Protecting the Precious Smiles; Intra-oral Mouth-guards Used In Sports

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Abstract

The risk of sports-related injuries is constantly present in various sporting activities. Dental injuries are the most common type of orofacial injury sustained during participation in sports with the increased popularity of contact sports and encouragement to participate at an early age, the role of the dental profession in relation to prevention of dental and other orofacial sporting injuries has become more important in view of this. The common orofacial related injuries include soft tissue injury and hard tissue injury- the teeth and facial bones, such as tooth intrusions, luxations, crown and/or root fractures, complete avulsions and dental-facial fractures. Any sport where the potential for dental trauma can exist should consider utilizing mouthguards as it may help to reduce the incidence of dental trauma.

Keywords: orofacial injury, mouthguard,dental trauma

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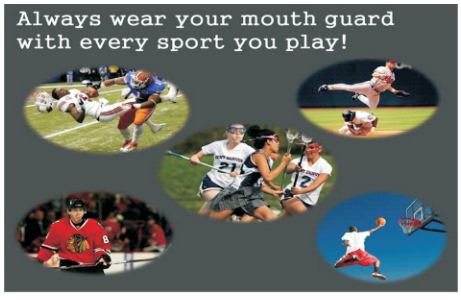
Introduction

Prevention is certainly hallmark of dentistry.[1]Sports Foundation for the prevention of Athletic injures has reported that dental / orofacial injures are the most common type sustained during participation in sports.[2]Mouthguard helps in minimizing orofacial trauma due to sports activity.[3]Boxing appeared to be the 1st sport in which mouth guard were used. Woolf Krause, a London dentist , developed a mouth guard in 1890 to protect boxers from debilitating lip lacerations.[4]Presently, mouth guard are standard or required in many sports . ADA recommends mouth guard to used in 29sports. It act as a buffer by moving the soft tissues in the oral cavity away from the teeth, it absorb the forces ,protect the teeth ,TMJ and prevent the contact of teeth.



Sports in which muthguard are used recommended by ADA

- Acrobatics
- Basketball
- Bicycling
- Boxing
- Equestrian events
- Extreme sports
- Field hockey
- Football
- Gymnastic
- Handball
- Ice hockey
- Incline skating
- Lacrosse
- Martial arts
- Raquetball
- Rugby
- Shot putting
- Skateboarding
- Skiing
- Skydiving
- Soccer
- Softball
- Squash
- Surfing
- Volleyball
- Waterpolo
- Wrestling
- Weight lifting

What is a Mouth Guard?

The mouthguard, also referred to as a gumshield or mouth pro-tector, is defined as a "resilient device or appliance placed inside the mouth to reduce oral injuries, particularly to teeth and surrounding structures."The word mouth guard is universal and generic and includes a large range of products bought at the sporting good stores to professionally manufactured custom made by a dentist.[5] According to the placement, mouth guards can be extra-oral, intra-oral and combined. The extra-oral mouth guard is attached to the helmet in the form of a protective net or grating. The intra-oral mouth guard is placed on the dental arch. There are monomaxillary and bimaxillary mouth guards. The monomaxillary mouth guard has retention on one dental arch. The bimaxillarymouth guard, due to its construction, has retention on both dental arches thus ensuring normal breathing.[1]

Importance of wearing a mouth guard:

ADA project that 1/3rd of dental injuries are sports related, 75% of high school athletes injuries that occurred when mouth guard was not worn, 40% of high school athlete injury that occurred when playing baseball or basketball.[6,7,8] According to the American Dental Association, the use of faceguards and mouth protectors prevent more than 200,000 orofacial injuries in football annually.[9] Thus, mouthguards should be mandatory as an effective device for the prevention of dental and orofacial injuries, as well as reducing the incidence and severity of minor traumatic brain injury.[10]

Mouthguard are designed to absorb and distribute the forces of impact received while participating in athletic activities.

1. Mouth impact- causes possible damage to soft tissue of the lips cheeks tongue and gums as well as teeth and upper jaw.
2. Direct jaw impact- causes damage to the teeth , TMJ and the jaws.
3. Under chin impact- causes damage to the teeth, tmj and jaws

Mouthguard helps to protect athletes from:

1. Laceration- properly fitted mouthguard help to protect soft tissue of the lips, cheeks ,gums and tongue by covering the sharp surfaces of the teeth.
2. Tmj trauma- properly fitted mouth guard reduce the potential for jaw fracture and displacement by cushioning against impact.
3. Jaw fracture- properly fitted mouthguard reduce the force upon impact helping to protect the jaws from fracture.
4. 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.[11]

Types of Mouthguard

ASTM (American society of testing and Materials) have classified the mouthguards into three types:[12]

Type I - Stock Mouth guards. (Least preferred)

Type II - Mouth formed mouth guards.

Type III - Custom fabricated (over a dental cast) mouth guards (Most preferred).

Stock Mouth Guards

It is prefabricated and ready to wear, available at most sporting good stores, come in limited sizes, has lowest-cost option .This type of mouthguard is usually made from polyurethane, a copolymer of vinyl acetate, or ethylene.[13] As they cannot be prepared to mimic the mouth, they fit poorly and are bulky.[14] They are designed for use without any modification and must be held in place by clenching the teeth together to provide a protective benefit .[5,13] Clenching a stock mouthguard in place can interfere with breathing and speaking and, for this reason, stock mouthguards are considered by many to be less protective.[5] Unfortunately, these are still the most commonly used on the market of many developing countries. Tooth arrangement & arch sizes varies too much between people. There is too much variability among dentitions for the mass production of effective mouth guards. They are available as single and bimaxillary mouthguard.[1]

Mouth Formed Mouth Guards

Mouth-formed, also known as "boil-and-bite", mouthguards are made from a thermoplastic material adapted to the mouth by finger, tongue, and biting pressure after immersing the appliance in hot water .[4,5]

This type of mouthguard is usually made from ethylene-vinyl acetate (EVA)[13]This type of appliance is relatively inexpensive and can be replaced frequently in athletes with a mixed dentition or by individuals who are experiencing rapid growth. However, it is often bulky and does not retain its shape over time. [13] These are widely used among athletes but vary greatly in protection, retention, comfort, and cost. As they

are formed at body temperature, they readily distort and wear off.[15] Thesemouthguards usually have little retention, offering very poor protection and, may interfere with breathing. Nevertheless these mouthguards are slightly better than the stock mouthguards.[4,13]

Custom Made Mouth Guards

They are more expensive, most comfortable, best-fitting custom-designed mouth guards recommended by the dentist .[16] Varieties of materials are currently being used for mouth guards, most commonly polyvinyl-acetate-polyethylene copolymer and polyvinyl chloride. Silicone rubber, natural rubber, soft acrylic resin, and polyurethane are less widely used. . Patrick and van Noort ranked the effectiveness of protective mouth guards, finding the laminated mouth guards with outer hard layers and an inner soft layer the most effective and stock mouth guards the least effective.[17] Custom-fit mouth guards are more effective at measurably absorbing the force of impact.[18]This type is fabricated on a cast of athletes (Max arch for patients with CL I or CL II Malocclusion, Mandibular arch with CL III Malocclusion). Before fabricating a thorough Medical and dental history, including, intra oral extra-oral and necessary radiographic examination is conducted.[19]

Their fabrication technology employs vacuum technique or pressure technique as well as thermal, polymerization (conventional or injection) and light-curing procedure and their combinations, depending on the material, type of sporting activity and individual characteristics of the jaw .[20]

Three types of custom made Mouthguards

1. Latex or latex reinforced with rayon or nylon flock by applying the material directly to a cast.
2. Clear or colored plastic sheets that are vaccum formed over a cast.
3. Plasticized acrylic resin available in powder and liquid form.

Custom made mouthguard should fulfill the following basic requirements:[13,21,22]

* First an accurate maxillary and mandibular alginate impressions should be made and cast isproduced . Then, a centric occlusion registration at approximately 5-mm opening anteriorly has been registered.The registration at an open vertical dimension can be facilitated by using a leaf gauge, an acrylic jig, or multiple rubber occlusal reduction guides between the anterior teeth to achieve the desired 5-mm opening.
* The standard thickness is 4-mm for most contact sports. The prosthodontist should determine the thickness of the device depending on the risk of injury involved with the particular sport or activity. It is recommended that a 5- or 6-mm thickness be used to better protect the athlete for extreme sports.
* It should enclose teeth to the distal surfaces of the second molars of the respective arch in which the prosthesis has been constructed. If the patient has a severe gag reflex, it may be reduced to cover till the distal surfaces of the first molars only.
* The labial flange should extend to within 2 mm of the sulcus.
* The palatal flange should extend approximately 2 mm above the gingival margin.
* The edge of the labial flange should be rounded, and the palatal edge should be tapered.
* Be comfortable and retentive and fit properly
* Be easy to clean.
* Not interfere with breathing or speech.

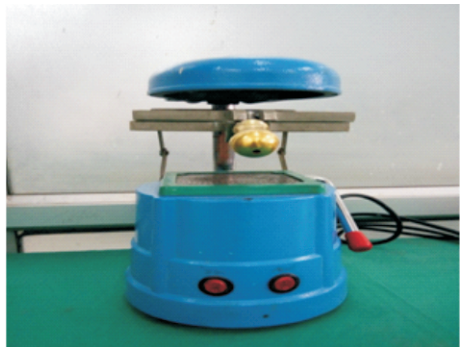
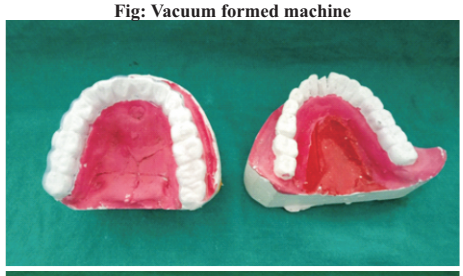


Fig: Vacuum formed machine



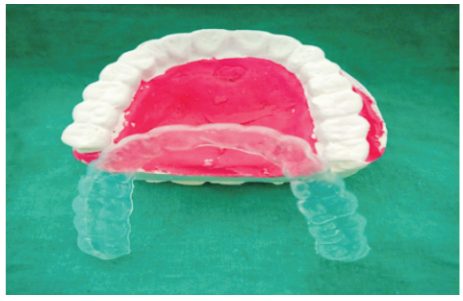
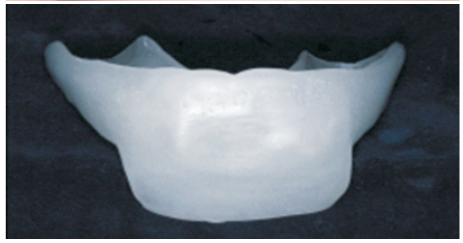


Fig.Custom mouth guard fabricated in Vacuum formed machine



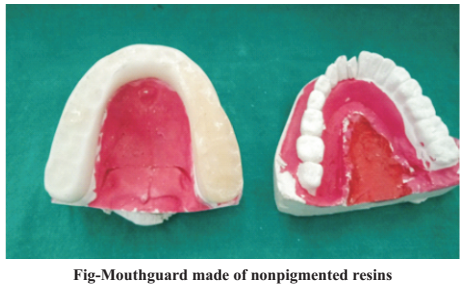


Fig-Mouthguard made of nonpigmented resins

Care and maintainance of Mouthguard[5]

- Do not chew on or alter the mouthguard as this will affect the fit and possibly damage it or decrease its effectiveness.
- Custom-made mouthguards are made for that particular time when the cast of the dentition is taken.
- Rinse the mouthguard with cold water or with a mouthrinse before and after each use. Avoid contact with hot water.
- Since the mouth contains bacteria and plaque, it is important to clean your mouthguard after each use. Clean it with a toothbrush or clean it in cool, soapy water and rinse thoroughly.
- Store and transport the mouthguard in a firm, perforated container to prevent damage and permit air circulation.
- Do not share your Mouthguard with others.

Conclusion

The prosthodontist should select which materials are best suited for the construction, determines the design, and decides which activity or sport requires protection. Patients who have previously suffered orofacial trauma or a concussion while participating in a sport or recreational activity need to be reminded of proper protective devices to reduce the risk of repeated injury to the orofacial areas. Custom-made mouthguards have proved to be the most effective means of prevention of injuries to the orofacial structuresThey are superior in quality, comfort, retention, and prevention of injuries. Sports always carry risk of traumatic injuries. It takes very little force to cause a lot of damage to a mouth .Mouth guard may be small but they can make a big difference in protecting athelets from orofacial injuries.

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