³⁴

Both stock mouth guards and “boil-and-bite” mouth guards are bulky and are loose, so they require occlusal pressure for adequate retention. Loose fit with these types of mouth guards was found in 42% athletes when compared to none with custom made ones.³⁵

To provide adequate retention, mouth guard should:

- Be properly fitted and accurately adapted to the wearer’s mouth and his/her oral structures.
- Be made of resilient material approved by the U.S. Food and Drug Administration and cover all remaining teeth on one arch, customarily the maxillary.
- Stay in place comfortably and securely.
- Be physiologically compatible with the wearer.
- Be relatively easy to clean.
- Have high-impact energy absorption and reduce transmitted forces upon impact.³⁶

Conclusion

It is clear that mouth guards offer protection against dental injuries sustained during sporting activities. It is equally clear that the custom-made mouth guards offer better protection as compared to the “stock” or “boil-and-bite” type, many people do not use them because they are expensive and also necessitate a visit to the dentist.



Figure 2: Stock mouth guard.



Figure 3: Mouth-formed "boil-and-bite" mouth guards.



Figure 4: Custom made mouth guard fabricated on a model.

There has been a growing belief that though progress has been made in the use of mouth guards, the profession should expand its use to governing bodies, coaches and schools; also should make them comparatively cheaper for its wide acceptance and increased use.

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