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Mandibular fracture with a mouth formed mouthguard in kickboxing

CASE REPORT

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Abstract – Reports of injuries caused by kickboxing, one of the contact sports that potentially causes a large number of injuries, are relatively rare. Wearing a mouthguard is obligatory in kickboxing, but the association between maxillofacial injuries and the quality of mouthguards has not been described thus far. In this article, we present a case of mandibular fracture in a 25-year-old male, who was injured during kickboxing despite wearing a mouth formed mouthguard.

Kickboxing is a martial art (fighting style and technique) in which punching, kicking and, under some rules, kneeing and elbowing are permitted (1). Kickboxing potentially causes several injuries like other contact sports. Recently, kickboxing has increased in popularity. However, the literature on injuries caused by kickboxing, especially maxillofacial injuries, seems to be relatively scarce (2, 3). The head, neck and face are most commonly injured during kickboxing, and thus, wearing mouthguards is compulsory. Yet, proper information regarding use of mouthguards in kickboxing is lacking and there are no reports that describe the relationship between maxillofacial injury and the quality of mouthguards. In this article, we present a case of mandibular fracture sustained during kickboxing in spite of wearing a mouth formed mouthguard. We have also attempted to gather information regarding maxillofacial injuries that occur during kickboxing, which can be avoided by using mouthguards of superior quality.

Case report

A 25-year-old male was referred to our clinic with mandibular fracture that had occurred during kickboxing. In a match held the day before he visited our clinic, he had received a kick from his opponent in the chin. Although, he had been wearing a mouthguard, a mandibular fracture was detected when he was taken to a nearby emergency hospital. The patient had been practicing kickboxing after working hours for 3 years. As kickboxers are expected to wear mouthguards during matches, he had bought a mouth formed mouthguard from a sporting goods shop. The mouthguard was made of thermoplastic material, which could be adjusted in the mouth after immersing in hot water and was kept in the upper jaw. Though he felt that the mouthguard did not fit him and was uncomfortable, he had continued to wear it. He and his instructors were unaware that there

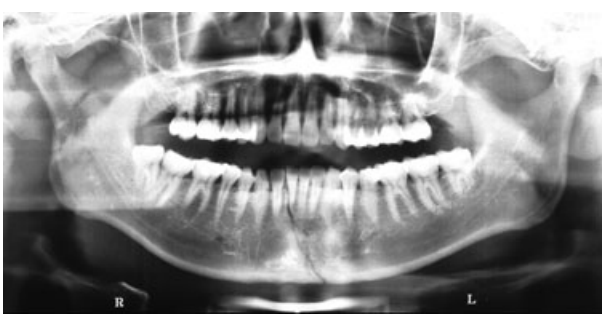

Fig. 1. X ray showing the fracture in the mandibular midline and right condylar process.

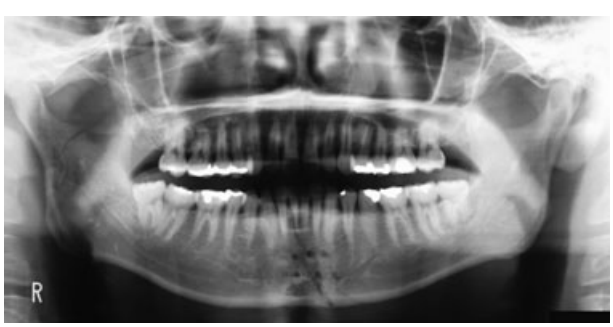

Fig. 2. Postoperative 1-month X ray.

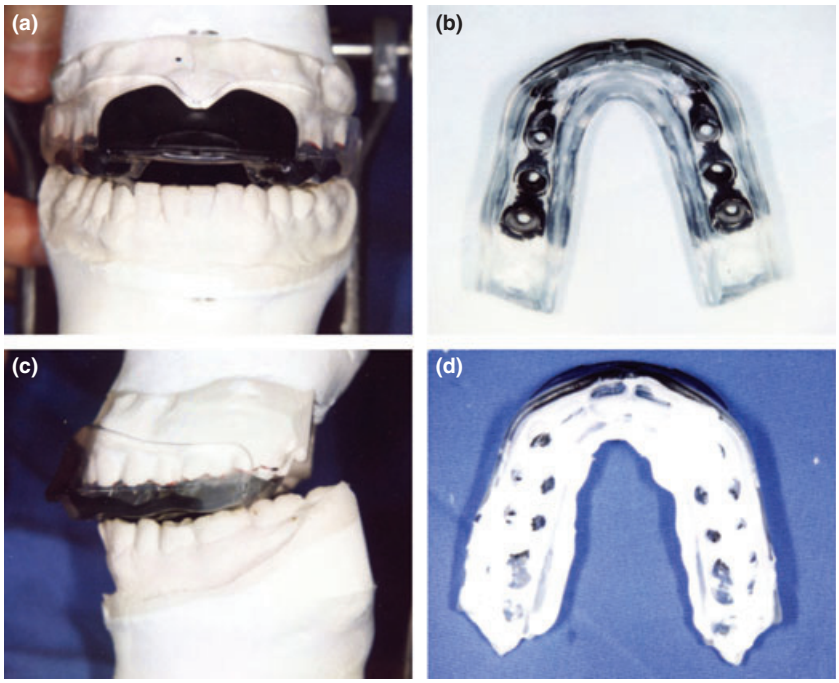

Fig. 3. Photographs of the mouthguard used at the time of injury. (a) Frontal view of the mouthguard on the plaster model. A canine-to-canine missing occlusion is seen. (b) Occlusal view of the mouthguard. The mouthguard is rough and hard, and occlusal contact points of the lower dentition are not marked clearly. (c) Lateral view of the mouthguard. The occlusion is not registered properly. (d) Inner surface of the mouthguard. The checking material (Fit checker®) (white portion) shows large amounts of space.

were various types of mouthguards and expected to be protected from maxillofacial injuries with any mouthguard.

On examination, his face was slightly swollen and tender around the chin. Intra-orally, a laceration was found at the mandibular mid line gingiva and the mandible was mobile at this part, but there was no dental injury. X-ray examination revealed a mandibular fracture at the midline and right condylar process (Fig. 1). The patient was otherwise healthy. Subsequently, he was admitted to our clinic and the midline fracture was fixed using two resorbable plates and screws, and the fracture of the right mandibular condyle was reduced conservatively under general anesthesia.

The postoperative course was uneventful and he developed no complications (Fig. 2). He also requested a custom-made mouthguard from our clinic for future use. The previous mouthguard used at the time of fracture was then examined carefully. The mouthguard was a 'boil and bite' type mouthguard with occlusion missing from canine to canine as a hollow for breathing, and the body was rough and hard, making it difficult to register the occlusion properly at the time of initial heating (Fig. 3a, b). As expected, the occlusion was not correct and occlusal contact points of the lower dentition were not marked clearly on the surface of the mouthguard (Fig. 3b, c). There were many gaps between the inner surface of the mouth guard and maxillary teeth and this space prevented the mouthguard from adhering closely (Fig. 3d).

Discussion

Many studies have demonstrated that wearing mouthguards can significantly reduce the incidence of orofacial injuries including mandibular fracture (4, 5). However, wearing inappropriate mouth guards is, if anything, dangerous and can accelerate injuries (6). In the present case, the mouthguard used was a 'boil and bite' type and this type is considered to have limited effectiveness in injury prevention (7). The unfitness and looseness of the inner surface and missing occlusion from canine to canine of the mouthguard would instead increase the degree of injury, especially mandibular fracture, when a kick is received in the chin. Experimentally, it was shown that wearing a defective mouthguard, particularly one lacking anterior contact, as in our case, would potentially cause a mandibular fracture (8).

It is a fact that many sports-related orofacial injuries have still occurred even though a mouthguard is used (5, 10). In this patient, it is not clear whether the mandibular fracture could have been prevented if he was wearing a custom-made mouthguard, but it was obvious that the mouthguard offered a very low level of protection and had the potential to accelerate injury (6).

We agree with other researchers that mouth guards should be made by dentists to ensure a good occlusal relationship for preventing maxillofacial injuries and concussion (8, 9). Awareness of the high risk for injuries would help to improve the protection and safety system in kickboxing, and careful examination of defective mouthguards would provide information regarding the use and fabrication of mouthguards suitable for various sports, including kickboxing.

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