Sports Dentistry: Yesterday, Today, Tomorrow

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Summary

Sports dentistry is a branch of dental medicine focused on the prevention, diagnosis, and treatment of orofacial and dental injuries related to sports activities. Although sports have a positive impact on overall health, they carry a significant risk of dental and soft tissue trauma, especially in contact and extreme sports. Mouthguards represent the most important preventive measure, with custom-made mouthguards being the most effective. Despite proven effectiveness, awareness among athletes and coaches about the importance of protective equipment remains low. Modern sports dentistry extends beyond trauma management to the prevention of sport-related oral diseases such as dental erosion and caries. Education of athletes and interdisciplinary cooperation are essential for reducing the incidence and long-term consequences of sports-related injuries.

Keywords: dentistry, sport, mouthguard

1. Introduction

Sport has a positive effect on an individual's psychological, social, and physical health. However, participation in sports activities carries a risk of bodily, orofacial, and dental injuries. The prevalence of dental injuries varies widely and is higher among males and in contact sports. The primary means of preventing dental trauma in dental medicine is the use of intraoral sports mouthguards; nevertheless, the level of awareness among athletes and dental practitioners regarding the importance of their use in sports remains low.

2. Sports Dentistry and Its Significance

Sports dentistry is a branch of dental medicine concerned with the prevention, diagnosis, and treatment of dental injuries and associated oral diseases resulting from sports and physical activity. This definition does not refer solely to the prevention and treatment of dental trauma, but also includes oral diseases related to sports participation, such as dental erosion and caries caused by frequent consumption of sports drinks or by vomiting associated with weight control practices (1,2).

Sports dentistry involves collaboration with athletes, coaches, and parents in order to minimize the risk of tooth avulsion, fractures, tooth mobility, and injuries to the facial soft tissues (3). The primary objectives of sports dentistry include the prevention and management of injuries and diseases of the orofacial region caused by sports participation, the collection and dissemination of new knowledge related to sports-related injuries of the stomatognathic system, as well as clinical research and the development of preventive strategies for orofacial injuries.

Although the prevention and management of dentoalveolar trauma remain its central focus, sports dentistry today encompasses far more than injury care alone. The goal of modern sports dentistry is to protect and enhance the oral health of all athletes; by improving oral health, overall health outcomes in athletic patients are also improved (1). It is important to note that in Croatia there are no specialists in sports dentistry; therefore, the management of such patients involves general dental practitioners as well as specialists in pediatric dentistry, oral surgery, maxillofacial surgery, and prosthodontics, depending on the type and severity of the condition.

3. How and Why Did Sports Dentistry Develop?

The development of sports dentistry began in response to the high incidence of oral and facial injuries in certain sports, particularly during the first half of the 20th century. In sports such as boxing and American football, injuries to the teeth and jaws were long considered an inevitable part of competition, despite their long-term aesthetic and psychological consequences. Boxing was among the first sports to recognize the benefits of sports dentistry (2).

During the 1950s and 1960s, the dental profession began to play an active role in the development of preventive measures. The introduction of the first official recommendations and regulations mandating the use of sports mouthguards in American football led to a significant reduction in orofacial injuries. The implementation of protective face masks and improvements in helmet design, combined with individually customized intraoral mouthguards, resulted in the near elimination of severe facial trauma in this sport.

These advances marked the beginning of modern sports dentistry, which continues to develop rapidly due to the increasing number of recreational and professional athletes, as well as the emergence of increasingly extreme forms of sporting activities (1). All of these factors indicate that the risk of sports-related injuries is rising each year, raising an important question: what is the central focus of contemporary sports dentistry?

4. Types of Sports Injuries and Their Prevention: Mouthguards and Protective Equipment

Traumatic injuries of the orofacial region are common in sports, particularly in contact sports such as basketball, football, combat sports, as well as cycling (3). Common injuries include crown and root fractures, luxation injuries, and tooth intrusion and avulsion, as well as fractures of the maxilla and mandible (4). For example, in cycling, luxation injuries are most frequent (56.3%), followed by crown fractures (28.8%), avulsions (7.2%), intrusions (4.4%), and root fractures (1.3%) (2).

Accurate diagnosis requires radiographic evaluation in addition to clinical examination. Periapical and panoramic radiographs (orthopantomograms) are particularly useful in the assessment of dentoalveolar injuries; however, three-dimensional imaging modalities such as cone-beam computed tomography (CBCT) and computed tomography (CT) play an important role, especially in cases of mandibular fractures and fractures of the midface and cranial region (2). Craniofacial fractures of varying types and severity are frequently associated with sports such as baseball (44.3%), skateboarding (8.4%), American football (7.8%), and basketball (7.2%) (1).

Treatment outcomes largely depend on the type of injury and the timeliness of intervention. Therapeutic approaches to sports-related dentoalveolar injuries are broad, ranging from repositioning and splinting to endodontic treatment and surgical management. However, modern sports dentistry is primarily focused on prevention, followed by diagnosis and treatment of injuries. The most important preventive measure is the use of protective equipment, including helmets, face masks, and intraoral sports mouthguards (4–6).

Intraoral sports mouthguards are effective in preventing sports-related oral injuries, but they also have certain limitations. Three main types of intraoral mouthguards are distinguished: stock (prefabricated), boil-and-bite mouthguards, and custom-made mouthguards. Each type has specific advantages and disadvantages (Table 1), with custom-made mouthguards currently considered the most effective in terms of quality and protective performance (3). A properly fitted intraoral mouthguard protects the teeth, lips, gingiva, tongue, and soft tissues and reduces the risk of jaw fractures; however, its effectiveness in protecting the temporomandibular joint and preventing concussion remains uncertain (2).

5. Promotion and Implementation of the Principles of Sports Dentistry

Close collaboration between the dental practitioner and the athlete/patient is essential. The dentist provides recommendations regarding the use of appropriate types of sports mouthguards, depending on the specific sport practiced by the individual. Particular attention should be paid to the presence of intraoral jewelry (piercings), and athletes should be advised to remove them during sports activities.

It is also necessary to warn athletes about the harmful effects of the misuse of certain substances used to enhance performance, such as anabolic agents and steroids, narcotics, and various stimulants. In sports in which body weight is a criterion for classification into specific categories, special attention should be given to potential eating disorders, such as anorexia nervosa and bulimia nervosa, and their detrimental oral manifestations. These may include erosion of the lingual tooth surfaces, bilateral swelling of the parotid glands, and loss of vertical occlusal dimension.

Contact sports pose the greatest risk for injuries to the orofacial region and the stomatognathic system. Awareness of injury prevention through the use of sports mouthguards remains low among both amateur and professional athletes (3). Injuries of the stomatognathic system can have long-term consequences; therefore, their prevention represents one of the primary objectives of sports dentistry.

6. Conclusion

The development of sports dentistry has led to a significant reduction in the incidence and severity of sports-related orofacial injuries. The most important preventive measure for protecting oral tissues is the use of individually

Table 1. Types of intraoral sports mouthguards..

Mouthguard Type	Advantages	Disadvantages
Stock (Prefabricated)	• Affordable • Easy to use	• Poor adaptability • Low retention and stability
Boil- and- bite	• Affordable • Easy to use	• Low retention and stability • Limited adaptation (better than stock mouthguards)
Custom-made	• Excellent fit • Optimal material thickness • Optimal material thickness	• Higher cost • Longer fabrication time • Requires additional training of the dentist

fabricated intraoral sports mouthguards, which significantly reduce the risk of dental and soft tissue trauma.

Despite the availability of effective preventive measures, the level of awareness and knowledge among athletes, coaches, and the general public remains insufficient. Although the complete elimination of trauma is difficult to achieve in many sports, systematic education and the active involvement of dental practitioners within the sports community are essential for improving preventive strategies, preserving athletes' oral health, and reducing the long-term consequences of sports-related injuries.

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