



Maxillofacial trauma due to a horse hoof kick: Report of a case

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ABSTRACT

Horses have been identified as the major cause of animal-related farm injuries. Interaction with horses may cause severe dental and orofacial trauma, mostly caused by falls, collision with branches when riding in forests or by horse kicks. Children are uniquely prone to animal-related injuries because of inexperience, incomplete physical and cognitive development and a lack of proper training. Horse-related injuries account for a large percentage of injuries of head/maxillofacial trauma in pediatric farm populations. Although soft tissue contusions, lacerations and abrasions are the most common horse-related injuries, head/maxillofacial trauma remains the predominant cause of death, especially in pediatric farm populations. The objective of this case report is to describe a case of severe maxillofacial injuries due to a horse hoof kick.

Key words: Maxillofacial trauma, horse hoof kick, mouth guards, helmets

Introduction

Equestrian activities (horse riding and working around horses) take an important place in dental trauma etiology with a high rate of injury. The role of horses in society changes from one country to another or from one region to another within the same country according to cultural factors. In the Western world, horses are used primarily for amusement and sportive activities, whereas agricultural communities utilize horsepower in farms. However, horses have been identified as the major cause of animal-related farm injuries [1–3]. Smith et al. [4] stated that in Ohio, animal-related injuries accounted for 40.6% of the farm-related injuries, with horses being involved in 92% of these animal-

related cases. In Utah, horse-related injuries were 58% of all documented agricultural injuries, and tend to produce more serious results than other causes [5]. Injuries from encounters with horses represent a significant health risk for rural communities [1,2]. Children are uniquely prone to animal-related injuries because of inexperience, incomplete physical and cognitive development and a lack of proper training. Horse-related injuries account for a large percentage of injuries of head/maxillofacial trauma in pediatric farm populations [4]. A retrospective study about injuries caused by horses and their effects on the maxillofacial region showed that the most common causes were: a horse's hoof kick, falls from a horse's back, horse bite, and a horse's head

push, respectively [6]. Although soft tissue contusions, lacerations and abrasions are the most common horse-related injuries, head/maxillofacial trauma remains the predominant cause of death, especially in pediatric farm populations [2,4].

Hoof kick injuries are stated as being the most common cause of trauma in unmounted equestrians. Exadaktylos et al. [7] showed that 17 kicked equestrians were unmounted at the time of injury. It was concluded that the equestrian community may underestimate the risk of severe injuries attributable to hoof kicks, especially while handling the horse. However, only a case of bilateral fractures of the mandible in a two-year-old child as a result of being kicked by a horse was described [8]. Also, a rare case of multiple mandibular fractures and a severe facial laceration due to a horse hoof kick was reported [2].

Hendricks and Adekoya [9] stated that in 1998, there were an estimated 6,438 animal-related farm injuries to youth less than 20 years. Approximately 41% of the injuries occurred to youth under the age of 10, and 29% between the ages of 10 and 15. In addition, 37% of the injuries involved horses. An epidemiological survey carried out among pony- and horseback-riding children in Istanbul revealed that 2.3% of children had been affected by dental and orofacial trauma previously [10]. In addition, reports between 2000 and 2003 demonstrate that from children sustaining dental trauma and visiting pediatric dentistry departments in Istanbul, only between zero and 0.3% had suffered this condition associated with horseback riding [11,12]. However, horses are utilized for travelling, transportation and agricultural purposes rather than sportive activities in the rural areas of Turkey, especially in eastern Anatolia, and no studies exist regarding the prevalence and prevention of dental and maxillofacial trauma due to hoof kick injuries. The objective of this case report is to describe a case of severe maxillofacial injuries due to a horse hoof kick.

Case Report

A 14-year-old boy was referred to the Gazi University Faculty of Dentistry Department of Paediatric Dentistry from Kars, a city in the eastern Anatolia region of Turkey, with a history of hoof kick injuries four days after the incident. He explained that when

he was driving a horse cart, he whipped the horse and was kicked. In the extraoral examination, extensive lacerations and abrasions in the perioral region were observed. Intraoral examination showed that, besides necrotic gingival tissues, the upper right lateral incisor and canine were avulsed and the upper right and left central incisors were extruded (Figure 1). During the mobility control, both the teeth and bone showed severe mobility pointing out an alveolar process fracture. Further radiographic evaluation confirmed the absence of the right lateral incisor and canine as well as a complete vertical alveolar process fracture in association with intraoral findings (Figure 2). No fractures involving the mandible and condyles were detected. Parental history revealed that he had no tetanus prophylaxis and



Figure 1. Extraoral view at the initial visit. Note the extruded upper right and left central incisors, necrotic gingival tissues and laceration at the lower lip.



Figure 2. Panoramic radiograph showing complete vertical alveolar process fracture.

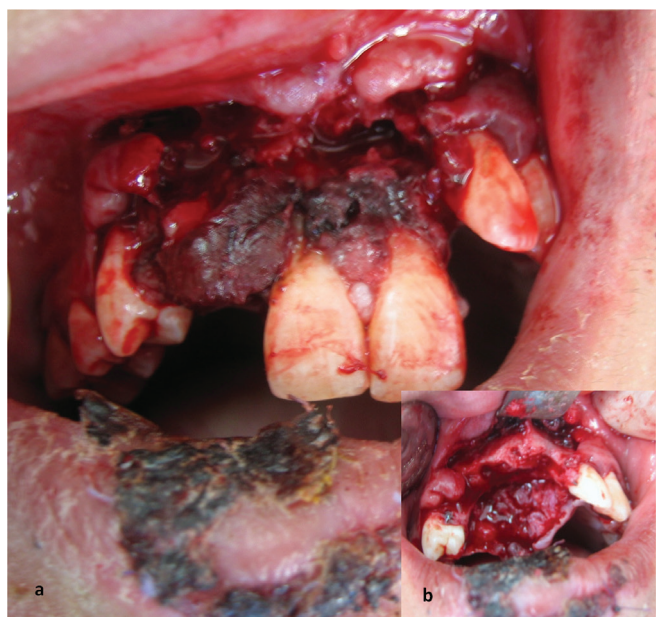


Figure 3. a: Intraoral view during surgical intervention. A vertical alveolar fracture line was observed between the mesial surface of the upper right first premolar and the upper left lateral incisor teeth. **b:** Intraoral view after extraction of the bone tissue along with the fracture line as well as upper right and left central incisors.

had been using antibiotics for three days. Treatment of soft tissues was done with immediate intervention. Prior to surgical intervention, consultation was held with the department of oral and maxillofacial surgery in order to determine treatment planning. Taking factors including the time elapsed after trauma, bad oral health and infection as well as the late referral of the patient into account, a radical surgical treatment was planned at the first visit. During surgical intervention the sequestration of the fractured bone was evident. Therefore, bone tissue along with the fracture line and upper right and left central incisors were extracted (Figure 3). Antibiotics (Augmentin BID, Biteral), an antibacterial mouthwash (Klorhex) and analgesics (Majezik) were prescribed for the patient, with a protocol for prevention of tetanus infection being followed. After a two-week recovery period, a removable partial maxillary denture was fabricated following routine procedures in order to improve esthetics, function and phonetics (Figures 4, 5). The patient was rescheduled for regular follow-up.

Discussion

Interaction with horses may cause severe dental and orofacial trauma, mostly caused by falls [3,13–17], collision with branches when riding in forests [13] or by horse kicks [2,3,13,16]. Horse racing, dressage, harness racing, pony club riding, trail riding, track work



Figure 4. a: Panoramic radiograph after two weeks. **b:** Intraoral view after two weeks.



Figure 5. Intraoral view after prosthetic treatment.

training, and simple pleasure riding are common riding pursuits [2]. Hill et al. [18] described horseback riding as the most dangerous individual sport regarding dental and facial injuries. Children can be injured during contact with horses by a variety of mechanisms, including being kicked or crushed by the horse, being thrown by or falling from a horse, and being struck by a motor vehicle while riding a horse [4]. Since children are not able to predict horse behavior and potential dangers, they are vulnerable to horse-related injuries. In the present case, the child's misbehavior gave rise to hoof kick trauma.

The power of the horse kick carries a force up to one ton, causing fractures to the skull and face as well as devastating damage to any part of the body. Ueeck et al. [17] reported the patterns of maxillofacial lesions resulting from horse-related accidents. The lesions were often associated with other types of injuries; the most frequent maxillofacial injuries were abrasions/contusions, followed by lacerations and fractures and may have a fatal outcome. On the other hand, there are few case reports describing mandibular fractures as a result

of horse hoof kick trauma [2,8]. However, the fracture in the present case occurred in the maxilla.

Four days of delay in the emergency dental treatment restricted the treatment plan in the present case. Bad oral health and infection deteriorated the blood supply of the fractured bone and led to the sequestration of the fragment. Therefore, bone tissue along with the fracture line was extracted. Bone grafting to the anterior region of the maxilla is a treatment method often used for reconstruction after dental trauma when teeth have been lost. Before implants can be installed in areas with bone deficiency, bone augmentation must first be performed at the defect site. This procedure is usually accomplished by increasing the bone volume with bone block grafts to the defect areas [19]. Since the loss of bone tissue was excessive and the risk of failure regarding implant therapy was great in the present case, bone grafting could not be carried out. Considering the ongoing growth and development of the maxilla, treatment with a removable partial maxillary denture was preferred in order to improve appearance, mastication and speech.

Because animal-related injuries are common and often severe, preventive efforts should target this source of injury [20]. Griffen et al. [21] state that "prevention of death from horse-related trauma is synonymous with prevention of head injury." In a study by Holland et al. [14], children wearing a helmet when riding a horse were less likely to suffer long-term neurologic sequels from a head injury compared with those who were not wearing a helmet. Currently, there are no guidelines regarding the use of mouth guards while horseback riding [10]. However, mouth guards and helmets are not used for prevention in the rural areas of Turkey, as seen in the present case.

Although helmet use contributes to an overall reduction of severity of the head injuries, occurrence of facial injuries in helmeted patients in cases of horse kick accidents is still a fact [22]. Therefore, an education program regarding proper horse handling, the use of helmets and custom-made mouth guards as oral protection, and supervising children, besides the management of dental trauma in case of emergencies, should be encouraged to prevent further injuries. Parents should closely supervise children around horses and

teach them the proper respect and behavior required when riding or working with horses.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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