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How to proceed in case of tooth avulsion: state of student knowledge

ABSTRACT

Aim Sport-related dental injuries are a growing concern worldwide. Regardless of how minor they may appear, some of them can lead to traumas which have a negative impact on quality of life, producing psychological and social discomfort. In view of the widespread lack of knowledge with regard to first aid procedures in cases of dental trauma, we would like to report the current state of knowledge of an academy of physical education and sport students compared with medical and general university students.

Materials and methods In order to assess the knowledge of appropriate first aid procedures following dental trauma a survey using questionnaires was undertaken. The sample size consisted of 356 students attending the last year of university: sport academy (123 students); medical university (115 students); general university (118 students).

Results The results revealed that just 3% of all students knew that in the case of dental avulsion immediate replantation should be performed. Only 6% of students were aware that the time factor after tooth avulsion is the single most influential factor affecting the prognosis. Only 16% of sport academy students and 23% of general university students knew the recommended transport medium for an avulsed tooth.

Conclusion In the face of such poor knowledge regarding dental injuries there is an urgent need for adequate education programs on the subject of sport-related orofacial injuries directed at all sports students, including athletes, players and coaches, so they could offer immediate help at the site of an accident.

Keywords Education; Dental trauma; Students knowledge.

Introduction

Sport helps in becoming and staying healthy. That is why a growing percentage of children and adults are taking active part in organised sports events. Even during moderate sport practice, not to mention high-level competition, accidents happen. Fast sporting activities with close body contact as well as activities using bats and rackets present a particular danger of serious orofacial injuries [Adair and Durr, 1991; Andersson and Bodin, 1990; Andreassen, 1970]. The literature demonstrates that sports activities can lead to dental injuries more often than it is commonly recognised [Andreassen et al. 2002; 2007]. It has been established that as many as 31% of all orofacial injuries are sport-related [Andreassen et al., 2002; 2003; Bakland and Andreassen, 2004]. Dental trauma can have serious consequences that affect not only the physical but also economic, social, and psychological aspects. In the permanent dentition the most severe dental injury can affect the surrounding alveolar bone structure and lead to loss of the tooth. Tooth avulsion, being the most urgent situation, needs immediate initiation of proper first aid procedures [Chan et al., 2001]. This permits to reduce costly long-term consequences of complications resulting from delayed treatment of teeth injuries.

The aim of this study was to investigate the state of knowledge and attitudes regarding first aid procedures after dental injury of sport academy students who will become in future athletes, players and coaches who will need and/or could give immediate help at the site of an accident. They are the ones most likely to be victims or witnesses of orofacial accidents in the practice of sport or in training others. That is the reason why their state of knowledge on the subject is vital for their competence and experience in first aid provision for themselves and others in very stressful and sometimes serious looking accidents where the time factor is all that matters. Their state of knowledge has been compared in this study with that of medical university students as future physicians and general university students as a control group without any biomedical element in their course curriculum.

Materials and methods

The study was carried out in May 2009 at the end of the last semester for each examined group. At the Academy of Physical Education and Sport, 123 fourth-year students were enrolled. At the Medical University, 115 sixth-year students took part, and at the Faculty of Humanities of General University 118 students in the fourth and fifth-year took part in our study. Mean response rate for all three universities exceeded 92%.

A questionnaire was developed and distributed during lectures to all students attending the last year

of education at each university. The completion process was surveyed by the teachers and timed as necessary to prevent students consulting each other regarding the correct response.

The self-completed questionnaire addressed definitions and first aid measures in the case of tooth avulsion and related to the following subjects.

- History of previous dental injury or witnessing of dental accident.
- Participation in first aid course.
- Treatment procedures in case of dental avulsion.
- Where to refer a person after dental injury.

The statistical evaluation was done with reference to university type, previous or no history of dental injury, being a witness or not of a dental accident, participating or not in a first aid course. Data analysis included descriptive and decisive statistics. Statistical significance was tested with Fisher's exact and Pearson chi-square tests. The level of significance was determined as $P < 0.05$.

The study received approval from the Research Ethics Committee of the Medical University of Gdansk as well as the Deans of each university where the survey was undertaken. All participants signed informed consent forms.

Results

The mean age of the three student populations was 24.2 years (range 22-33). Students' mean age at the sports academy was 23.5 years, at the medical university 24.7 years, and at the general university 24.2

years. In the whole population of 356 students there were 150 male and 198 female subjects (eight students forgot to define their gender).

In the first question students were asked if they had participated previously in a first aid course. As we can see, most of the population took part in such courses (Table 1). A statistically significant difference between students from the medical university and the others was observed, which is understandable, owing to the medical curriculum.

Around 30% of students reported a previous history of dental injury and no significant difference was identified, even for the sport academy students.

Students at the sport academy witnessed a dental accident more often than other students. The difference was statistically significant.

Immediate replantation, as the best treatment option after tooth avulsion, was recommended by fewer than 10% of students, showing no difference between the three universities.

If the avulsed tooth is contaminated before replantation it should be rinsed with cold tap water. More than 50% of medical university students knew about it, but in the general university and sport academy only around 20 to 25% of students had this knowledge.

The prognosis for an avulsed tooth depends upon prompt care, which is a determinant factor in successful periodontal healing. Periodontal ligament cells responsible for the attachment of the tooth to the alveolar bone are susceptible to drying out. If they are in a dry environment for more than 30 minutes they

	Sport Academy (S)	Medical University (M)	General University (G)	Statistics Fisher's test
Participation in first aid course	63.6%	98.2%	67.8%	$p < 0.001$ M vs. S,G
Previous history of dental injury	38.8%	29.8%	29.7%	ns.
Witness of a dental accident	46.7%	27.7%	28.0%	$p = 0.003$ S vs. M $p = 0.004$ S vs. G
Recommendation of immediate replantation	5.2%	8.1%	5.1%	ns.
Rinse the tooth in tap water before replantation /YES/	25.0%	54.1%	20.5%	$p = 0.002$ M vs. S $p < 0.001$ M vs. G
One hour after tooth avulsion healing process becomes substantially inhibited /YES/	6.1%	8.1%	3.4%	ns.
Proper transport medium for an avulsed tooth	16.0%	61.0%	23.0%	$p < 0.001$ M vs. S $p < 0.001$ M vs. G
Proper behavior after tooth avulsion	25.6%	62.6%	40.7%	$p = 0.002$ S vs. M $P = 0.003$ M vs. G

TAB. 1 Results of self-completed questionnaire.

become non-vital. If the tooth is placed in a proper transport medium such as milk, saline or saliva, the periodontal ligament may stay vital longer, however one hour after tooth avulsion the healing process becomes substantially inhibited. Fewer than 10% of students knew about it and there was no statistical difference between student populations from the three universities.

Maintenance of the avulsed tooth in a storage medium compatible with the survival of periodontal ligament cells before replantation is fundamental for successful healing. An avulsed tooth should be placed in physiological saline, milk or even saliva (between the cheek and the lower molars). Only 16% of sport academy students knew one of the recommended storage media, whereas 61% of medical university students knew how to store an avulsed tooth properly.

The proper storage and/or transport medium for an avulsed tooth that is usually available at the site of an accident is milk. Only 6% of general university students, 5% of sport academy students and 4.5% of medical university students knew about it. Keeping the avulsed tooth in saliva should also be recommended if other storage media are unavailable. Only 5% of sport academy students were aware of this. In the last question, students were asked what they would do if dental avulsion occurred in their presence. There were only three correct answers out of the seven provided: 1) find the tooth and take the patient to the dentist as soon as possible; 2) find the tooth, rinse it with tap water, replant the tooth; 3) find the tooth, keep it in saliva between the cheek and the lower molars, and transport the patient as soon as possible to the dentist.

Just 26% of sport academy students knew how to react correctly when a tooth avulsion occurred. Even general university students were better informed about proper first aid procedures for an avulsed tooth.

When we compared the results and evaluated them in terms of previous or no history of dental injury, being a witness or not of a dental accident, and participating or not in first aid courses no statistically significant differences were found. In view of this study we can conclude that first aid courses do not contain sufficient information about dental injury treatment and that previous dental trauma history or being a witness of a dental accident does not allow students to gain sufficient knowledge to be able to introduce proper first aid treatment at the site of dental accidents.

Discussion

The present study revealed a low level of knowledge on the part of students from different universities regarding first aid measures for tooth avulsion. Students of the Academy of Physical Education and Sport who took active part in different sports events

as athletes and players, or were training to become coaches or physical education teachers, could more often be a witness or a victim of dental injury. That is why it is particularly important to educate them; they are the ones who can provide immediate help on the sports field to minimise long-lasting consequences. The literature shows a lack of adequate knowledge about proper first aid procedures in case of dental injury among physical education teachers and athletes in different countries and is related to the fact that acute dental trauma treatment is generally not included in the physical education curriculum [Feliciano and de Franca Caldas, 2006; Flores et al., 2007; Frujeri and Costa, 2009; Fuss, 1985; Glendor, 2009; Holan et al., 2006; Jorge et al., 2009].

Compared with many other outpatient injuries, traumatic dental injuries are more time-consuming and costly to treat [Lang, 2002]. Tooth avulsion, as a complex injury affecting multiple tissues with complete displacement of a tooth from its alveolar support, may result in the greatest functional and aesthetic impairment owing to its poor prognosis. It is the only situation in dentistry that should be treated as a real emergency, requiring prompt and appropriate management to improve prognosis significantly [Andreasen, 1970]. Recent studies and guidelines recommend immediate replantation of an avulsed tooth [Lieger et al., 2009]. In our study just 5.2% of sports academy students knew that such treatment is the best procedure that we can offer in case of tooth avulsion. We can understand this lack of knowledge among sports academy students and general university students since their curriculum subjects do not include first aid procedures for dental trauma, but surprisingly only 8.1% medical university students knew how to render correct first aid in the case of tooth avulsion. That is a very poor level of knowledge indeed and it could have serious consequences for treatment outcome. Immediate replantation within 30 minutes after injury is a simple procedure that is fundamental to successful healing. To clean off contamination, an avulsed tooth should be rinsed in cold tap water before immediate replantation. Just 25% of sports academy students thought that such a procedure was possible, whereas over half of the medical university students were familiar with it. In a stressful situation like that of a dental injury people should know beforehand how to act quickly and purposefully. Once again, the students least aware of the proper cleaning procedures in case of dental avulsion were general university students.

An extra-oral dry time of one hour is considered to be the point where survival of the periodontal ligament cells of the root responsible for the attachment of the tooth to the alveolar bone is unlikely [Mori et al., 2009]. Most of the students did not know how important the time factor was. Fewer than 10% of the whole student population knew that replantation should be performed

within one hour, because the healing process becomes seriously inhibited after that, and the longer the time between tooth avulsion and replantation, the greater the risk of replacement resorption or inflammatory root resorption [Andersson and Bodin, 1990].

If the procedure of immediate replantation is too intimidating or difficult for a lay person, an avulsed tooth should be maintained in a proper storage medium compatible with the survival of periodontal ligament cells. In agreement with recent guidelines an avulsed tooth before replantation should be placed in a storage/transport medium such as physiological saline, milk or even saliva (between the cheek and the lower molars). Just 16% of sport academy students knew one of those options. Medical university students selected physiological saline as the best transport medium, but only 4.5% knew that if it were hard to find milk could be used instead. Once again, this is very important information that could be responsible for treatment outcome. As time is the most important factor, proper first aid procedures in the case of dental avulsion significantly improve the healing process and reduce undesirable complications. Instruction for lay people, especially in all sports-related environments where dental injury may occur, should be short and readily comprehensible. With regard to such low levels of knowledge, especially among sport academy students, the education curriculum should be expanded to include dental injury management.

A study by Holan [2006] demonstrated that a campaign targeted at a cohort of physical education teachers improved the knowledge of those teachers, even the ones who did not attend the seminars, probably because of contamination effect. Even a single lesson on the management of avulsed permanent teeth may significantly enhance the likelihood that the correct measures would be taken in the case of tooth avulsion [Perunski et al., 2005; Trope, 2002]. Educational poster campaigns may also significantly improve knowledge about first aid procedures in the case of dental trauma [Lieger et al., 2009].

Conclusion

In the face of such poor knowledge regarding dental injuries there is an urgent need for adequate education programs on the subject of sport-related orofacial injuries to be provided for all sport university students as well as athletes, players and coaches or physical education teachers who could give immediate help at the site of an accident.

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