

Sports Dentistry : A Review

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Abstract

Whether for exercise, competition or the simple enjoyment of recreational activity, increasing numbers of health conscious people are involved in sporting activities. Dentistry plays a large role in treating oral and craniofacial injuries resulting from sporting activities. The prevention of both sports dental injuries and specific oral diseases in sports community are important aspects of the sports dentistry. The significance of various preventive strategies such as use of mouth-guards and dietary counseling are described. The role of sports team dentist is well recognized in diagnosis, management and prevention of dental injuries and diseases in sports community. The sports team dentist also acts as the main source of research in sports dentistry. It is recommended that sports dentistry should be included in dental curricula at both undergraduate and postgraduate levels.

Key Words: Sports dentistry, dental injuries, prevention.

Introduction

Sports dentistry had evolved as an independent sub-specialty during the last decade. It has expanded much beyond its traditional image of being limited to mouthguard fabrication and treatment of fractured teeth. There has been a revolution in the concept of identification of cause, treatment and prevention of dental injuries and diseases related to sports community at both recreational and organized level. It encompasses sports activities from toddler age to the adult and senior citizens' stage.

According to the International Academy of Sports Dentistry (IASD), "sports dentistry involves prevention and treatment of oro-facial athletic injuries and related oral diseases as well as the collection and dissemination of information on dental athletic injuries and encouragement of research in prevention of such injuries"¹.

Oral health of participants in major championships and Olympic games has been surveyed². While the athletes at these events clearly represent the highest levels of physical development and conditioning, their oral health was often found to be either at or below the average level as compared with the general population.

The National Youth Sports Foundation for Safety has presented the following facts about oro-facial sports injuries³; Dental injuries are the most common type of oro-facial injuries sustained during participation in sports; the majority of these injuries are preventable. An athlete is 60 times more likely to sustain damage to the teeth when not wearing a protective mouth-guard. Every

athlete involved in contact sports has about 10% chance per season of an oro-facial injury or 33% - 56% chance during an athletic career. Victims of knocked out teeth who do not have tooth properly preserved or replanted may face lifetime dental costs, hours in the dental chair and possible development of other dental problems. Researchers have focused on the dental diseases such as tooth wear^{4,5} and soft tissue^{6,7} changes found in athletic community as related to their life styles and eating habits. Consequently dietary advice, life style change and oral health education have attracted much of the attention in sports dentistry.⁸

The position of team dentist at the club level and national level has become a requirement. It is rewarding in not only treating injured athletes but also preventing more potential dental injuries and diseases from occurring.

Common Sports Injuries

1. Soft Tissue Injuries : The face is often the most exposed part of the body in athletic competition and injuries to the soft tissues of the face are frequent. Abrasions, contusions, and lacerations are common and should be evaluated to rule out fracture or other significant underlying injury.⁹ These usually occur over a bony prominence of the facial skeleton such as the brow, cheek, and chin. Lip lacerations are also common.¹⁰

2. Fractures : Fractures of the facial bones present an even more complex problem. The most frequent site of bony injury is the zygoma (cheekbone). Fractures of the zygoma account for approximately 10% of the maxillofacial fractures seen in sports injuries, occurring as a result of direct blunt trauma from a fall, elbow, or fist.¹¹ In a study by Linn and others, of the 319 patients treated for sports-related injuries, males proved to be more prone to zygomatic fractures than females because of the powerful physical contacts during sports.¹² Like the zygoma, the prominent shape and projection of the mandible cause it to frequently be traumatized. Approximately 10% of maxillofacial fractures from sporting activities occur in the mandible when the athlete strikes a hard surface, another player, or equipment. In a mandibular fracture, airway management is the most important aspect of immediate care.¹³ In both children and adults, the condyle is the most vulnerable part of the mandible. Fractures in this region have the potential for long-term facial deformity. Recent data suggest that condylar fractures in children can alter growth of the lower face.¹⁰

3. TMJ Injuries : Most blows to the mandible do not result in fractures, yet

significant force can be transmitted to the temporomandibular disc and supporting structures that may result in permanent injury. In both mild and severe trauma, the condyle can be forced posteriorly to the extent that the retrodiscal tissues are compressed. Inflammation and edema can result forcing the mandibular condyle forward and down in acute malocclusion. Occasionally this trauma will cause intracapsular bleeding, which could lead to ankylosis of the joint.

4. Tooth Intrusion : Tooth intrusion occurs when the tooth has been driven into the alveolar process due to an axially directed impact. This is the most severe form of displacement injury. Pulpal necrosis occurs in 96% of intrusive displacements and is more likely to occur in teeth with fully formed roots. Immature root development will usually mean spontaneous re-eruption. Mature root development will require repositioning and splinting or orthodontic extrusion.

5. Tooth Fractures : This is the commonest dental injury in sports community⁷. It usually splits a tooth into two fragments, one remains attached to the socket and the other becomes free. The teeth which are mostly affected by dental trauma are permanent maxillary central incisors.^{14,15} The decision of allowing the athlete to continue or refer for dental treatment depends upon the type and level of the tooth fracture. Tooth fracture at the level of enamel or dentine (not involving the pulp) may not need immediate referral. The fracture which involves pulp or root fracture may cause severe pain and bleeding; hence needs quick referral to a dental clinic.

6. Luxation : In this condition the tooth shifts its position at the level of root but does not completely remove it from the socket¹⁶. The tooth may be extruded from the socket or it may be intruded into the socket. It may also be displaced laterally. During sports activity, it may need immediate attention and an attempt is made to reposition the tooth, and stabilize it by biting on a towel or wearing a mouth guard until more definite treatment is provided in a dental office. If it is not possible to reposition the tooth, immediate referral to a dental office is required.

7. Avulsion : This dental injury causes the tooth to be knocked out or removed completely from its socket. Boys are three times more likely to experience avulsion than girls, and most frequently between the ages of 7-11 years.¹⁷ According to Andreassen¹⁸, eruption teeth have loosely structured periodontal ligaments which favor avulsion. The avulsed tooth may be replanted immediately into the socket with extreme care to avoid infection and damage to the



periodontal ligaments. The replanted tooth can be further stabilized by biting on a towel or wearing mouthguard until further treatment is provided in a dental office. However, if it is not possible to replant the tooth at the spot, the tooth must be stored in an ideal storage medium until it is replanted in a dental office.¹⁹ A 90% success rate is achieved if the tooth is replanted within thirty minutes of the avulsion. Ideal transport media include saliva, physiological saline and milk. Custom prepared Hank's balanced salt solution or Viaspan solution²⁰ is bio-compatible with periodontal ligament cells keeping them viable for 24 hours, due to its pH and osmolality. The tooth should not be stored in water, alcohol for antiseptics, as they all compromise the vitality of the periodontal ligament cells. It is recommended that Hank's solution should be included in emergency sports care kit.

Prevention of Dental Injuries

All these dental injuries and other major oro-facial injuries are preventable. The National Alliance Foot-ball Rules Committee²⁰ of USA in 1962 adopted a resolution to instruct players to wear intra-oral mouth and tooth protection. IASDI has also strongly recommended the use of mouthguard during several sports such as basketball, baseball, boxing, equestrian events, football, gymnastics, handball, martial arts, squash, volleyball, water polo, weightlifting and wrestling. Each of these sports has the potential to seriously harm the head, face and mouth of the players as a result of head to head contact, hazardous fall, tooth clenching or blows to the mouth and teeth. It has been estimated that about 200,000 injuries per year have been prevented by use of mouth-guards or other protective equipments.²¹ The use of mouth-guard also places the head of mandibular condyle in temporomandibular joint at a position which sustains most concussions from blows to chin.²¹

The mouth-guard is made up of the materials which are resilient, tear resistant and comfortable. There are three basic types of mouth-guards-

- The ready-made or over the counter mouth-guards.
- The mouth formed "boil and bite" mouth guards.
- The custom-made mouth-guards by a dentist.

In a position statement, IASDI recommends the use of a properly fitted mouth-guard; encourages the use of custom-made mouth-guard made over a dental cast and delivered under the supervision of a dentist, and supports a mandate for the use of a properly fitted mouth-guard in all collision and contact sports. IASDI has also recommended the inclusion of special trauma cards in emergency care kits to help sports coverage personnel in providing fields

treatment in case of a dental injury.

Oral diseases in Sports Community

Tooth wear/tooth substance loss is becoming an increasingly common problem in athletic community.² It has been reported that athletes may be placing themselves unintentionally at risk for dental erosion.^{22,23,24}

It has been identified that dental problems are arising from the consumption of acidic foods and drinks among several sporting groups.²⁵

Dental erosion is a non-carious pathological loss of tooth substance by chemical process. Vigorous exercise and strenuous sports cause dehydration which reduces the salivary protection against the acids present in sports supplements and soft drinks consumed during and after the sport activities.^{4,5,24,25} Dehydration reduces the salivary flow rate and in turn its buffering capacity to clear acids from mouth.²⁶ Dental erosion is also common in people who swim regularly in gas-chlorinated pools, where the water becomes acidic.²⁷

Prevention of Oral Diseases

Prevention remains a cornerstone in the management of toothwear particularly dental erosion. Proper dietary analysis and advice should be provided to sports community.^{24,27} The frequency of taking acidic foods and drinks should be checked, limiting the intake to mealtimes only. Neutral sodium fluoride mouth washes are advised to combat acidic damage, and to control tooth sensitivity. Patient is advised to avoid tooth brushing immediately after consuming acidic foods and drinks. The toothbrush pressure may cause significant loss of already demineralized tooth surface. The use of mouth-guard with application of alkaline solutions (sodium bicarbonate, milk of magnesia) is also advised during strenuous sports activity. Patients with rapid erosive tooth wear may need restorative dental treatment to arrest the progress of the wear and related complaints.²⁸

Drug Abuse among Sports Community

Use of anabolic steroids and performance enhancers by athletes is strictly prohibited by antidoping laws. There is a significant association between the use of anabolics and misuse of cannabis and cocaine. Insulin may also be abused by the athletes due to its growth promoting properties. Anabolic steroids & performance enhancers may cause consumption of a diet high in carbohydrates which increases the risk of dental caries.²⁸

Smokeless Tobacco & Sports Community

There is a historic link between sports community and use of smokeless tobacco.²⁹ The smokeless tobacco is also known by other names such as spit tobacco, dip, snuff or chewing tobacco. The longstanding relationship between athletes and smokeless tobacco had its origin in dusty playing fields of bygone days which use to cause stress and discomfort. Although, cigarette smoking has

largely replaced the use of smokeless tobacco, it is still present and taken as a ritual position rather than necessity.³⁰ It is a potent source of nicotine and known carcinogens, and research has documented it as addictive and adverse to oral and general health.^{6,7,31}

IASDI supports the concept that smokeless tobacco is not a safe alternative to cigarettes or any other forms of smoking. Research studies have shown that half of the smokeless tobacco users are at risk for precancerous lesions in their mouth; and chances of getting oral cancers is 400 times greater than the non-users.² Another potential risks is that the smokeless tobacco users may start smoking cigarettes and other forms of substance abuse.^{30,31} In athletes, abstaining or stopping the use of smokeless tobacco poses greater challenge than stopping cigarette smoking.³⁰ The use of nicotine gum, transdermal patches and mint snuff as placebo oral substitutes are advised in these cases. Mint snuff is simply mint leaves packed in small round tins designed to mimic cans. This product contains no sugar and nicotine and effectively imitates smokeless tobacco.

Sports Team Dentist

The importance of participation of dentist along with other support personnel is well recognized. The dentist required support specific knowledge and special training in order to work during sporting events. The responsibilities of a team dentist may include: Providing dental care coverage during sports competitions.

- Organizing the dental care for a specific team.
- Developing a dental prevention program.
- Working as a main source of research required in this field.
- Identifying drug abuse in sports.
- Continuing education courses for team dentists are conducted in sports dentistry conferences, and are also available online.

The IASDI supports the inclusion of topics related to sports dentistry and fabrication of mouth-guards in dental school curricula. The sports dentist can assist in developing the curricula for the dental schools, dental societies and athletic trainers.

Summary

With the many sports that children play, such as soccer, basketball, football, baseball, and "in-line" skating or roller blades, it is recommended that dentists fabricate mouth-guards for all patients especially children who participate in organized and unorganized sports. Dentistry should be working diligently to require mandatory use of mouth-guards in all sports, which starts at the local and state levels.

References

References are available on request at editor@healtalkt.com

