



SPORT-RELATED INJURIES PROTECTIVE DEVICES AND APPLIANCES

SPORLA İLGİLİ YARALANMALAR KORUYUCU CİHAZLAR VE APAREYLER

Rezzan GÜNER¹

¹Professor Dr., Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Mustafa Kemal University, Hatay/TURKEY

ORCID ID: 0000-0003-2064-9600

Corresponding Author:

Prof. Dr. Rezzan GÜNER

Department of Maxillofacial Surgery, Faculty of Dentistry, Mustafa Kemal University, Hatay/TURKEY

rezzanguner@gmail.com , +90 (326) 245 6060

Abstract

Sport in today's society is more popular than probably ever imagined. Large numbers of athletes participate in a variety of youth, high school, collegiate, professional, and recreational sports. As it is known, every kind of sports is at risk of injuries. Sports activities that can be either professional or amateur are getting increased day by day so sport related injuries are getting increased as well.

There is evidence that eye protection, mouth guards, helmets, and face guards are effective in reducing the risk of facial injury. In this paper reviewed on this protective appliances.

Keywords: Fracture, injuries, face, sport-related.

Özet

Spor günümüzde oldukça popüler bir uğraştır. Çok sayıda sporcu amatör veya profesyonel olarak spor aktivitelerine katılmaktadır. Bununla birlikte sportif faaliyetlerin belirli bir risk oluşturduğu da bilinmekte spor yaralanmaları da dün geçtikçe artmaktadır.

Bu tür yaralanmalardan korunmanın ve olası riskleri azaltmanın en etkili yolunun göz, ağız ve yüz koruyucuları kullanmaktır. Bu makalede bu tür koruyucu tedbirler hakkında literatür gözden geçirilmiştir.

Anahtar Kelimeler: Kırılma, yaralanmalar, yüz, sporla ilgili.

Article Info / Makale Bilgisi

Received / Teslim: 22 May 2018
Accepted / Kabul: 26 June 2018
Online Published / Yayınlanma: 03 February 2019

DOI:

INTRODUCTION / GİRİŞ

As physically active lifestyle is important for all age groups, the number of participants in sport-related activities has grown constantly over the past 10 or 20 years (1).

Reasons to participate in sports and physical activities are many, such as pleasure, relaxation, competition and maintenance and improvement of fitness and health (1).

As it is known, every kind of sports is at risk of injuries. Sports activities that can be either professional or amateur are getting increased day by day so sport related injuries are getting increased as well. Team and individual contact and collision sports include for a large proportion of these injuries (2).

Although restoring function and aesthetics is important, to prevent injuries should be the primary focus (3). Therefore, this will prevent both physical and psychological traumas of the patient so that athlete can continue his or her life sport without any cut (3).

There is debate in literature about prevention of sport related cranio-maxillofacial injuries. Protective devices and rule changes are widely accepted to avoid injuries. A multidimensional scientific approach exists to predict these injuries accurately and create prevention strategies (2).

OVERVIEW / GENEL BAKIŞ

Most existing cranio-maxillofacial injury prevention literature focuses on the effect of helmets, eye/face guards, mouth guards and rule changes (4, 5, 6, 7). In addition for various types of equipment are currently in progress. When the use of protective equipment is enforced, protective facial devices decrease the incidence of facial injuries. For example before 1960, 50% of American football injuries involved the facial or dental regions. Face masks became mandatory for football players in 1959. In 1988 the incidence rate dropped to approximately 1.4% (3). The use of full-face protection and helmets has also decreased the rate of facial injuries, especially contact sports. Also, when protective eyewear has been used, eye injuries have been almost totally eliminated (3).

World wide professional organisations have published recommendations for the use of protective equipment and have sponsored public service advertisement campaigns for, parents, coaches, athletic trainers and physicians (3).

Arch bars, mouth guards, face guards, goggles, helmets are mostly used as protective devices on oral and maxillofacial area (2,3,4,5,6,7,8,9,10,11,12,13,16,17,18).

Mouth-Protection

Arch bars, acrylic splints and mouth guards are used for mouth-protection (3).

Arch bars are commonly used for jaw fractures treatments. Mono or bi-maxillary application is chosen in accordance of the type of fractures.

Arch-bars and acrylic splints are not only used in treatment but also used in preventing the possible traumas of the athlete after the injury. The usage of arch-bars and acrylic splints will provide stabilisation so that the athlete might have no injury or a slight one during the collision (2).

Mouth guards are protective devices in the form of occlusal bite plate involving protective parts In some of the species of mouth guards there are extra protective areas in cheeks and lips parts for increasing their protection (Fig1) (8,10).



Fig-1. Includes extra protective areas in cheeks and lips parts for increasing their protection.

There are a several distinct types of mouth guard such as stock, mouth formed or boil and bite guards and custom made mouth guards. The simplest are stock mouth guards, which may be purchased from sporting goods stores. They are considered the least retentive, the most bulky, and the most likely to interfere with breathing and speech (Fig-2) (3).



Fig-2. Stoc Mouth guards.

Some authors consider them potentially jeopardy and believe they should not be recommended. The second type of mouth guard is mouth formed or boil and bite guards, which are heated and immediately worn by the athlete allowing some adaptation to the dentition to occur.

The third type, more complex mouth guards are custom made. This requires an impression cast of the patient's dentition as the initial step and this guard is made on this cast. The simplest of these is a vacuum formed guard made from a single layer of polyethylene. Custom-made mouthguards are most highly recommended mouthguards used for successful prevention of oro-facial and dental injuries (4). Custom made mouthguards have great advantages such as retention, comfort, fit, ease of speech, resistance to tearing, easing of breathing as well as good protection of teeth, gingiva, lips and facial hard tissues. The shape and surface of the mouthguard which encloses the teeth, the gingival and the hard palate can vary depending on the anatomical features of the athlete's jaw (4).

As many investigators reported, the use of mouthpieces and the reduction of injuries to the oro-facial region are well co-related. The most important special feature of a properly fitted mouthguard functions like a shock absorber upon impact. Mouthguard alters mandibular position on lateral skull radiographs, so that the condyles are distracted from their fossa. Forces from mandibular impact applied to the head and neck would be attenuated, resulting in fewer injuries. A well-constructed and well-fitted mouthguard separates the upper teeth from the lower teeth approximately 3 or 4mm, displaces the mandibular condyles from their articulation with the base of the cranium, and minimizes damage to the teeth, temporomandibular joint and their supporting structures. The results of some studies have indicated that mouth guards that are properly constructed can aid in reducing concussive injuries to the head (8).

There are different clinical and experimental studies in literature about mouthguards. It has been reported that the women basketball players wearing mouth guards had oro-facial injuries rate 2.8 % while players not wearing had incidence of 30.3 % (13). Another study about basketball players showed that injuries increased 6.8 times when mouthguards were not used.

Although it is widely accepted that mouth guards decrease the incidence of dental injuries. There is a controversy among sport medicine professionals as to effectiveness mouthguards in decreasing the incidence or severity of sport-related cerebral concussion (14).

However, some researchers have found that the use of mouthguards doesn't decrease the severity of concussion, it is important to note that the use of mouth guards is marvellous in reducing maxillofacial and dental traumas. Their use should continue to be mandated by athletic associations and supported by all dental and sport medicine professionals (10).

The use of mouth guards has been made compulsory in some kinds of sports. For example in American football, ice hockey, lacross approximately for fifty years. Therefore, the number and severity of dental, facial bones injuries and concussions among these athletes have decreased (15).

Eye Protection

Appropriate, well-fitted eye protective devices have reduced the number of injuries to the eyes (3). Additionally protective eyewear should be constructed from a polycarbonate material that is shatterproof and lightweight. It should also be constructed so that it doesn't interfere with the athlete's direct or peripheral vision (Fig-3) (3).



Fig-3. Eye protective devices.

Eye protection is so important in oral and maxillofacial surgery especially in preventing orbital blow-out fractures. Orbital fractures represent a small proportion of sport-related injuries world-wide. However, the significant functional and cosmetic sequelae especially blow-out fractures of the orbital wall. It is known that if these fractures are not treated or delayed, these symptoms such as diplopia or enophthalmus may be permanent. In these sport related injuries goggles can be recommended to avoid this type of injuries, especially in ball sports (3, 7, 18).

The effect of protective eyewear and face guards has been investigated in many sports. The results show that reduced impact balls and eye and face guards were associated with a reduced risk of injury. In several sports, athletes refuse to wear eye protection because they feel that it obstructs their vision (18, 19).

Investigators found that there was no significant decrease in the peripheral vision was detected in both devices. American academy of Paediatrics and American academy of Ophthalmology a state that properly fitted, appropriate eye protects reduce the risk of eye injury by 90 % (19).

Facial protection

The most commonly used protective device for the prevention of injuries to the mid face, particularly the nose, is a custom-made plastic facial shield. A patented face mask has been developed that is composed of 2 layers of protective materials, an energy-absorbing and energy-dissipating visco-elastic polymer (Fig-4) (3).



Fig-4. Custom-made plastic facial shield.

This mask is designed to take advantage of the naturally protective design of the bony facial buttresses and reinforces them to further decrease the amount of energy that reaches the injured site (7).

Kaplan et al (6) reported as named "fabrication of a facial shield to prevent facial injuries during sporting events: A clinical report". In this article it was defined facial shield for soccer player was produced by them to protect the face of the player who had a zygomatic bone fracture in his early soccer match. In this clinical report the patient has successfully worn the facial shield for almost a year while playing goalie position for his soccer team without further injury (Fig-5) (6).

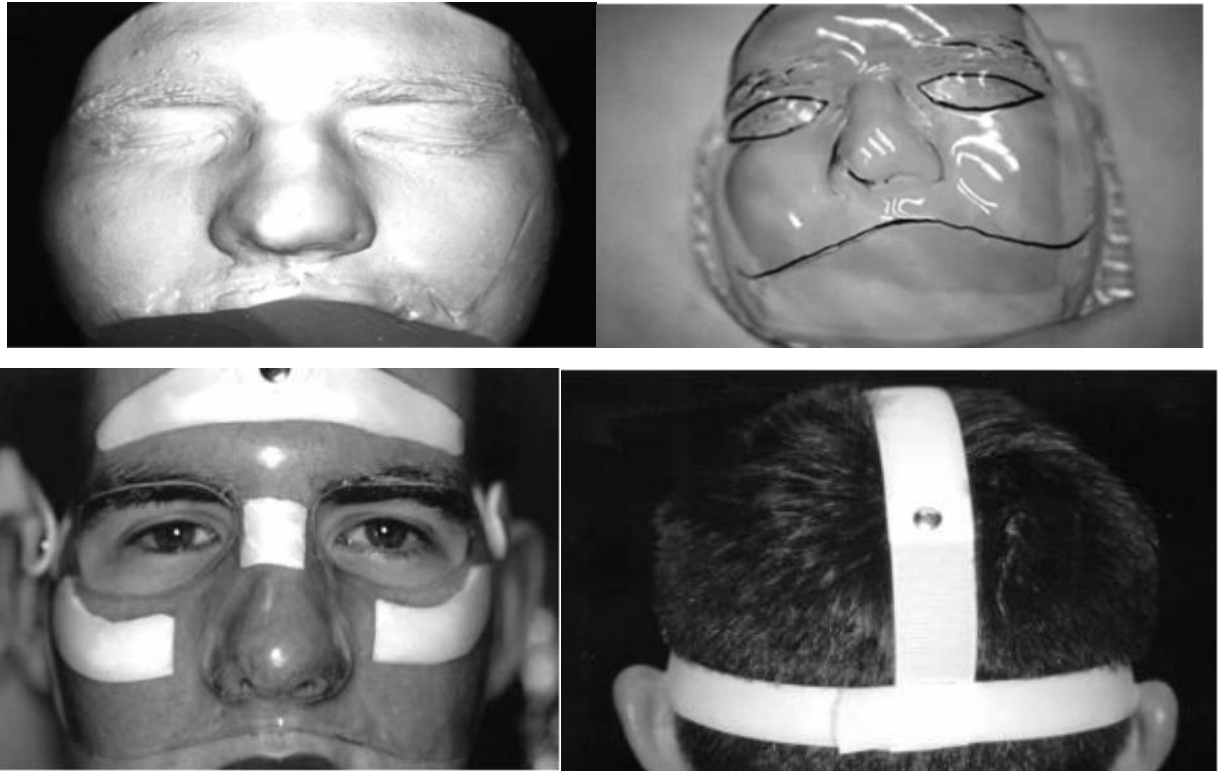


Fig-5. Fabrication of a facial shield to prevent facial injuries during sporting events (Sarit Kaplan et al).

Security High-Tech Individual Extra-Light Device Mask is another form of facial mask. A completely customized mask was forged over the player's face cast to protect the injured area. Most important advantage of this appliance is stability, visual field, and comfort (Fig-6) (7).



Fig-6. Security Hi-Tech Individual Extra-Light Device Mask (Cascone et al; J Craniofac surg. 2008; 19(3):772-6).

Among Professional soccer players, a relevant incidence of maxillofacial trauma has been reported. The main challenge in these particular patients is to give them the possibility of a very short recovery period and the make possible their agonistic activity as soon as possible. These masks shorten covalence period. It's so comfortable and easy fitting, thus allowing the player to perform his or her sport activities at a professional level in the shortest time (7).

Helmets

Helmets afford the athlete protection of the cranium and have been instrumental in decreasing the morbidity and mortality from cranial injuries (20) (Fig-7).



Fig-7. Helmets.

Standard specifications continue to evolve for all helmets. Results of some studies revealed a high prevalence of lower facial injuries, especially in cycling and skiing and horse riding, sports in which athletes often wear helmets. Many professional athletes now wear racing helmets with an extension that covers the lower jaw, which may help reduce the prevalence of facial fractures. The air padded helmets in addition the decreasing the force impact.

American football, baseball, ice hockey and lacrosse helmets are now mandated at all levels of participations.

Sport related helmet studies reviewed primarily involve American football, soccer, rugby, lacross and ice hockey. The document incidence o intracranial haemorrhage associated with severe head injuries or traumatic brain injury has decreased with an improved helmet design involving a hard outer shell. Concussion or minor traumatic brain injury continues despite improved helmet design in some sports. Data for the use of protective headgear in soccer is still inconclusive. One of the conclusions from the 2002 institute of Medicine Report was that there was no available evidence to support to mandatory to use of helmets in soccer players. Appropriate design of helmets with face guards will reduce the incidence of facial injuries caused by cycling-related accidents and incentives are needed for making helmet use compulsory for all cyclist, particularly for mountain-bikers. Acton et al stated that bicycle helmets need design modifications to more adequately protect the face and jaw (21).

SUMMARY / SONUÇ

The face is the most vulnerable area of the body and is usually the least protected. Proper initial assessment and management of injuries may prevent unfavorable long-term results and permanent facial deformities. Although ultimate goals are for the athletes to recover functionally and aesthetically from the facial injury and to return to competition in a timely manner, prevention this injururies primary focus.

Acknowledgements / Teşekkür

References / Referanslar

1. Barr R, Holme I. Risk factors for sports injuries: a methodological approach. Br J Sports Med 2003;37:384-99.
2. Echlin Et al, Craniomaxillofacial injury in sport: a review of prevention research. B.J. Sport. Med. 2005;39:254-263.
3. Facial Trauma, Sports-Related Injuries Chao MT, Paletta C, Garza JR.
4. RR Seals and BC Dorrough. Custom mouth protectors: a review of their applications. The Journal of Prosthetic Dentistry 51;2: 238-242 1984.

5. Badel et al. Custom-made mouthguards and preventions of oro-facial injuries in sports. *Acta Med Cr* 61;9-14 2007.
6. Fabrication of a facial shield to prevent facial injuries during sporting events: A clinical report. Kaplan S, Driscoll CF, Singer MT. *The Journal of Prosthetic Dentistry* 84;4:387-89 2000.
7. Security Hi-Tech Individual Extra-Light Device Mask: A New Protection for [Soccer] Players. C Piero P, Petrucci B, Ramieri V, TitoMatteo M. *Journal of Craniofacial Surgery*: 19; 3:772-776 2008.
8. T Takeda T, Ishigami K, Hoshina S, Ogawa T; Handa J, Nakajima K, Shimada A, Nakajima T, Regner C W. Can Mouthguards prevent mandibular bone fractures and concussion *Dent. Traumatol* 121:134-140 2005.
9. Masesterello and Promosh. Orofacial trauma and mouth protector wear among high school varsity basketball players. *ASDC J of Dentistry for Children*; 56;1: 36-39 1989.
10. T Takeda, K Ishigami, T Ogawa, K Nakajimi; Are all mouthguards the same and safe to use? The influence of occlusal supporting mouthguards in decreasing bone distortion and fractures. *Dent Traumatol.*; 20: 150-156 2004.
11. Prevention of Sport-related Facial Injuries. Black AM., Emery CA. *Clin Sports Med.* 36; 2: 257-278 2017.
12. Intra-oral Mouth-Guard In Sport-Related Oro-Facial Injuries: Prevention is Better than Cure. Mantri SS., Deogade, Bhasin S, Abhilasha S. *Journal of Clinical & Diagnostic Research.*, 8;1: 299-302 2014.
13. Masesterello and Promosh. Orofacial trauma and mouth protector wear among high school varsity basketball players. *J Dent Child*; 1: 36-39 1989.
14. Effect of mouthguards on dental injuries and concussions in college basketball. CR Labella, BW Smith, A Sigurdsson *Medicine and Science in Sports and Exercise* 34(1):41-44 2002.
15. Muhtarogullari M Non-surgical treatment of sport-related temporomandibular joint disorders in basketball players. *Dent Traumatol.* 2004; 20:338-343.
16. Maxillofacial Injuries And Mouthguard Use During Sport Activities In Children And Adolescents : A Survey Investigation In East Anatolia, Turkey Tozoğlu S, Cağlaroğlu M, Tozoğlu U. *Atatürk Üniv. Diş Hek. Fak. Derg.* 19; 1: 20-25 2009.
17. Lee and Chou. Facial Fractures in Road Cyclist *Australian Dental Journal* 53: 246-249 2008.
18. Sport-related eye trauma: a survey of the presentation of eye injuries to a casualty clinic and the use of protective eye-wear Pardhan S, Shacklock P, Weatherill J *Eye.* 9:50-53 1995.
19. Changing trends in pintball sport related ocular injuries. Mitchell S. Fineman, MD John B. Jeffers, Buerger DG; Repke C *Arch Ophthalmol* ;118(1):60-64 2000.
20. Lee and Chou. Facial Fractures in Road Cyclist *Australian Dental Journal* 53: 246-249 2008.
21. Caroline HC Acton, S Thomas S, Nixon JW, Clark R, Pitt WR, Battistutta D; Children and bicycles: what is really happening? *Studies of fatal and non-fatal bicycle injury Injury Prevention* 1: 86-91 1995.