



## Mouthguard a Preventive Mode in Sports Dentistry. A Review

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### Abstract

The purpose of this article is to present a wide description of sports dentistry and various aspects related to orofacial injuries, their significance and prevention. The most important constituent of sports dentistry is described briefly. Various orofacial sports dental injuries due to various sports and sports community are discussed. The prime concern is prevention of these orofacial injuries in sports dentistry. The importance of various preventive measures such as availability and use of various types of mouthguards their significance and maintenance for an individual in sports dentistry is described briefly. Overall a dentist plays a major role in diagnosis, treatment planning, evaluation, prevention and management of these orofacial dental injuries in various fields of sports community. The dentist also plays a major role in research value in sports dentistry.

**Keywords:** Mouthguard; Preventive Mode; Sports Dentistry

### Introduction

New booming Exercises, competitions, self-enjoyment, fame, recreational activity, are attracting newer generation especially young youth toward sports activity. Leading to more and more sports participants and related dental and craniofacial injuries [1].

Sports dentistry is the branch of dental sciences include prevention, protection and clinical management of oral and maxillofacial region of athletes and sports active members, it also deals with the safety precautions towards orofacial region and its disorders. Hence precaution, prevention and safety measures are the key factors in avoiding oral and maxillofacial injuries [2]. As trend changes the lifestyle changes too previously sports stores used to provide mouthguards or faceguards for protection towards dental and orofacial injuries, but due to recent advances, internet, education and various researches in dentofacial injuries the population member are more concerned for prevention and safety of dentofacial injuries and hence prefer to take consideration from dentist, hence dentist assist and guide them in diagnosis, prevention and treatment of oral and maxillofacial injuries [3].

Each and every individual as they are active or passive participants in sports are prone towards sports injuries. Athletes, coaches, athletic directors, athletic trainers, every person participating in sports, parents, and members of the dental community should be aware of how individuals who participate in sporting activities are at great risk for dental/orofacial trauma.

### Maxillofacial sports related injuries comprise of

1. Soft tissue laceration.
2. Tooth or alveolar bone fracture.
3. Tooth avulsion can be extrusion or intrusion.
4. Injury to gingiva, surrounding mucosa, tongue, palate.
5. Maxillofacial injury like fracture of maxilla, mandible, zygoma, floor of the orbit, etc.

### Role of a dentist towards maxillofacial injuries embrace as follows:

- Dental and maxillofacial injuries relatively cause stress to an individual as it includes the most aesthetic region of the orofacial area like, central incisors.
- Hence, the dentist team play an important role in recognition, diagnosis, treatment planning and prevention of orofacial/dental injuries in sports community [4].

- History, oral and maxillofacial Examination, overall screening, Diagnosis and Pre-treatment of orofacial/dental region should be carried prior to any sports, which in turn actively reduce sports injuries [2]. It not only reduce the risk for injury it also gives a positive attitude and confidence in players.

**Pre-operative protocols should comprise:**

1. Removal of diseased tooth which can't be treated.
2. Maintenance of proper oral hygiene by oral-prophylaxis.
3. Replacement of missing tooth.
4. Restorative considerations of diseased tooth which include dental caries etc.
5. Special care should be considered in children's as maintaining primary dentition should be a prime concern first then tooth removal.
6. Fabrication of shielding devices to protect sport dental injuries.

**Mouth guards a guide to preventive measure for dental sports injuries**

**Mouth guards/gum guards/mouth protector/gum shields**

A mouth guards a protective resilient device or appliance used in the oral cavity for protection of both hard and soft tissues particularly teeth and its supporting structures and which will lead to minimal and no dental injury.

Woolf Krause a London dentist invented mouthguard as a protecting device against lip lacerations for boxers [5]. Unprotected Teeth are more prone to dental injury without any support hence gum shield helps in diminishing the deflection and high forceful impact caused during sports injuries [5].

Any sport where the potential for dental trauma can exist (such as boxing, basketball, football, soccer, ice hockey, field hockey, rugby, and wrestling) should consider the use of mouthguards or faceguards to protect themselves and the competitor player [1].

As the severance and number of incidence in craniofacial/dental injuries has increased the use and acceptance of mouth guards for preventive purpose is increased in sports community [3].

The myth and misunderstanding about mouthguards in athletes was regarding the breathing affect and their performance was nullified by recent studies that prefabricated or custom made mouthguards does not show any effect on any aerobic performance of the athletes [6].

**Representation of some facts related to orofacial/dental injuries and consideration of safety by sports foundation as follows [4]:**

1. Most craniofacial, dental injuries occurring during active participants in sports can be prevented.
2. Members are more prone to sustain damage to the orofacial region if they don't take protective measures of wearing mouthguards.
3. According to the survey every athlete has about 33% - 56% chances of craniofacial/dental injuries in their career.
4. Diseased people due to orofacial injuries are more prone to lose their tooth or spend more dental chair time and money if safety precautions are not taken prior to any sports.

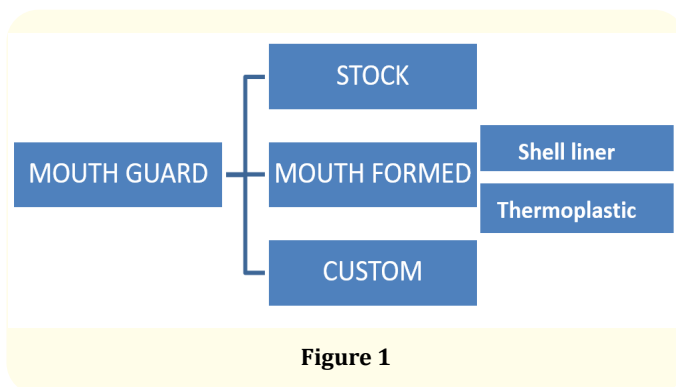
In an issue of the Journal of the American Dental Association (JADA) it was reported that 13 - 39% of all dental injuries are sports-related, with 2 - 18% of the injuries related to the maxillofacial region. Where Males are traumatized twice as often as females and among which the maxillary central incisor is the most commonly injured tooth [5].

**Beneficial outcomes of an ideal mouthguard are as follows [5]:**

- It helps in protecting the teeth, periodontal ligaments, soft tissue, bone structure, and temporomandibular joints etc.
- It diminishes the incidence of concussions and neck injuries.
- It exhibits protective properties that include high power absorption, distribution and expansion.
- provides a high degree of comfort and fit to the maxillary arch.
- It remains securely and safely in place during action.
- It allows speaking and does not limit breathing.
- It is durable, resilient, tear resistant, comfortable, odourless, and tasteless.

**Types of mouth guards [4]**

**Classified as:**



**Figure 1**

## Stock

These mouthguards are pre-fabricated. They are made of rubber, polyvinyl chloride, vinyl acetate and ethylene material. They are mostly widely used in the immediate situation when a customized mouthguard is unavailable. As this mouthguards are affordable and easily available in sports stores most people use this protective device.

### Fringe benefit of stock mouthguard:

- They are easily available.
- They are not cost effective hence affordable by the patient.
- They Come in multiple variety with enormous number of shapes, sizes and flavouring agents.

### Pitfall of using stock mouthguard (disadvantages):

- Difficulty in breathing
- Bulky
- Improper fit
- Non-adjustable
- Cause occlusion imbalance and lead to orofacial problem.
- Leads to improper bite and can cause malocclusion.
- Inadequate support and retention
- Easily distorted over time
- Uncomfortable
- Leads to malocclusion
- Insufficient protection.

## Mouth formed

### Shell/liner:

- The fit is better than stock mouthguard
- Bulky
- Liner gets separated.

## Thermoplastic

They are called as thermoplastic because a thermoplastic material like ethylene-vinyl acetate (EVA), polyolefin, Kraton and polyurethane is used in fabrication so that the material will change its properties as when heated or boiled then the material is then molded by the user. Various flavouring agents are used to counter the smell of the thermoplastic material by the manufacturers.

## Fringe benefit of thermoplastic mouthguard

- Better fit
- Better coverage
- Breathing and speaking is better than stock mouthguard.
- Disposable.
- Inexpensive.

### Pitfall of using thermoplastic mouthguard (disadvantages):

- Improper bite
- Improper occlusion.
- Decreased retention over time.
- Less shock absorber.
- Not customized by the dentist hence improper coverage and uneven.

## Custom

These mouthguard are fabricated by the dentist hence called as custom mouthguard. They can be fabricated for both normal and malocclusion patients.

Various methods are used in fabrication as per the patients need and according to the occlusion of the patient to give maximum protection to both teeth and its surrounding structures. It can be of single layer or multiple layers. For spaced dentition an inter-proximal filling mouthguard is fabricated. For patients with dry mouth and poor oral hygiene a better aerobic mouth guard can be fabricated to provide better osmosis to create an aerobic condition and dissipate shock [8].

The mouth-guard can also be fabricated for partially edentulous patient in which an EVA (ethylene vinyl acetate) is used to compensate the edentulous space which gives support to teeth and the edentulous area and the surrounding structures to give maximum protection for dento-mucosal structure without compensating for aesthetics, safety and shock [9].

## Fringe benefit of custom made mouthguard

- Proper occlusal fit.
- Maximum Occlusal stability.
- Never leads to malocclusion.
- No effect on breathing or speaking.
- Better shock absorption.

- Maximum protection to teeth and surrounding structures.
- Comfortable to patient as it is customized according to his/her occlusion.
- Maximum retention.
- Less distortion and minimal loss of retention over time.

#### Pitfall of using custom made mouthguard (disadvantages)

- Cost effective.

According to American Society for Testing and Materials (ASTM) they can be classified as [12]:

1. **Type 1:** Includes custom made. They provide proper fit, maximum protection and fine occlusal stability.
2. **Type 2:** Includes boil and bite mouthguards, they are also available in sporting stores where the mouthguards are kept in boiling water and then used. Poor fit and improper occlusion lead to bite disturbances.
3. **Type 3:** Includes stock mouthguard available at sporting stores. They are least desirable [10].

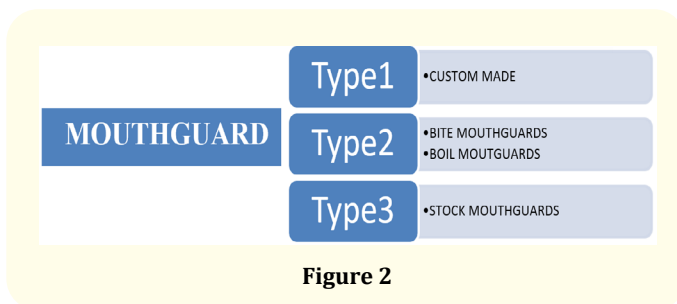


Figure 2

#### Various methods followed for maintaining mouthguard and oral hygiene:

1. Daily hygiene:
  - a. Regular tooth brushing.
  - b. Cleaning of tongue.
  - c. Mouth rinsing.
  - d. Flossing.
2. Use of mouth rinses like chlorhexidine.
3. Use of antimicrobial paste.
4. Drinking of adequate amount of water to avoid dry mouth condition and dehydration.
5. Maintaining a healthy diet.
6. Regular dental and medical check-up.

7. Use of disinfectant to clean mouth guard.
8. use of soft tooth brush and tooth paste to clean mouthguard.
9. Keep the mouth guard in hard-perforated tray when not in use which will prevent it from damaging.
10. Spray application of antiseptic solutions on mouthguard.
11. Avoid keeping mouth guard in hot water or in sunlight or in open when not in use which may lead in distortion.
12. Always cross check it before using whether it fits properly or it is torn which may lead to further injury.
13. Visit dentist for regular check-ups along with mouth guard so that the dentist can examine the mouthguard for any irregularities and its fit.

#### Disinfection of mouthguard

As during mouthguard usage the teeth and the surrounding structure are blocked by the aeration due to which a less oxygen is supplied in these areas leading to create a favourable environment for anaerobic bacteria. This environment thus favours in microbial growth leading to initiation of biofilm formation. Moreover these bacteria releases sulphur dioxide which is oxidized by the saliva to form a sulphuric acid, thus causing caries and tooth wear. Hence regular cleaning and maintenance of mouth guard and oral hygiene is equally important.

#### Conclusion

Even though regular research on mouthguard material, fabrication technique its use and safety precautions which should be followed by the users, the main aim in providing a customised mouthguard for every individual is still lacking due to incomplete users education, improper discrimination of use of customized mouthguard by sports committee, manufactured or use of self-mouldable mouthguards and peoples attraction towards manufactured made mouth guard due to low cost is increasing day by day. Thus leading the mouthguard user to an unconditional way of using a mouthguard. As custom fabricated mouthguards are designed according to users own dental structures it gives a maximum protection and considerable advantages over manufactured mouth protectors. If the guidelines of maximum safety, protection, design, comfort and advantages are standardized and ruled over by wearers the rate of sports related dento-facial injuries can be decreased.

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