

Mouth Guards: Guardians of the Dontium

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Abstract

Children and teens are more prone to injuries while playing, with most of the impact taken by the face especially the jaws and the teeth. The most significant factor in preventing sports-related or recreational orofacial injuries is wearing basic protective devices such as properly fitting helmets, face masks, or mouth guards. A mouth guard, custom-fitted by your dentist and worn every time you play or train, will protect against dental injury. Mouth guards are available in 3 different variants which are stock, self-adapting, custom-made mouth guards. The benefits far exceed the expenditure when considering the fees and discomfort associated with a traumatic dental injury

Keywords: Mouth Guard; Orofacial Structures; Teeth; Custom; Sports; Injuries

Introduction

Physical activity forms a very important part of life. There have been constant reports of sedentary lifestyle being associated with disease processes and over the time a lot of importance has been emphasized on physical activities be it the gym or the sports. Children and teens are more prone to injuries while playing, with most of the impact taken by the face especially the jaws and the teeth. Hence, it becomes very important to wear protective gear as these injuries might not only cause temporary impairment but also cause hindrance to the growth and development of the facial structures and also may lead to an unaesthetic appearance of the child at the later stage. The injuries occurring in sports can range from a simple ball-hit to a serious impairment of the head, face or the mouth. It is very important to wear protective gear when you are actively participating in any recreational outdoor events and also in some instances in the indoor activities with the risk of injuries. The most significant factor in preventing sports-related or recreational orofacial injuries is wearing basic protective devices such as properly fitting helmets, face masks, or mouth guards. The use of the mouth guard forms the basic minimal requirement for protecting your mouth, which should form an essential piece of the

athletic equipment that the athlete should use as the standard gear equipment from a very early age.

A mouth guard, custom-fitted by your dentist and worn every time you play or train, will protect against dental injury. Well-fitted mouth guards prevent violent contact between the maxillary and mandibular dentition, which can result in soft tissue lacerations, tooth avulsions, tooth or bone fractures, endodontic injuries, and concussions [1]. This being said it has been found that injury to teeth are 60 times more likely when the athlete is not wearing the mouth guard than when he/she is wearing it. Statistically, sporting activities contribute to nearly one-third of all dental injuries [2-4]. Mouth guards help buffer an impact or blow that otherwise could cause broken teeth, jaw injuries or cuts to the lip, tongue or face. Mouth guards also may reduce the rate and severity of concussions. Consequently, the dentist plays an important role in informing patients, athletes and their parents, and coaches of the importance of prevention, diagnosis, and treatment of orofacial injuries in sports and recreational activities [1].

A mouth guard should be able to fulfill the following basic requirements:

- a) Encompass all maxillary teeth extending up to the distal surfaces of the second molars in class I and class II patients [4-7].
- b) Encompass all mandibular teeth extending up to the distal surfaces of the second molar on class III patients [4-7].
- c) Mouth guard may be abridged to cover until the distal surfaces of the first molars, in case it is known to trigger the gag reflex of the patient [4].
- d) The labial flange should range to within 2mm of the sulcus [5].
- e) The palatal flange should range around 2mm above the gingival margin [5].
- f) The margins of the labial flange should be rounded.
- g) The margins of the palatal edge should be tapered [5].
- h) Be easy to clean [8,9].
- i) Not impede with breathing or speech activity [4].
- j) Be fabricated from a material approved by the U.S. Food and Drug Administration that can reduce the impact force to teeth, surrounding soft tissues, and bone [4,9].
- k) Be comfortable and retentive and fit properly [9].

Mouth guards are available in different variants

- A. Stock
- B. Self-adapting
- C. Custom-made

A. **Stock**

These are readily available over the counter in different sizes, made from polyurethane, a copolymer of vinyl acetate, or ethylene. As they are produced in bulk and are of standard sizes, they remain inexpensive, however they offer a low level of protection with little retention and is not so easily accepted by the athlete. The need to hold the mouth guard in place by clenching his or her teeth together is another disadvantage.

B. Self-Adapting

Also known as the "boil-and-bite" type mouth guard. It is readily available over the counter and made from ethylene-vinyl acetate (EVA). Herein, it is heated in hot water and then placed in the mouth to be adapted to the teeth by biting down. It is relatively inexpensive and can be replaced frequently in athletes with a mixed dentition or by individuals who are experiencing rapid growth. It has the property of re-adaptability. However, it is often bulky and does not retain its shape over time.

C. Custom-Made

The custom-made mouth guard is fabricated in a dental laboratory on a cast taken from an impression made by a dentist. The custom-made mouth guard offers the best fit and the most

protection of any of the protective devices [4,5,9]. It is usually made of a thermoplastic material that is heated and adapted to the cast under pressure or with a vacuum form machine. Due to the laborious work involved in the fabrication of this type of appliance, it is expensive but retentive. The American College of Prosthodontists (ACP) recommends the use of custom mouth guards for all contact sports and for any recreational activities that may hypothetically end in orofacial injuries. Accurate maxillary and mandibular alginate impressions in centric occlusion registration recorded by a qualified dentist at approximately 5-mm opening anteriorly shall be used for fabrication of the custom trays as recommended by the ACP [4,5]. The standard thickness is 4-mm, however 5- or 6-mm thickness is recommended as it will be able to protect the athlete better in case of extreme sports [4].

Mouth guards can be either single-layered or multi-layered. Currently, the most commonly used materials in the construction of custom mouth guards are EVA copolymer, soft acrylic resin, polyvinyl chloride, polyvinyl acetate-polyethylene (pEVA), and elastomers [1,8,9]. Many different designs of multi-layered materials are available. The most frequently used is a double layer made of similar materials. Dual laminated mouth guards possess an outer hard shell of styrolbutadiene co-polymerisate, and a soft inner layer of ethylene copolymer and vinyl acetate. This design of a more rigid outer material with an inner softer material will reduce the impact force transferred to the teeth due to the shock-absorbing capability of the softer layer [4,5]. The critical areas in terms of energy absorption and transmitted forces are the incisal edges of the anterior teeth and the attached (marginal) gingiva. Therefore, an optimal thickness of the device is achieved by the application of vacuum forming pressure-lamination technique of two layers of a thermoplastic sheet (EVA copolymer) and if necessary, by placing two layers of protective air-cells against the critical areas. An acrylic-resin-based elastomer may be processed over the thermoplastic sheet to improve protection for the athlete [4]. Custom-made mouth guards have proved to be the most effective means of prevention of injuries to the orofacial structures [1,4,5]. They are superior in quality, comfort, retention, and prevention of injuries when compared to stock or self-adapting devices. Although custom-made mouth guards are the most expensive type of protective oral device, they are the most highly recommended.

Conclusion

The benefits far exceed the expenditure when considering the fees and discomfort associated with a traumatic dental injury. Further, it becomes the duty of the dentist to create awareness among the athletes and make it a habit for them to wear mouth guard as a part of their equipment for sports.

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