International Journal of Dental Sciences
www.dentaljournal.in
E-ISSN: 2663-4708, P-ISSN: 2663-4694
Received: 20-07-2021, Accepted: 05-08-2021, Published: 20-08-2021
Volume 3, Issue 2, 2021, Page No. 08-12

The craft of dentist in the art of sports

Pooja Khandelwal
Department of Prosthodontics Crown and Bridge, Bharati Vidyapeeth Dental College and Hospital, Maharashtra, India

Abstract
Sports is an integral part of life and has become a career option for many. This article is based on the injuries that are both soft and hard tissue injuries encountered in sports and studies on the incidence of orofacial injuries by various authors, their prevention and protection with the use of special appliances. Immediate and long treatment of dental injuries and their rehabilitation. This article also talks about the current guidelines to practice as a Sports dentist. The data is collected from PubMed, Research Gate, International journal of physical education, sports and health, European Journal of Molecular & Clinical Medicine, International Dental Journal, academy for sports dentistry. org.

Keywords: sports dentistry, protection and prevention, management, prosthodontic rehabilitation, qualifications of a sports dentist

Introduction

I've missed over 9,000 shots in my career. I've lost almost 300 games. Twenty-six times I've been trusted to make the game-winning shot and missed. I've failed over and over and all over again in my life. And that is why I succeed." -Michael Jordan

Games are a major part of life. Involving in any kind of physical activity enhances the quality of life, and one who experiences this quality in life will make it a routine either to be fit or to have fun. It energizes an individual to be active throughout the day. It is an excellent tool to build self-confidence and reduces stress. But good experiences also have some bad consequences, that is injury especially oral and maxillofacial region which needs to be taken care of. Kids, adolescents, adults get hurt or might get hurt in the play especially contact sports which require immediate intervention or prevention, and that's when the craft of dentist comes in the art of sports. Also, poor oral health can affect the quality of life and well-being, two elements that are important for good athletic performance. Caries and periodontal diseases can cause inflammations and infections in the body, with a negative effect on athletic performance.

Table 1: Studies on the incidence of orofacial injuries

sports	Reviewed by	year	%
Basketball	Wenli Ma *et al.*	2008	80.6% of professionals and 37.7% semi-professional.
Baseball and softball	Kanoh *et al*	1999	22% baseball trauma; 7% softball trauma
soccer	Esber C¸aglar *et al.*	2009	16.6%
Ice hockey, field hockey and lacrosse	Rattai *et al.*	2018	16%
bicycle	Amadori F *et al.*	2017	37%
Rugby	Ilia *et al.*	2014	64.9%
Gymnastics	Bayliss T *et al.*	1996	7%

Definition of Sports Dentistry

In 1998 the Academy for Sports Dentistry (ASD) created its first position statement that defined sports dentistry, and it is revised to its current form today. "Sports Dentistry is the branch of medicine that deals with the prevention and treatment of dental injuries and related oral diseases concerned with sport and exercise". The present definition of sports dentistry also involves oral diseases such as caries, dental erosion, attrition due to increase use of sports drink, carbonated beverages, protein bars (sweetened), bruxism mainly stress-related along with the prevention and treatment of dental injuries in sport.

Orofacial injuries

Table 2

Type of injury	Treatment
1.Soft tissue injury	
a. Abrasion, contusion and lacerations	Proper rinsing of the injured area and debridement of the wound so that no soil or tooth remains. sutures may be required on large wounds. Antibiotic prophylaxis is required for punctures wounds. tetanus shots may also be required.

1. Hard tissue injury	
a. Avulsion of tooth	▪ Immediately keep the tooth in saline, saliva, milk or Hank's balanced salt solution (HBSS). ▪ Root canal treatment may be required.
a. Tooth fracture (infraction, Ellis Class I, II, or III)	▪ Enamel infraction – seal off the cracks – use enamel adhesives. ▪ Ellis Class I fracture- Remove or smoothen the sharp edges to stop injury to the soft tissues. Restoration of fracture with GIC or composite. ▪ Ellis Class II fracture- RMGI or Fuji IX cement used to coat dentin– temporary treatment. ▪ Ellis Class III complex fracture- for permanent teeth immediate pulp cap could also be performed. ▪ Exposure larger than 2 mm Cvek pulpotomy could also be performed.
a. Dental intrusion	▪ Allow primary tooth to erupt spontaneously for 2-3 months till the time permanent tooth bud is not affected. ▪ Reposition the tooth immediately, actively reposition with some amount of traction and expect for the tooth to return to its previous position (repositioning passively) ▪ Immediate repositioning of incisors either surgical or non-surgical if intruded beyond six mm– perform root canal treatment.
a. Fracture of root (apical, cervical and mid-root)	▪ *Apical root fractures* - not painful nor mobile. Treatment- establish baseline information with a periapical radiograph and observation. ▪ *Middle root fractures*- sensitive to percussion or on biting pressure. The tooth may be mobile. Treatment- immediate reduction of the fractured segments, followed by a passive wire splint held in place with an acid-etched composite resin for 6 to 8 weeks. Antibiotics may be prescribed and root canal therapy may become necessary. ▪ *Cervical root fractures*- requires extensive treatment such as RCT, crown lengthening, orthodontic extrusion and a post-core crown. If severe extraction and prosthodontic replacement required.
1. Acute Temporomandibular Joint (TMJ) Dislocation	▪ Manual reduction of an acute dislocation, perform physiotherapy after two weeks of the restricted opening of the mouth. Advise soft diet for at least a week. NSAIDs and muscle relaxants will relieve pain and swelling. Due to the dislocation of TMJ, instruct patients about the risk of ligament stretching and tearing.
1. Fractures	
a. Mid-face fractures	▪ Non–Le Fort- repaired to reconstruct the anatomy. ▪ Le Fort fractures-. Reconstruction involves re-establishing the occlusion with maxillo-mandibular fixation and repair of any mandibular fractures, before midface restoration. This approach permits reconstruction of the occlusal base upon which the midface is then restored. Methods of fracture repair include open reduction with internal rigid plate fixation, maxilla-mandibular fixation and skeletal suspension wires.
a. Mandibular fractures	▪ Emergency management- airway maintenance, removal of intra- oral debris, assessment for concussion and cervical spine injury. ▪ The mandible may be supported for athlete comfort with a gentle and unrestrictive Barton bandage. A soft cervical collar also is appropriate to support an injured mandible. ▪ Both methods may reduce the discomfort associated with patient transport. ▪ Maxillomandibular fixation with or with open reduction and internal fixation can be done intraorally and extra orally. ▪ All surgical exposures involve dissection to preserve associated trigeminal or facial nerve structures. Care must be taken to align the bone fragments and re-establish occlusal relationships

Prosthodontic Rehabilitation

Temporary removable partial dentures

Temporary removable appliances provide the traumatized partially edentulous patient with an immediate replacement of lost dentition. This form of treatment offers psychological and oftentimes physical comfort for an athlete.

Transitional fixed partial dentures

Because traumatic injuries produce swelling and oedema within the edentulous area, an interim restoration is required permitting an appropriate healing time before the final prosthesis is made. This healing time serves well to permit the injured athlete time to accommodate both the concept of fixed prosthodontics as well as a physical change in the dentition.

Resin-bonded fixed partial denture

Resin-bonded retainers are utilized in many instances as a transitional type of tooth replacement and, in some cases, used for the extended type of prosthetic treatment. Patients with parafunctional habits, such as bruxism and clenching, should be treated with a more durably retained prosthesis. In the same area of treatment, patients who have sustained a contact injury to the natural dentition without tooth loss may require resin-bonded retainers for stabilization of the tooth.

Large edentulous areas: The use of removable partial dentures

When extensive tooth loss has occurred, the abutment teeth are often spaced widely. The use of fixed partial denture may be contraindicated. An excellent example of this condition is a loss of all maxillary anterior teeth. Under these circumstances, the use of multiple posterior abutments for maximum retention of fixed prosthesis would place these teeth under severe strain because of the forces applied to the anterior cantilever pontic section. A removable partial denture would then be indicated. It is not uncommon when large numbers of teeth are lost and the traumatic injury is severe, that portions of the alveolar ridge are also lost. when this occurs the removable partial denture also

provides a functional and esthetic replacement for the lost residual ridge tissue. The final design construction of the removable partial denture should consider essential elements including (A) careful treatment planning including esthetics; (B) phonetics; (C) function; and (D) stability of the prosthesis.

The implant prosthesis replacement
The use of osseointegrated implants for tooth replacement for patients who have sustained traumatic injuries takes on some very special considerations.

Traumatically avulsed tooth
Replacement of teeth that have been avulsed traumatically during sports injury may be accomplished using osseointegrated implants with immediate implant placement following the injury.

Implant placement secondary to alveolar ridge healing
Following the severe traumatic loss of numerous teeth, often seen in racing accidents producing a high-speed impact' in most instances the edentulous ridge should be allowed to heal completely before fixture placement. This permits complete mucosal closure over the remaining alveolar bone. The use of guide stents is helpful during the surgical placement of fixtures to obtain the most ideal position for the screw-retained prosthesis.

Biologically conservative tooth replacement
Prosthodontic philosophy. The use of osseointegrated implants today may be considered the most biologically conservative form of tooth replacement of patients who have sustained traumatic tooth loss.

Removable prosthesis versus fixed implant-supported prosthesis
In some circumstances, professional athletes who have lost some of the anterior dentition can benefit greatly from the use of osseointegrated implants and permanent tooth replacement. Such examples might be professional boxers and hockey players who have high impact trauma to the anterior dentition. If such athletes continue in their professional careers, the clinician must consider carefully whether or not the use of fixed implant-supported prosthesis is advisable. Because osseointegration by definition is the intimate contact of living bone on the surface of a load-carrying implant, without a soft tissue interface, there is absolutely no mobility to the implant fixture. Without a peri-implant ligament, such as the periodontal membrane surrounding the natural dentition, any impact to the implant-supported bridge will convey the same impact to the underlying bone. A sharp or sudden blow to this prosthesis may create sudden micro fractures to the bones, thereby destroying the osseointegration, leading ultimately to the failure of the bone-anchored prosthesis. When professional athletes continue to participate actively in sports, the clinician may consider the use of osseointegrated implants to support a removable appliance with a resilient interface between the prosthetic teeth and osseointegrated fixtures, such appliances can be constructed in the form of over dentures with soft tissue liners.

Single tooth replacement
The single tooth replacement is used most frequently for traumatic injuries where tooth avulsion has occurred and the alveolar bone has remained intact. The placement of the Branemark fixture into the alveolar ridge beyond the apex of the missing tooth provides ideal anchorage for single incisor replacement.

Multiple tooth replacement with osseointegrated fixture
When multiple teeth have been lost traumatically, osseointegrated fixture provide the best and most biologically conservative form of tooth replacement.

Interdental Papilla Replacement
Removable gingival unit
When large sections of the alveolar crest have been lost, the replacement of interdental papilla for maximum esthetics is essential. This can be accomplished in two forms: One form of replacement is the use of a gingival replacement unit. This small lightweight acrylic or composite resin prosthesis is designed to overlay the area of loss and create a facade replacing the lost papilla. This form of removable appliance has the distinct advantage of permitting the patient to maintain easy access to the titanium abutment supporting the fixed prosthesis for maximum oral hygiene. The disadvantage of such a prosthesis is its very delicate nature and ease of fracture.

Non-removable gingival unit
The alternative form of the papilla and mucosal replacement is the construction of the porcelain facade as an integral part of the fixed prosthesis. The advantages of a singular prosthesis with a porcelain facade are the elimination of the removable component and the frequent requirement of their duplication. Additionally, the colour stability of the porcelain is superior to that of all the removable facades.

Prevention and Protection
Prevent
Educate
Every sports person should know about the prevention and initial management of injuries. It should be the duty of the dentist to give information on the same.

Oral hygiene and regular visit to the dentist
Instructions on proper brushing techniques and use of a fluoridated toothbrush, brushing twice daily for two minutes, use of mouth wash 30 minutes after brushing. Rinse mouth after every meal.
Visit a dentist every 6 months, fluoride application, check for DMFT score.

Diet
Be healthy, eat healthily, eat food that does not cause caries, avoid sugar when snacking, eat seeds, nuts, fruits. Avoid sticky food. Avoid acidic beverages, drink non-sweetened non-aerated beverages. Stay hydrated drink water 3-5 litres a day.

Smoking and alcohol
Say NO to smoking. NO to alcohol.

Protect

Table 3

1. Mouth Protectors (ASTM International classification of mouth protectors, 2006) Type I—Thermoplastic IA.—Vacuum-formed. IB.—Mouth-formed. Type II—Thermosetting IIA—Mouth-formed. Type III—Stock type.	1. Protect hard tissues from a direct blow on the tooth 2. Protect soft tissues gingiva, tongue, buccal mucosa, lips from abrasion, lacerations. 3. Protects from the direct violent contacts between the upper and the lower teeth. 4. Provides support to the jaw also to the unsupported structures such as angle of mandible, condyles.
1. Helmets	1. Protects eye, ears, head in collision sports and also from motorcycle and bicycle collision. 2. Helmets reduces the impact of an injury on the brain and head. The soft padding in the helmet absorbs the impact. 3. They can be open or closed depending upon the type of game played. 4. They prevent soft tissue injuries such as lacerations, abrasions contusion. 5. They protect the hard tissues of a skull from direct injury thereby protecting the brain from concussion, contusions, penetrating injuries, intracranial haemorrhages. 6. Currently they are made up of plastic materials such as polystyrene, poly carbon, acrylonitrile butadiene styrene.
1. Facemask/ Faceshield	1. Protect against the spread of respiratory droplets especially during the COVID pandemic. 2. They protect the eyes, nose, cheeks, from direct trauma. 3. Prevents face from lacerations. 4. The total cage mask full safety to the face especially in contact sports such as boxing.
1. Eyewear	1. Wear eye guards or goggles to protect the eye from eye injury, vision loss, irreparable damage, penetration injury, blunt trauma. 2. Made up of polycarbonate lenses

FDI

Policy Statement on Sports dentistry, approved by the FDI General Assembly in 2016

"The purpose of the FDI policy is to boost the overall health of an athlete their oral, general and psychological health that will enhance their sports performance and guard them against sports injuries. Moreover, having dentists at the sports events and competition is a vital task to make sure athletes' general health, through oral preventive and remedial actions."

Policy

FDI recommends to

1. Prevention, protection and maintenance of oral health.
2. Use of custom made protective gears like mouthguards, face masks and face shields, headgear.
3. Education on the importance of oral health status on sports performance and also the manifestation of oral lesions and their reactions on the body derived from sports conditions.
4. Educate on the relationship and importance of an athletes oral health and systemic health.
5. Promote the advantages of a balanced diet and nutrition for maintaining oral health.

Qualifications of a Team Dentist

Following are the measures to satisfy the qualifications of the position of a team dentist™ [ASD]

1. Be a part of team ASD.
2. Attend and finish the course on the academy of sports dentistry dental team which is once in 5 years.
3. Attend and Finish subjects related to sports dentistry every 3 years with a minimum of 15 credit hours.
4. Be skilful with the making of customized mouthguards, the institution of occlusion and making of good impressions.
5. Inherit the information and experience on the ways to safeguard from sports-related maxillofacial injuries and oral diseases and teach athletic trainers and coaches, health care professionals, players and their families about the same.
6. Be well acknowledged with identification and treatment of orofacial trauma and shouldn't be restricted to

- Emergency treatment of avulsion, displacement, and tooth fractures
- Emergency care in case of oral lacerations, contusions,
- Identification of temporomandibular joint injuries, jaw fractures and dislocations and displacement injuries.
- Identify complications associated with head injuries.
- Should even know about doping and its effect on sports performance.
- Reinforce a team of dental professionals and supplementary staff.
- Collaborate with other sports specialists to take care of the overall general and oral health of athletes.

Accepted by the ASD Dental medicine Board of administrators 06/30/2018.

Conclusion

The purpose of this text is to produce data on orofacial injuries in sports and their immediate management along with the

prosthodontic rehabilitation of oral injuries. This article also talks about the protective role of appliances for the prevention of onsite injuries during sports.

The intent of this text directs towards the need of a dental professional for the enhancement of sports performance and their role in education concerned with caries, gingival and diseases of gums and to attenuate the athlete's dentitions from dental issues.

References

1. Ma W. Basketball players' experience of dental injury and awareness about mouthguard in China. Dent Traumatol,2008:24(4):430-4. DOI: 10.1111/j.1600-9657.2008.00586.x. PMID: 18721342.
2. Kanoh Y, Nukata J, Michizawa M, Mat- sumoto R, Matsuyama H. Clinicostatistical study of 68 cases maxillofacial fractures caused by sports. JJTON,1999:47:766-769.
3. Kumamoto DP, Maeda Y. A literature review of sports-related orofacial trauma. Gen Dent; quiz 281, 2004:52(3):270-80. PMID: 15206262.
4. Selva MS, Aparna S, Madan KD. Prevalence of orofacial injuries in contact sports: A systematic review. International Journal of Physical Education, Sports and Health,2019:6(3):39-46.
5. Rattai J, Levin L. Oral injuries related to Ice Hockey in the province of Alberta, Canada: Trends over the last 15 years. Dent Traumatol,2018:34(2):107-113. doi: 10.1111/edt.12387. Epub 2018 Mar 9. PMID: 29406619.
6. Amadori F, Bardellini E, Copeta A, Conti G, Villa V, Majorana A. Dental trauma and bicycle safety: a report in Italian children and adolescents. Acta Odontologica Scandinavica,2017:75(3):227-231. doi:10.1080/00016357.2017.1279345
7. Ilia E, Metcalfe K, Heffernan M. Prevalence of dental trauma and use of mouthguards in rugby union players. Australian Dental Journal,2014:59(4):473-481.doi:10.1111/adj.12223
8. Ranalli DN, Demas PN. Orofacial injuries from sport: preventive measures for sports medicine. Sports Med,2002;32(7):409-18. doi: 10.2165/00007256-200232070-00001. PMID: 12015803.
9. Roettger M. (ed.), Modern Sports Dentistry, Textbooks in Contemporary Dentistry, https://doi.org 10.1007/978-3-319-44416-1_1
10. Brian Euerle MD, Brian Kelly, MD. Maxillofacial Injuries: Imaging, Management, and Disposition, Relias media, 2005, 1.
11. Gijwani D, Singh S, Mathur A, Makkar DK. Traumatic orofacial injuries and its prevention. Saudi J Sports Med,2017:17:70-4.
12. Ranalli DN, Demas PN. Orofacial Injuries from Sport. Sports Medicine,2002:32(7):409-418. doi:10.2165/00007256-200232070-00001
13. Balshi, Thomas. Oral prosthodontic rehabilitation for traumatic sports injuries. Dental clinics of North America,1991:35:771-96.
14. Bourguignon C, Sigurdsson A. Preventive Strategies for Traumatic Dental Injuries. Dental Clinics of North America,2009:53(4):729-749. doi:10.1016/j.cden.2009.06.002
15. Dr Aravindha Babu N, Dr Sridevi Anjuga EP, Dr Malathi L, Dr Rajesh E. "Prevention Of Orofacial Injuries – A Review:". *European Journal of Molecular & Clinical Medicine*,2020:7:5:1495-1499.
16. FDI policy statement on Sports dentistry. International Dental Journal,2017:67(1):18-19. doi:10.1111/idj.12314