Letters to the Editor

Effectiveness of mouthguards in reducing neurocognitive deficits following sports-related cerebral concussion

Dear Dr Andersson, Editor-in-chief Dental Traumatology

As a dentist and supporter of neurocognitive testing for our athletes, I was pleased to see an article published that describes attempts to study the relationship between sports mouthguards and concussions (1). This is the beginning of trying to put some objective data behind long asked questions about the relationship of sports mouthguards and various brain injuries.

As a study design however, I think improvements can be made for future evaluations. In any study, we need to take great care in establishing the constants and variables. It seems the authors made attempts to select their subjects carefully by excluding attention-deficit/hyperactivity disorder (ADHD) and other learning disabilities from the evaluations. This clearly removed a significant variable resulting in a more constant pool of subjects and adds validity to the neurocognitive data. However, the authors did not do the same in looking at the sports mouthguards. If we are going to create a study to evaluate the influence of a piece of equipment worn by an athlete and then evaluate with objective neurocognitive testing data, I would think you would make efforts to establish a constant of a defined mouthguard, or at least consider how to subdivide the mouthguards into types, fit, and condition, etc. I have no way of knowing from reading this article whether the mouthguards were covering back teeth, paper thin, properly fitted, etc. If this study was carried out to compare helmet influence on concussion prevention, you would certainly have defined and described the helmet types and variations. These are just thoughts for future studies or reevaluation of the data from this study. I look forward to more studies of this type.

Sincerely,

Leslie A. Rye
President Academy of Sports Dentistry,
Reston, VA, USA

Response

Editor:

We would like to thank Dr. Rye for her Letter to the Editor discussing some of her concerns with our recent report (1).

We agree with Dr Rye that our study establishes an important first step in a line of research that may better address the relationships between mouthguard use and protection against various forms of brain injuries. Although we cannot generalize our findings to all brain injuries that may be sustained while participating in sports, our study suggests the use of mouthguards has no effect on reducing acute clinical neurocognitive performance deficits in the context of sports-related cerebral concussion.

As stated in our discussion, we concur that a more detailed investigation of mouthguard types is warranted. While we acknowledge our study did not discriminate between different types of mouthguards (i.e. generic stock, boil-and-bite, and custom made) available to athletes, we lacked sufficient sample size to adequately represent each individual type of mouthguard in our analyses; any findings as a result would not have been sufficiently conclusive and arguably void of interpretation with no basis for comparison. Our study, as Dr Rye suggests, provides that important basis for future work. Another important aspect, we agree, pertains to the fit of the mouthguard. Our discussion further illustrates that, in addition to different types of mouthguards, there also exists the question of differing material properties (i.e. thin vs thick, polyethylene vinyl acetate vs tri-laminant composites). In order to more fully answer these specific aims, a substantial sample size would need to be recruited into a large prospective study whereby type, material, condition, and hours of mouthguard use would be carefully evaluated and documented on a daily basis. We agree this is an important question for sports medicine professionals including certified athletic trainers, team physicians, and dental professionals, and any member of the sports medicine team mandated with the care of our athletes.

We would like to emphasize that our findings should not be interpreted to suggest the use of mouthguards are not recommended for athletes. While we agree that continued research as to their

effects on reducing severity of sports-related cerebral concussion is warranted, the use of mouthguards in reducing maxillofacial and dental trauma remains unquestioned. Despite their effectiveness in this regard, many athletes still do not choose to use them. At this time, we believe that a concurrent focus should be directed to educating athletes and coaches on the known benefits of mouthguard use. One concern that must be considered is the notion that athletes returning from a previous cerebral concussion could gain a false sense of security by changing mouthguard types if clinicians were to prematurely suggest one type would be better at protecting athletes from cerebral concussion than another. As this falls in line with the mission statement of the Academy of Sports Dentistry, of which Dr Rye is the president, our authorship team comprised of certified athletic trainers, an endodontist, and clinical neuropsychologists, are happy to join her effort in this education process.

Jason P. Mihalik
The University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Reference

1. Mihalik JP, McCaffrey MA, Rivera EM, Pardini JE, Guskiewicz KM, Collins MW, Lovell MR. Effectiveness of mouthguards in reducing neurocognitive deficits following sports-related cerebral concussion. Dent Traumatol 2007;23:14–20.

Reattachment of subgingivally fractured central incisor with an open apex

Dear Sir,

In the latest issue of *Dental Traumatology*, the article by Eden et al. 'Reattachment of subgingivally fractured central incisor with an open apex' was published (1). While the immediate/short-term results are acceptable, I am very much concerned that there was no mention of the long-term risk of endodontic treatment on the young tooth (the patient was 6 years old). In the *Textbook and Color Atlas of Traumatic Injuries to the Teeth* (2), figures from Sweden and Norway indicate that endodontic treatment of young, root-open teeth have an 80% risk of long-term failure due to fracture of these thin-walled roots. This means that all measures should be taken to preserve pulp vitality to ensure continued root development. Such warnings were not to be seen anywhere in the article. Of course, a goal in the treatment of acutely traumatized teeth is the re-establishment of aesthetics. However, first priority must be tooth preservation; and in this case, that would mean preservation of pulp vitality. Therefore, I would like to have seen such a warning incorporated in the article's 'Discussion'.

In 1984, I published a similar paper, whereby subgingival crown root fractures could be treated by *in situ* bonding with Gluma® dentin adhesive. Prior to bonding, a pulp capping procedure was described as maintaining pulpal vitality. The latter procedure succeeded; however, due to the inherent weaknesses of the Gluma® system, the reattached fragment failed. Newer dental adhesive systems could probably solve this problem.

Relative to the current paper, pulp capping prior to fragment reattachment and possible orthodontic extrusion of the apical fragment should be recommended for the purpose of ensuring tooth survival over a longer period of time.

Sincerely,

Frances M. Andreasen, DDS, dr. odont.
Specialist Consultant in Dental Trauma
Copenhagen,
Denmark
e-mail: francesbluetooth@mail.dk

Response

Dear Editor-in-Chief,

It is a great pleasure to see colleagues who are interested in our article (1). I want to thank Dr Andreasen for her interest. I agree with her comment. It is true that the first step is to keep the pulp vital in young patients with an open apex. This provides stronger root formation with apexogenesis. However, as you may see from the text, our case could only attend to the clinic 3 days after the trauma. As seen from Fig. 5, the tooth fragment was actually the vestibule pulp chamber wall, therefore the pulp was extensively open during this period. On the other hand, it was not possible to seal the remaining pulp during the surgery as the fracture was extending deeply under the gingival margin. So in our case, it was not possible to preserve the pulp vitality but I strongly agree that it is important to keep the pulp vital if the case is suitable. We also tried to discuss the biocompatibility of the natural tooth surface for proper healing after reattachment and the disadvantage of long-term waiting periods