

Sports dentistry: a perspective for the future

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Abstract

Sports Dentistry (SD) acts in the prevention, maintenance and treatment of oral and facial injuries, as well as the collection and dissemination of information on dental trauma, beyond stimulus to research. Establishes as a duty for the dentist detect problems related to the athlete's stomatognathic system. This essay is based on the provided data from the literature related to SD, including definition, practice areas and research fields. To discuss the data, six areas were categorized: shares in sports dentistry; oral health of athlete; sports-related dental implications; dental-facial trauma; face shields; and mouthguards. The analyzed data show that the SD is still an underexplored field of action by dentists, but it is expanding, despite not being recognized specialty by the Federal Council of Dentistry, but the Brazilian Academy of Sports Dentistry has been created with a mission to show the real importance of Dentistry in sport. The dentist should be part of the group of professionals associated with the athlete to perform periodic checks in order to ensure oral health which may contribute to athletes' performance. When impact occurs, however, it would be possible reduce the severity of the impact related to injuries, by using helmets, masks, goggles, face shields and mouthguard. Additionally, it is imperative that dentists, sports coaching, athletes, and professional who work with athletes be aware of the benefits of incorporating SD as an important academic and professional subject.

KEY WORDS: Mouthguard; Face shield; Trauma; Athletes's oral health.

Introduction

In time where the words of Baron de Coubertin "The important thing in life is not the triumph but the struggle" to improve the athlete's performance was not as much meaning these days where the important thing is to win. Depending on the sport practiced, milliseconds can make the podium and the health of the athlete now has vital importance. For this there was a great incentive for research to bring improvement in athletic performance, talent detection, care that result in breaking records, medals and trophies. With the results of these surveys Clubs, Associations and Institutions started to give due consideration to performance of their athletes thus providing its professional staff involved in the day to day of these in physiology, biomechanics, game analyst, nutritionists, physiotherapists, psychologists, doctors and dentists currently.

The role of dentistry in the sports is important, because it provides the athlete optimal oral

health conditions which in turn can contribute to achievement of optimal performance during competitions. Sports Dentistry (SD) involves the prevention, maintenance and treatment of oral and facial injuries, as well as the collection and dissemination of information on dental trauma, in addition to stimulating research¹. It directs a duty of the dentist detect problems of the athlete, such as mouth breathing, poor positioning of the arches, and properly administer medications free of substances, that may provide the positive doping present in many painkillers. The SD is still recent in Brazil, and the Federal Council of Dentistry (FCD) does not recognize the SD as a specialty and it is not included as a compulsory subject in the curriculum offered at most universities.

Among the different sports, there are those which the risk of injury due to the contact or impact can

be considered high. For instance, some team sports and combat sports such as. Sports as boxing, judo, karate, jiu-jitsu, wrestling, sumo, soccer, basketball, volleyball, handball, mountain biking, motocross, hockey and skating. As a result, not saving efforts with epidemiological studies about injuries in sports and the resulting establishment of preventive methods. It is estimated that approximately 150,000 injuries to the mouth tissues are prevented annually through mouthguards during the practice of sport².

Shares in sports dentistry

The history of SD in Brazil happens concomitant with the occurrence of some of the major sporting events and refers to the time of the World Cup Soccer 1958, when the dentist Mario Trigo accompanied Brazillian soccer team during this competition and consequently in the Cups of 1962 and 1966. In 1958, in Sweden, Trigo performed 118 extractions on 33 players. As a dentist of Fluminense Football Club, Trigo reports had observed that athletes who waited longer to recover of concussions were precisely those who had dental infection. After elimination of the infection, athlete's recovery was faster, optimizing treatment and facilitating the team squad³.

Until 1990s, there were few dental professionals working in the sports field. Between 1992 and 1996, only 10 Brazilian soccer's teams, of a total of 42, has dental offices in threes headquarters. Professional football institutions mostly lacked dentists working in conjunction with the coaching staff, using outsourced services, targeting more curative treatment in relation to preventive interventions⁴.

Aldo Forli Scocate was the dentist responsible for the oral health of Olympic athletes in 1992, performed 265 assistances. The average of 14.6 patients per day is high rate high for a delegation with just over 300 members. As a result of the treatment during the Olympics, there was an increase of psychological situation of athletes and the improved of muscle performance reacquired⁴.

The dental care at the Athens Olympics in 2004 was the second most searched service in the Olympics, behind only physiotherapy. The dental clinic was in the field of medical care area

Observing the need for expanding and disseminating knowledge about this field of dentistry, due to scarce studies about SD, the objective of this essay is define and discuss some published articles in this area, as well as the role of professionals, focused on the prevention methods and frequent risk situations that involve athletes. Six areas were categorized in this essay: shares in sport dentistry; oral health of athlete; sport-related dental implications; dento-facial trauma, face shields, and mouthguard.

of the Olympic Village, where 28 dentists treated 658 patients. The most common procedures were restorations (313 permanent and 31 temporary) and endodontic treatment. The second week of games was the period of greatest achievement of procedures⁵.

In Beijing Olympics in 2008, 80 dentists performed about 1600 treatments. As in the previous edition of the games, were held several restorations and endodontic treatment, with a large number of cases of pericoronitis treatment and mouthguards confection. When comparing the number of procedures crippling performed in Beijing Games with the 1968 Olympics, held in Mexico, there is a decrease in procedures such as tooth extraction, from 370 to 47 cases. This fact highlights the philosophy and acting of a minimal invasive dentistry, and more careful with the health of the athlete⁶.

The political interaction between unions, councils and associations, as well as discussions forums are relevant to cover the area of SD actuation. The first World Congress of Sports Dentistry and Dental Traumatology was held in Boston - USA, in June 2001. This meeting summarized the relationship between two international organizations: International Association of Dental Traumatology (IADT) and International Academy for Sports Dentistry (SDA), which decided to publish official journal Dental Traumatology⁷. Brazilian Dental Association (BDO) searches for greater integration of the dentist in sports, and is the response of the bill PL 5391/2005, which defines how the presence of standard dentist specializing in SD at a competition⁸.

Oral health of athlete

The high standards of performance required of athletes can only be achieved by an individual totally healthy. The time, effort and money invested in realization of this maximum level of fitness should not be jeopardized by preventable oral health problems, which occur before or during competition⁹.

To provide the best performance, it is important that the dentist make a detailed assessment of oral health status of the athlete to detect changes and pathologies such as dental malocclusion. If the athlete presents alterations in the occlusion can be significantly compromising the performance since it interferes with the efficacy of chewing, and subsequent digestion of food, thus impairing nutrient absorption. The loss of muscle balance, headache, temporomandibular joint problems, discomfort and stress can also be an imbalance occlusal¹⁰.

From 2003 to 2006, professional players of the Spanish football team Barcelona Football Club were compared with students of Dentistry and Medicine, University of Barcelona. The average active caries was significantly higher among professional football, adopting as justification that students are more

sensitive / willing to dental treatment¹¹. Agreeing with the increased risk of dental caries among soccer players, when approached female cast, 57% had the disease, demonstrating the importance of establishing a program of oral health from the health promotion related to the sport practice¹²⁻¹³.

The oral health problem affects not only professional athletes, worsening among amateur athletes, as shown in a study that evaluated nearly 400 records of football players, with 353 amateurs and 47 professionals. The results showed that amateur athletes are more alarming: 283 caries lesions - 71%, root canal 109 - 27% 33 abscesses - 9% extractions and 78 - 22% when compared to professional athletes: 32 cases of cavities - 68%, root canal 11 - 23%, no cases of abscess - 0% and 24 extractions - 51%¹⁴.

Therefore, it's duty of the dentist active in SD conduct regular reviews to identify any changes and diseases and to promote health education. The duty of dentist is working with patients, identifying individual risks, whether physiological or modality, and develop prevention plans that are enjoyable to the feeding requirements of the athlete and lifestyle¹⁵.

Sports-related dental implications

Sports drinks, especially carbonated are often consumed by the population, mainly by professional athletes and amateur sports people, with the purpose of rehydration and electrolyte replacement during highly aerobic sports¹⁶. These drinks have detrimental effect on the teeth due to the low pH and the presence of citric acid in its composition, which can be potentially erosive for tooth tissue if consumed improperly and with high frequency¹⁷.

When the pH reached 5.5, the hydroxyapatite crystals begin to dissolve, so below this value the enamel is at risk of decalcification¹⁸. Another negative effect of the low pH of carbonated sports drinks is the potential of being harmful to the properties of the composites. An in vitro study concluded that energy drinks used affected the color of composite resin restorations evaluated after a period of six months¹⁹.

Swimming athletes are affected with biocorrosion enamel because the pools are chlorinated to reduce bacterial contamination and algae. Although a low pH can cause irritation in the absence of appropriate glasses, excess chlorine in the water. It can not be

detected by swimmers, allowing the acidic water in contact with the teeth, could cause irreversible tooth structure wear²⁰. In published case, swimming athlete showed several loss of tooth enamel, in just two weeks, especially in their anterior teeth. This case emphasizes the need to ensure that the water is properly chlorinated and pH adjusted to 7.5²¹.

Also in relation to water sports, divers can suffer barodontalgia, considered an intraoral pain evoked by changes in barometric pressure. Changing the volume of gas within cavities of the rigid body, associated with fluctuations in atmospheric pressure can cause adverse effects, being the most common oral diseases reported as possible sources of barodontalgia: unsatisfactory dental restorations (30.31%), dental caries without pulp involvement (29.2%), inflammation of the pulp / periradicular necrotic (27.8%), vital pulp pathology (13.9%) and recent dental treatment (barodontalgia postoperatively, 11.1%)²²⁻²³.

Already dental barotrauma, can manifest as tooth fracture reduction and retention of dental restoration or fracture, caused by changes in atmospheric

pressure. Besides the need for dental treatment, the potential consequences include aspiration or swallowing of the fragment of restoration and / or pain, which can lead to incapacitation or disruption during the dive²⁴. Therefore, when acting

for patients who dive, the dentist should perform periodic checks and preventive measures, including periapical and vitality test, with special attention to apical pathology, defective restorations and secondary caries lesions²⁵.

Dental-facial trauma

Worldwide, there is a rise in the number of practitioners of regular vigorous physical activity and contact sports. Unfortunately, the benefits provided by physical activity are associated with the risk of injury, including hard and soft tissue trauma²⁶. Contact sport athletes have up to 10% more probability of suffering orofacial injury when compared to non-practitioners²⁶ and 33-56% risk of suffering a facial injury during his career².

Regarding to hard tissue trauma, nasal bone is one of the most affected structures in sports accidents, because it is located in a vulnerable area of the face and projected forward in relation to adjacent structures²⁷. In cyclists, the zygomatic bone is the most prevalent fracture (30.8%) and fractures of the temporomandibular joint with a rate of 18.8%. It is essential to adopt preventive methods for high impact sports, to minimize traumas that can jeopardize the career of an athlete²⁸.

The dental trauma is the most common in sports activities and it is often associated with serious consequences: aesthetic, functional, economic and psychological. It will depend on severity, and it can even exclude the athlete of an important competition. These lesions are more occurrent in sports, such as mountain biking, roller, skate and

aggressive contact sports. Amateur athletes have greater chance of injury than professional athletes²⁹.

The front teeth are the most affected by dental trauma and the upper incisors are more predisposed to injury (52-90%), due to the anatomical location³⁰. The uncomplicated crown fractures are the most common (44 to 62.5%)³⁰. In the 2007 Pan American Games, 39.8% of the injuries were fractures of enamel, and 21.9% of these were in daily practice or competition in their respective sports³¹. When considering each sport separately, 41.2% of the athletes in jiu-jitsu suffered dental trauma, 37.1% in team handball, 36.4% in basketball, football 23.2%, 22.3% in judo and 11.5% in hockey³². In the event of avulsion, exists in the USA and EUROPE "Rescue Dental" kit, which improves periodontal healing with immediate replantation³³⁻³⁴.

Although 18.11% of athletes seek care after trauma, in Brazil the dentist is not widely inserted in sports activities³⁵, providing that they rarely gets the first aid. When lesion occurs, it is recommended fast and appropriate attendance, because will help player to prevent or minimize psychological and/ or physiologic damage, beyond consequences that may occur as a result of trauma³⁶.

Face shields

Differently from traumas caused in the daily, if the event occurs during in the sports practice, it differs due to the possibility of prevention and softening of damages. It is possible through the education and the use of protective equipment, such as helmets and face shields and mouth (FS and MG)³⁷.

The use of protective helmets is relevant in high-risk sports activities because it reduces the risk of oral, facial and skull lesions. The outer layer of modern helmets are usually fabricated from polycarbonate or polymers of higher quality, which promote better distribution of the stresses and

forces attenuating impact energy³⁸⁻³⁹. The correct use of the helmet can protect against head injuries among riders snowboard when subjected to falls or collisions. However, there are a lot of practitioners who do not use the equipment, with 52.9% of the riders who have suffered dental or oral and facial trauma, reported not wearing a helmet⁴⁰.

The location of the nasal bone is anatomically potentially more vulnerable and to protect this region, it is important which the material used for manufacture the nose shield has the adequate capacity of shock absorption, such as ethylene vinyl

acetate (EVA). The shield made with a 2 mm layer of EVA superimposed by a flexible sheet of 1 mm EVA disk, the risk of fracture of the nose was reduced by decreasing the stresses in the bone after impact²⁷.

Protective masks are used after facial fractures, usually individualized and used to protect and prevent recurrent injuries during the healing period. This shield promotes the dissipation of stresses resulting from the impact to the surrounding tissues and support structures⁴¹.

Eye injuries related to sports can be preventable in up to 90% of accidents, and the use of protective eyewear is responsible for preservation. This category should be effective shield for safety, but without compromising the viewing area of the sportsman. The

American Academy of Ophthalmology recommend the use of this equipment in sports activities with potential risk of injury to the eyes, however, this is not required in most sports. Although, it is few used by football players, this sport is becoming the leading cause of eye injury in the context of sports⁴²⁻⁴³.

Despite the wide availability of face shields, there is no guarantee that the entire oral and facial lesions will be prevented. However, the risk will be minimized because the damage depends on the magnitude and source of force, beyond the anatomical region reached⁴¹. Concomitant the use of face shields, an information program emphasizing importance of using protective clothing and education of urgency is essential and should be training routine⁴⁰.

Mouthguard

Many of dento alveolar trauma resulting from sports activity could be minimized by the use of appropriate mouthguards, recommended by the American Dental Association (ADA) in sports since 1950⁴⁴. This category is effective, in the case of an absorbing device inserted into the mouth to prevent and reduce potential dental trauma and adjacent structures, which may cause dental and maxillofacial injuries of moderate to severe. The use of MG is increasing and diffusing among athletes, becoming mandatory in certain sports: rugby, american football and ice hockey; and significantly reduces the incidence of dental injuries in these sports⁴⁵.

Despite benefits, there is a lack of awareness among athletes to use the protectors during training and competitions. This fact is justified due to promote discomfort, breathing and pronunciation difficulties, besides the possible drop in athletic performance^{10,44,46}, still contested⁴⁷.

Mouthguards are generally classified into three categories: pre-fabricated, thermoplastic and custom. Athletes tend to opt for prefabricated or thermoplastic because they find it less expensive. However, these categories have deficiencies such as excessive weight and unfitness. MG must be individually made by a dentist, using plaster model of the athlete, as determined by ASTM 697-80⁴⁸ which also determines that MG for sports should

not hamper the phonetic and breathing, not affect the physical performance of the athlete and enable longer use the same equipment^{44,48-49}.

The MG does not affect systemic functions of the athlete⁴⁴, and acts better dissipating the stresses transmitted in the area of impact and reducing the incidence of: lacerations of soft tissue, trauma to the anterior teeth after a frontal blow, damage to the posterior teeth in both arches and mandibular fractures^{44,50}. There are differences between researches on the use of MG related to the prevention of mild traumatic brain injury (MTBI). Controlled studies of neurological tried to demonstrate the effectiveness of MG to prevent this type of injury, and concluded that there was no changes in the result of preventing MTBI⁵¹.

In a study with about 150 students from dental schools and physical education, showed that 68% did not know any of the categories of MG on the market, with undergraduate courses provided the ones who least access to such knowledge⁵². A special education program emphasizing the importance of using mouthguards, as first aid measures for dental trauma. It is essential to promote the knowledge, awareness and motivation among athletes and coaches⁴⁹. Future research is needed for better guidelines to increase its development and utility of the MG. In addition, a greater effort must be made effective strategies to promote health, increasing use of the equipment⁴⁴.

Final considerations

As stated above, dentistry has an important role in the athlete's health and consequently on sport performance. The presence of Dentist in athlete support staff is of paramount importance. Surveys have shown that systemic diseases can often be caused by a dental problem.

Actions to raise awareness of the importance of oral health in athletes as well as the need to use shields, which also minimizes maxillofacial injuries provide a brief return to sports activities in case of fractures are needed.

In some countries groups of research in this area already consolidated. Searches that determine material, geometry and ideal thickness of oral and

facial protectors are underway with satisfactory results and that already have clinical applicability and reproducibility with proven effectiveness.

Studies that attest to the interference of oral health on overall health of the athlete must be considered because there is already news of athletes who died from bacterial endocarditis from foci of oral infections. Materials with different damping, odorless, biocompatible and incipient capacity should also be the focus of future research. Anyway dentistry must have their place of importance in the life of the athlete and the dentist should be one of the professionals involved in your day to day.

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