

## Dentoalveolar and Mandibular Body Fractures Caused by a Horse Kick: Report of a Case

Wilson Denis Martins, DDS, PhD; Daniela Martins Fávoro, DDS;  
Marina de Oliveira Ribas, DDS, PhD; Guilherme Martins



### Abstract

A rare case of multiple mandibular fractures and severe facial laceration is presented. The cause was a horse hoof kick to an unmounted equestrian. The pertinent literature is reviewed and the maxillofacial injuries associated with animal interaction are discussed.

**Keywords:** Horse accidents, maxillofacial trauma, dentoalveolar fractures, mandibular fracture

**Citation:** Martins WD, Fávoro DM, Ribas MO, Martins G. Dentoalveolar and Mandibular Body Fractures Caused by a Horse Kick: Report of a Case. J Contemp Dent Pract 2006 May;(7)2:137-144.

© Seer Publishing

## Introduction

Maxillofacial injuries after animal associated incidents are uncommon. Large epidemiologic studies seldom make specific references to the prevalence of injuries caused by animals, along with the clinical management and associated complications.<sup>1-3</sup>

Prevalence of injuries caused by animals is largely related to cultural factors since the causes and incidence of maxillofacial injuries vary from one country to another or from one region to another within the same country.<sup>8,18</sup> A recent study in Nigeria showed the prevalence of accidents was caused by cows, camels, donkeys, and dogs.<sup>5</sup> Accidents with camels are the third causative factor of facial fractures in the United Arab Emirates, following road traffic and falls.<sup>6</sup> A review of the etiology and incidence of oral and maxillofacial fractures in children in Jordan showed a prevalence of horse related incidents, among the animal associated injuries.<sup>2</sup>

A surprisingly high incidence of dog bite injuries, particularly in children under seven years of age, was found in a Welch study.<sup>7</sup>

Equestrian activities (horse riding and working around horses) are associated with a high rate of injury.<sup>4</sup>

The goal of this investigation was to review the literature and report a case of severe maxillofacial injuries caused by a horse hoof kick.

Interaction with horses occurs in sport related activities and in occupational situations. Injuries from encounters with horses represent a significant health risk for rural communities. In a study of 145 patients with injuries related to large animals, it was found 79 patients (55%) were injured by horses. The predominant reason for injury were falls.<sup>9</sup>

Horse related injuries accounted for a large percentage of injuries of head/maxillofacial trauma in a pediatric farm population. Five children (5.2%) died, and one child with a severe brain injury was discharged to a long-term rehabilitation facility.<sup>8</sup> A case of bilateral fractures of mandible in a 2-year-old child as a result of being kicked by a horse was described.<sup>11</sup>

The neuro-ophthalmological sequelae of horse-related accidents were highlighted in a recent study.<sup>10</sup> It was concluded horse riding and working around horses constitutes an occupation or recreation hazard with inherent dangers, and helmet use should be vigorously promoted. The pattern of injury favors head and spine in recreational and non-helmeted riders and extremities for professional and helmeted riders.<sup>13</sup>

Even though incidents of facial injuries are common among those who ride horses, the use of custom-made mouth guards as oral protection for equestrians is not promoted by the equestrian industry.<sup>12</sup>

Polo players, as well as participants in the cross country phase of eventing, are considered to be engaged in dangerous equestrian sports. Although many sports have injury rates much greater than 8/1000 player-game hours, the severity of most injuries occurring in polo was classified as major, with fractures and facial lacerations common.<sup>14</sup> Eventing is one of the most dangerous equestrian sports, in which head and facial injuries represented the largest group.<sup>15</sup> Eventing could be termed an "equestrian triathlon." It involves working with a horse both on the flat and over fences. The three phases are: dressage, endurance (or cross-country), and show jumping.

An Australian comparative study of the severity of sports related accidents showed horse riding injuries ranked third after Australian rules football and cricket, but horse riding injuries had the most severe injuries (89.1% of the patients required surgery and hospital stays ranged from zero to 18 days, with an average stay of 4.7 days).<sup>16</sup>

Hoof kick injuries are more common in unmounted equestrians. A Swiss study showed that 17 kicked equestrians were unmounted at the time of injury. In nine patients an isolated facial injury was diagnosed; five needed referrals to the Department of Plastic Surgery because of the complexity of the facial soft tissue wounds and three underwent maxillofacial surgery. It was concluded the equestrian community may underestimate the risk of severe injuries attributable to hoof kicks, especially while handling the horse.<sup>17</sup>

A German study about injuries caused by horses and their effects on maxillofacial regions showed the following causes were recorded: horse's hoof kick, 14 cases; fall from horse's back, six cases; horse bite, one case; horse's head push, one case. Most of the cases (16 cases, 70%) were related to equestrian sports, three to agricultural workers, and three were children.<sup>19</sup>

An American study reported the patterns of maxillofacial lesions resulting from horse related accidents.<sup>20</sup> The lesions were often associated with other types of injuries; the most frequent maxillofacial injuries were abrasions/contusions, followed by lacerations and fractures, and being kicked was correlated with a more serious injury. In this patient population wearing a helmet does not seem to add protection to the face.

### Report of a Case

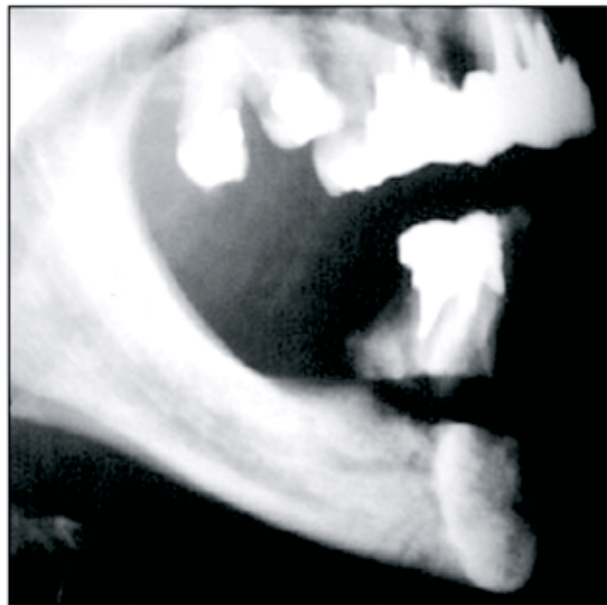
A 45-year-old man was kicked while working around his horse after a recreational ride. He was admitted for emergency care at the Oral and Maxillofacial Surgery Unit of the Hospital Clinica de Fraturas e Ortopedia XV, Curitiba, Brazil, presenting with an extensive laceration in the chin region (Figure 1).

Radiological examination revealed a complete vestibular/lingual horizontal mandibular alveolar fracture with a 2 cm gap between the basal bone and the dentoalveolar fragment (Figures 2 and 3).

A second fracture line was disclosed by a lateral jaw radiograph of the mandible (Figure 4).



**Figure 1.** Extensive laceration in the chin region as presented in the patient upon admission to the hospital.



**Figure 2.** Profile view showing the horizontal dentoalveolar fracture



**Figure 3.** Postero-anterior view. In spite of the superimposition of the cervical spine, it is possible to observe the 2 cm gap between the dentoalveolar and basal fragments.



**Figure 4.** Lateral jaw view of the mandible showing the total vertical fracture of the body of the mandible.

The patient was in good general health and underwent immediate surgery for repair of the mandibular fractures and soft tissue. After general anesthesia, the wound could be inspected more carefully. The horizontal alveolar line of fracture was situated just behind the apices of the anterior teeth. The apices of three teeth could be seen in Figure 5 as if they were “emerging” from the base of the dentoalveolar fragment. The left mandibular body vertical fracture was accessed via the same wound. The fractures were reduced, and wire fixation was used to secure the bone fragments (Figure 6).

Fixation and satisfactory stabilization of both dentoalveolar and mandibular body fractures were achieved (Figures 7 and 8).

The soft tissue wounds were carefully repaired, with good results since no loss of soft tissue had occurred during the injury. A protocol for prevention of tetanus infection was followed.<sup>21</sup> The post operative course was uneventful, and the patient was discharged from the hospital on the second day. Maxillomandibular immobilization was maintained for six weeks, and the final occlusal result is shown in the Figure 9. The patient was referred to his general dentist for prosthetic rehabilitation.



**Figure 5.** The apices of three teeth could be seen in the base of the dentoalveolar fragment.



**Figure 6.** Wire fixation of the dentoalveolar fragment.

### Discussion

In recent decades the role of horses in society has changed. Considered a work animal in the past, the horse is now used primarily for sports activities and for recreation.

Equestrian activities encompass a wide range of professional and recreational activities. Horse racing, dressage, harness racing, pony club riding, trail riding, track work training, and simple



**Figure 7.** Postero-anterior post-operative view showing the two reduced fractures. The osteosynthesis wires can be observed.



**Figure 8.** Profile post-operative view showing the satisfactory position of the fragments.



**Figure 9.** Final occlusion after releasing of the maxillo-mandibular immobilization.

pleasure riding are common riding pursuits. Opportunities for injury also arise in non-riding activities such as handling, training, shoeing, and feeding horses.<sup>13</sup>

The higher prevalence of accidents and severity of the injuries among recreational equestrians is shown in the literature. There is a tendency between the recreational equestrians to underestimate the risks of not wearing helmets and other protective items, such as clothing and mouthguards<sup>13,16,17,20,22</sup>

In an imaging study of serious horse-riding accidents with multi-slice CT (computed tomography) three main injury mechanisms were established: falling off a horse, a horse kick, and a crushing injury caused by a falling horse.<sup>4</sup> Injuries caused by hoof kicks are the most serious ones, especially when equestrians were unmounted while handling the horse.<sup>17,19,20</sup> The full impact of the hoof hits a relatively small surface causing significant injury, as in the present case.

A Swiss study showed 17 kicked equestrians were unmounted at the time of injury. In nine patients an isolated facial injury was diagnosed; five needed referrals to the Department of Plastic Surgery because of the complexity of the facial soft tissue wounds and three underwent maxillofacial surgery. It was concluded the equestrian community may underestimate the risk of severe injuries attributable to hoof kicks, especially while handling the horse.<sup>17</sup>

Head and face protection has been always recommended.<sup>14,23,24</sup> Helmet use contributes to an overall reduction of severity of the head injuries,

but facial injuries still occurred in helmeted patients in cases of horse kick accidents.<sup>13</sup> The power of the horse kick was described by an ancient Arab proverb, "The graves yawns for the horseman."<sup>24,25</sup> This possible lethal power 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.

### Conclusion

As helmet use does not seem to add protection to the face, as previously demonstrated, it was recently suggested more education regarding proper horse handling, use of helmets and custom-made mouth guards as oral protection, riding skills, and supervising young riders is encouraged to prevent further injuries.<sup>20</sup>

## References

1. Gassner R, Tuli T, Hachl O, Rudisch A, Ulmer H. Cranio-maxillofacial trauma: a 10-year review of 9,543 cases with 21,067 injuries. *J Craniomaxillofac Surg* 2003 Feb;31:51-61.
2. Qudah MA, Bataineh AB. A retrospective study of selected oral and maxillofacial fractures in a group of Jordanian children. *Oral Surg Oral Méd Oral Pathol Oral Radiol Endod* 2002; 94:310-14.
3. Ansari MH. Maxillofacial fractures in Hamedan province, Iran: a retrospective study (1987-2001). *Craniomaxillofac Surg*. 2004;32:28-34.
4. Kiuru MD, Koivikko MD, Koskinen SD. Serious horse-riding accidents: imaging findings and evaluation with multi-slice CT. *Emerg Radiol*. 2002; 9:213-18.
5. Ugboko VI, Olasoji HO, Ajike SO, Amole AO, Ogundipe OT. Facial injuries caused by animals in northern Nigeria. *Br J Oral Maxillofac Surg* 2002 Oct;40:433-37.
6. Klenk G, Kovacs A. Etiology and patterns of facial fractures in the United Arab Emirates. *J Craniofac Surg*. 2003;1:78-84.
7. Shaikh ZS, Worrall SF. Epidemiology of facial trauma in a sample of patients aged 1-18 years. *Injury*. 2002 Oct;33:669-71.
8. Smith GA, Scherzer DJ, Buckley JW, Haley KJ, Shields BJ. Pediatric farm-related injuries: a series of 96 hospitalized patients. *Clin Pediatr* 2004;43:335-42.
9. Norwood S, McAuley C, Vallina VL, Fernandez LG, McLarty JW, Goodfried G. Mechanisms and patterns of injuries related to large animals. *J Trauma* 2000 48:740-44.
10. Fleming PR, Crompton JL, Simpson DA. Neuro-ophthalmological sequelae of horse-related accidents. *Clin Experiment Ophthalmol* 2001;29:208-12.
11. Crean ST, Sivarajasingam V, Fardy MJ. Conservative approach in the management of mandibular fractures in the early dentition phase. A case report and review of the literature. *Int J Paediatr Dent* 2000;10:229-33.
12. Douglas BL. Oral protection for equestrians. *CDS Rev* 1995;88:28-30 13.
13. Lim J, Puttaswamy V, Gizzi M, Christie L, Croker W, Crowe P. Pattern of equestrian injuries presenting to a Sydney teaching hospital. *ANZ J Surg* 2003 73:567-71.
14. Costa-Paz M, Aponte-Tinao L, Muscolo DL. Injuries to polo riders: a prospective evaluation. *Br J Sports Méd* 1999;33:329-31.
15. Whitlock MR. Injuries to riders in the cross country phase of eventing: the importance of protective equipment. *Br J Sports Med* 1999;33:212-14.
16. Lim J, Moore MH, Trott JA, David DJ. Sports-related facial fractures: a review of 137 patients. *Aust N Z J Surg* 1993;63:784-89.
17. Exadaktylos AK, Egli S, Inden P, Zimmermann H. Hoof kick injuries in unmounted equestrians. Improving accident analysis and prevention by introducing an accident and emergency based relational database. *Emerg Med J* 2002 19:573-75.
18. Oikarinen K, Schutz P, Thalib L, Sandor GKB, Clokie C, Meisami T, Safar S, Moilanen M, Belal M. Differences in the etiology of mandibular fractures in Kuwait, Canada and Finland. *Dent Traumatol* 2004;20:241-245.
19. Blumel J, Pfeifer G. Unfälle durch den Umgang mit Pferden und ihre Auswirkungen im Bereich des Gesichtsschadels. Analyse aus dem Krankengut der Nordwestdeutschen Kieferklinik von 1970-1975. *Unfallheilkunde* 1977;80:27-30.
20. Ueeck BA, Dierks EJ, Homer LD, Potter B. Patterns of maxillofacial injuries related to interaction with horses. *J Oral Maxillofac Surg* 2004;62:693-96.
21. Sudesh Prabhakar MD DM and Vinod K Grover MD. Tetanus. Current treatment options in infectious diseases 2002;4:473-84.
22. Gwalli F, Sahlin P, Guimaraes-Ferreira J, Lauritzen C. Orbital fractures in craniofacial trauma in Goteborg: trauma scoring, operative techniques, and outcome. *Scand J Plast Reconstr Surg Hand Surg* 2003;37:69-74.
23. Kriss TC, Kriss VM. Equine related neurosurgical trauma: a prospective series of 30 patients. *J Trauma* 1997;43:97-9.
24. Pounder DJ. "The grave yawns for the horseman". Equestrian deaths in South Australia 1973-1983. *Med J Austral* 1984;141:632-35.
25. Sorli JM. Equestrian injuries: a five year review of hospital admissions in British Columbia, Canada. *Inj Prev* 2000;6:59-61.

## About the Authors

**Wilson Denis Martins, DDS, PhD**



Dr. Martins is an Oral and Maxillofacial Surgeon and a Professor of Stomatology at the Pontifical University of Paraná (PUCPR) in Curitiba, Brazil.

e-mail: [w.denis@pucpr.br](mailto:w.denis@pucpr.br)

**Daniela Martins Fávaro, DDS**



Dr. Fávaro is an Orthodontist in private practice in Paranavaí, PR, Brazil.

**Mafna de Oliveira Ribas, DDS, PhD**



Dr. Ribas is an Oral and Maxillofacial Surgeon and a Professor of Stomatology at the Pontifical University of Paraná (PUCPR) in Curitiba, Brazil.

**Guilherme Martins**



Mr. Martins is a dental student at the Pontifical University of Paraná (PUCPR) in Curitiba, Brazil.