Review Article

PREVENTION OF SPORTS RELATED ORO FACIAL INJURIES: A REVIEW

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Abstract
Physical fitness, skill development, stress reduction and team building are some of the important positive aspects associated with participation in vigorous recreational activities and sports. Despite these benefits, there are certain risk factors, which are associated with participation in these activities. Since many sports – related oro facial injuries are preventable; the benefit – upon – risk ratio can be enhanced by the use of appropriate, properly fitted, protective athletic equipment. Furthermore, as the predictive risk factors associated with such injuries are more clearly identified and defined, the design and development of new protective devices may contribute to future athletic injury prevention. At present, helmets, faceguards and mouth guards are the protective devices, which are used in some sports to reduce the likelihood and the severity of sports – related traumatic injuries to the head, face and mouth of an athlete. Prevention of oro-facial trauma during sports activities includes teaching proper skills, purchase and maintenance of appropriate equipment, safe playing areas and wearing and utilization of properly fitting protective equipment. Thus, dental professional can play an important role in meeting the challenge of preventing these sports – related injuries.
Keywords:Sports, orofacial injuries, trauma, prevention

Introduction

The broad range of human activities beyond the daily routine of living and working includes recreation, sports and athletics. Sports are derived from an old combination of words that literally meant "to carry away from work". According to the Concise Oxford Dictionary[1], sport can be defined as "any pastime or game requiring physical effort that is undertaken for amusement, diversion or fun". Such activity can be competitive or recreational, amateur or professional.

Sports influence the lives of majority of the world population. There are many reasons to participate in sports and physical activity such as pleasure, relaxation, competition, socialization and maintenance and improvement of fitness and health. Ronald La Porte[2] and colleagues presented a definition of sports injury in a paper on the surveillance of recreational injuries, published in 1993, which is as follows "any unintentional or intentional damage to the body resulting from participation in any pastime or game or requiring physical effort that is undertaken for amusement, diversion of fun". A study by Birjuret al[3] in 1995 found that sport related injuries account for 36% of all injuries from all causes representing 4,279,000 sports injuries annually in the United States. San J[4] in one of his study found that out of all sports – related accidents reported, 11 – 18% were maxillofacial injuries.

Here, an attempt is made to review and discuss the literature pertaining to prevention of sports related oro-facial injuries.

Protective Equipment for the Prevention of Craniofacial and Intraoral Injuries

Helmets

Helmets are designed to protect the skin of the scalp and ears from abrasions, contusions and lacerations. Helmets protect the bones of the skull from fractures and the brain and central nervous system from dietary concussions, unconsciousness, cerebral hemorrhage, brain damage, paralysis and death[18].

During the decades between the 1920s through the early 1950s, the primary form of helmet used in sports was the sturdy leather helmet. The development of the synthetic resins brought about the creation of the plastics industry as manufacturers began to mould hard plastics into the football helmets of the 1950s. Since these rigid helmets afforded a greater degree of protection, had higher impact strength and were more resistant to damage than the leather helmets. Plastic helmets were fabricated from thermoplastics composed of acrylonitrile – butadiene – styrene and polycarbonate. A later modification was the placement of a protective rubber pad at the midline of the forehead. When used properly, helmets enhance player safety and reduce morbidity. Conversely, when used improperly as weapons against an opponent, they can potentiate injuries to the head, neck or spine.The increased awareness of this situation and to caution participants regarding the potential dangers involved in competing in this sport, warning labels are affixed to the external back section of football helmets[15]. One type is known as the suspension helmet. This type if helmet is lined with soft plastic – covered foam that absorbs traumatic forces and possesses the capacity to spring back to the original shape. The other is the so – called air helmet, which has the added safety feature of an inflatable bladder to enhance protection[20]. According to Withnal c et al[15], the two most critical properties of helmet are impact energy attenuation and load distribution. The documented incidence of intracranial hemorrhage associated with severe head injuries or traumatic brain injury in American football has decreased with an improved helmet design involving a hard outer shell, which attenuates direct impact. Helmet testing,

design improvement and standardization by nations or international organizations – for example, The American society for testing and Materials (ASTM), The Canadian standards association (CSA), and the international **Organization for standardization (IOS) –** have focused on increasing helmet energy attenuation of direct impact forces and providing an improved external deflective surface[18].

Eye / Face Guards

Face guards are designed to protect against facial injuries to the mouth, nose, eyes, nasal pyramid and zygomatic arches, depending upon the style of facemask used[18]. Facemasks are manufactured from various numbers and diameters of plastic or rubber tubing or welded steel or aluminium and are covered with a coating of vinyl plastic. The earliest style of facemask introduced, consists of a contoured single bar. While all styles of facemasks provide varying degrees of protection to the maxilla by forces directed horizontally from large objects, the single bar facemask provides the least amount of protection from forces directed angularly such as those from an extended finger, a clenched fist, a forearm, or a helmet directed respectively toward the eyes, nasal pyramid, zygomatic region, or the mandibular arch[19]. The full – cage facemask affords the greatest degree of overall facial protection and is generally preferred by defensive players to avoid injuries. One major disadvantage of the facemask is that it prevents a protruding object within the ready grasps of an opposing player. When the facemask is pulled or twisted by an opponent during the course of play, serious physical consequences such as muscle, neck or spinal column damage can result[20]. Approximately 40,000 –100,000 sports or recreationally related eye injuries occur annually in the United States. The most common causes of North American sports related eye and facial injuries are baseball, basketball and racquet sports. Prospective surveillance studies of ice hockey related eye and facial injuries performed in the early 1970s resulted in the mandated use of helmets with full-face protectors in amateur ice hockey by 1977. The benefit of wearing certified full-face protectors was shown by the fact that no catastrophic eye / facial injuries were reported from 1978 to 2000. In several sports including hockey, squash, baseball, basketball, football and lacrosse, athletes refuse to wear face / eye protector because they feel that it obstructs their vision. Further investigation and improvement in product design and function could lead to increased acceptance. A recent joint policy statement issued by the American Academy of Ophthalmology states that properly fitted appropriate eye / face protectors reduce the risk of facial injury by 90%. This policy statement recommends the prescription of specific protective eye wear for youths involved in organized sports, based on a risk specific classificationsystem.Echlin P S et al[18] has recommended mandatory protective eye wear for all functionally one eyed athletes, who had eye surgery or trauma and those who have been advised to wear eye protection.

Mouthguards

Athletic mouth guards are designed to protect the lips and intra oral soft tissue from bruises and lacerations; protect the teeth from crown fractures, root fractures, dislocations and avulsion; protect the jaws from fractures and dislocations and provide support for edentulous spaces[20,21]. The American Society for testingand materials (ASTM) designation: F 697 – 80 entitled the following definition for a mouth guard (or mouth protector): “a resilient device or appliance placed inside the mouth (or inside or outside), to reduce mouth injuries, particularly to the teeth and surrounding structures”.

The properties of a properly fitted mouth guard as defined by Academy for sports dentistry (ASD) are as follows:

1. Adequate thickness in all areas to provide for the reduction of impact forces.
2. A fit that is retentive and not dislodges on impact.
3. Speech consideration equal to the demands of the playing status of the athlete.
4. A material that meets U. S. food and drug administration approval.
5. Preferably a wearing duration of time equal to one season of play.

The ASTM in Designation: F697 – 80 (Re-approved 1986) established the classification system for athletic mouth guards:

Stock mouth guards**:** They are purchased over the counter by consumers from sporting goods stores. Stock mouth guards are made of polyethylene,They are the least expensive, least retentive and often bulky, interfere most with the athlete’s ability to breathe and speak and often cause the athlete to gag. [20, 21].

Mouth formed mouth guards: boil and bite variety & shell-lined variety is fabricated by placing freshly mixed ethyl methacrylate into a hard shell, which is then inserted into the athlete’s mouth until the material sets. Although offering relatively good adaptation to the dental arch, this variety is often too bulky and uncomfortable as well as having an unpleasant odour and taste.

Custom fabricated mouth guards: They are made professionally over a dental cast of the athlete’s arch (maxillary arch for patients with class I or class II malocclusion; mandibular arch for patients with class III malocclusion). Believed to interfere least with breathing and speech. Because of superior fit and comfort, made from Rubber, Vinyl laminate; polyurethane and rubber; silicone rubber, methane rubber, acrylic, and thermoplastic vinyl; polyvinyl acetate; or polyvinyl acetate and polyethylene[21].

Laboratory methods, which are commonly used for the fabrication of mouth guards:

1. Photo polymerized methane diacrylate mouth guards by Ranalli D N & Guevara Peter A
2. The vacuum forming technique material used is poly ethylene vinyl acetate (EVA)
3. The heat – pressure laminating technique, high heat and pressure with Drufomat, the Erkopress 2004 or the Biostar[17, 21]

Pros and Cons of Wearing Helmets, Facemask and Mouthguards

Protection of the teeth and intra oral structures[5, 7], Prevent Jaw fractures and edentulous areas, Reduction of other head and neck injuries: Jackson E. Winters[11], mouth guards prevent sports related concussion by increasing the time and distance involved in acceleration when the mechanism of injury is an upward blow to the head through the mandible, boosts Athlete's confidence.

An opportunity for the dental profession: Involvement in the endorsement of mouth guard use and the fabrication of mouth guard provides the dental profession with a unique opportunity to serve as an advocate for the health of sports participants. Active involvements by dentists with local teams or committees that determine athletic policy provide wider recognition for the profession in general, and for the individual practitioner in particular for improving oral health and protecting against oral dental injuries to athletes[22].

Objections and disadvantages to the use of mouth guards relate more to issue of inconvenience and maintenance than to long – term health issues.

Comfort: they are uncomfortable because of their bulk and improper fit, poor retention, gagging, nausea, dry mouth, lack of durability, lack of cleanliness.

Tissue reaction: ulceration, fever blisters, cancher sores and even numbness.

Function and maintenance: it can impair normal breathing, normal speech or restrict the intake of fluids[22].

Conclusion

The present day educational system for children is keeping them too busy in academic activities and the time and place for sports has become narrow. The concerned authorities should give a proper thought and see that the upcoming youngsters are exposed for sports activities too. The other groups (like middle and old age) should also select and participate in sports activities. Sports may cause minor or major injuries. Hence, the concerned person / organizations should try to implement all the care and preventing strategies so that the injuries can be prevented. Screening programs could be conducted for school children to identify those with high anatomic and behavioral risk for occurrence of traumatic injury to the anterior teeth so appropriate preventive measures such as preventive orthodontic treatment and use of mouthguards can be implemented. A healthy population can build up a healthy progressive nation. Let us hope people around the world will understand this and give sufficient importance for the sports activities.

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