

## Successful Surgical Repair of Rostral Mandible and Maxilla Fracture with Cross Pinning and Cerclage Wire in a Horse

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*Cross pinning and interfragmentary cerclage wiring was done to stabilize the rostral, bilateral mandibular and maxillary fracture in a four year old, non-descript male horse.*

### KEYWORDS

Rostral, mandible, maxilla fracture, horse.

### INTRODUCTION

Open, dislocated, contaminated fractures of the inter-dental space of the mandibles and maxillae are often self-inflicted, frequently when the teeth are caught in a stationary object. The majority of these fractures are bilateral (Friedrich and Avalon, 2006). The fracture described in this study pose a significant surgical challenge. Different methods have been described to repair these fractures with variable success (e.g., intraoral acrylic splints, intramedullary splints with tension band wires, internal fixation, and external fixation with a Kirschner-Ehmer device) (Schneider, 1990). The tooth loss, malocclusion, osteomyelitis, sequestration, as well as chronic discharge are the possible complications with a horse suffering from such fracture (DeBowes, 1996; Belsito and Fischer, 2001). The aim of such fracture fixation is to provide the normal occlusion and rapid mandibular function via the rigid fixation method, to avoid excessive soft tissue damage, and to protect the teeth, tooth roots, and the neurovascular structures in the mandibular canal from fixation materials (DeBowes, 1996; Beard, 1999). The present case study describes the surgery conducted on 4

year old non-descript male horse presented with bilateral rostral mandible and maxilla fracture.

### MATERIALS AND METHODS

A 4-year-old non-descript male horse presented to the Referral Veterinary Polyclinic of Indian Veterinary Research Institute, Izatnagar with bilateral rostral mandible and maxilla fracture (Fig.1). According to information obtained from the owner, the horse got struck with a truck carrying iron bars that lead to fracture of maxilla and mandible. A bilateral rostral mandibular body and maxilla fracture was detected following clinical examination (Figure. 2). The animal was anesthetized with xylazine HCl (1 mg/kg, IV) and ketamine (2mg/kg,IV) combination given 5 minute apart. Thereafter, the anesthesia was maintained with ketamine HCl (1 mg/kg, IV) given intermittently according to the horse's reactions for the constancy and duration of the anesthesia. The fracture sites were thoroughly cleaned with sterile saline and then prepared for operation by spraying an oral antiseptic (chlorhexidine gluconate 0.2%).

The fracture stabilization was achieved with cross pinning (3mm Steinmen pins) and cerclage wiring in mandible (Fig.3) and interfragmentary cerclage wiring (steel wire) in maxilla. For bilateral mandible fracture the pins were passed in cross manner with hand chuck. Thereafter wiring was done across the canine tooth and pins for better stabilization of the fracture. The 1.2 mm drill bit was used to create the holes for wiring. The wire ends were twisted for fracture reduction and wire knots were bent to prevent any soft tissue irritation. The intraoral lacerated soft tissue lesions were sutured with

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vicryl (No.1) and skin was sutured with silk (No.2) to cover the fracture line (Figure. 5).

The oral cavity was cleaned with saline. Soframycin® ointment was applied locally and Dolin® spray was done to get rid of with the flies. The post-operative care included intravenous fluids, Ringers solution (10L) and 5% dextrose in normal saline (5L) daily for 5 consecutive days, 2g ampicillin and 2g cloxacillin every 12 hours for 7 days IV, 20ml gentamicin I/V (100mg/ml) every 12 hours and 15 ml meloxicam IM for 3 days. The animal was maintained on liquid diet for another 5 days and thereafter on semisolid diet for next 20 days. Animal was kept as indoor patient till the suture removal on 12th postoperative day and discharged thereafter.

## RESULTS

The surgical procedure was fully successful. After 3 months animal was checked for healed wound. There was mild malocclusion of teeth with slight drooping of the upper lip of the affected side (Fig.6).

## DISCUSSION

An obvious minor malocclusion on the rostral side occurred because of the horse's unconscious jaw movement during the postoperative days. On 3rd postoperative day, it was observed that some sutures were open and re-suturing was done. The horse started to use the jaw within a week after the surgery. Monthly routine clinical examination revealed that the wound was healed. Fixation material was left in place, as they had become covered by mucosa and were causing no irritation to the adjacent tissues. Fortunately, very few complications were recorded in present case. Some studies have recorded up to 68% complications in unstable bilateral maxillary and mandibular fractures in horses (Henninger et al., 1999). Additionally, interdental wire loosening or failure in the same study was also reported in 22% of the horses (Henninger et al., 1999). A possible complication with an external fixator such as entanglement in the external objects creates hazards for both horses and their handlers (Belsito and Fischer, 2001). Irritation to the base of the tongue and mastication

difficulties related to the intraoral splint application has been reported (Henninger et al., 1999). The technique we used in present study had no such complications. The interfragmental fixation method used in the present study did not have enough biomechanical efficiency; therefore, a mild mandibulo-maxillary malocclusion occurred during mastication movements after surgery. However, this complication did not cause any problems such as pain or food intake reduction. Moreover, the malocclusion occurred in the postoperative awakening period and did not worsen following days, and no anesthetic complication was observed.

## CONCLUSION

Although complications in horses with fractures of the mandible and maxilla are common, long term prognoses for functional and cosmetic outcome are favorable when repaired with cross pinning and cerclage wire.

## REFERENCES

1. C Beard W. The skull, maxilla, and mandible. In: Auer, J.A., Stick, J.A., Eds: Equine Surgery 2nd Edition. Philadelphia, PA, Saunders, 1999; 887-899.
2. Belsito KA, Fischer AT. External skeletal fixation in the management of equine mandibular fractures: 16 cases (1988-1998). Equine Vet. J., 2001; 33: 176-183
3. DeBowes, RM. Fractures of the mandible and maxilla. In: Nixon, A.J., Ed.: Equine fracture repair. Philadelphia, PA, Saunders, 1996; 323-335.
4. Friedrich C. von Saldern and Avalon O'Keeffe How to Stabilize Mandibular and Maxillary Fractures Using Trans-Dental Dynamic Compression-Plate Fixation AAEP Proceedings 2006; Vol. 52 : 617
5. Henninger RW, Beard WL, Schneider RK, Bramlage LR, Burkhardt HA. Fractures of the rostral portion of the mandible and maxilla in horses: 89 cases (1979-1997). J Am Vet Med Assoc. Jun.1999; 214(11):1648-1652.
6. Schneider RK. Mandibular fractures. In: White NA, Moore JN, eds. Current practice of equine surgery. Philadelphia: JB Lippincott, 1990; 589.

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## FIGURES



Fig.1. Animal at the time of presentation



Fig.2. Fracture of rostral maxilla and mandible (animal in lateral position)

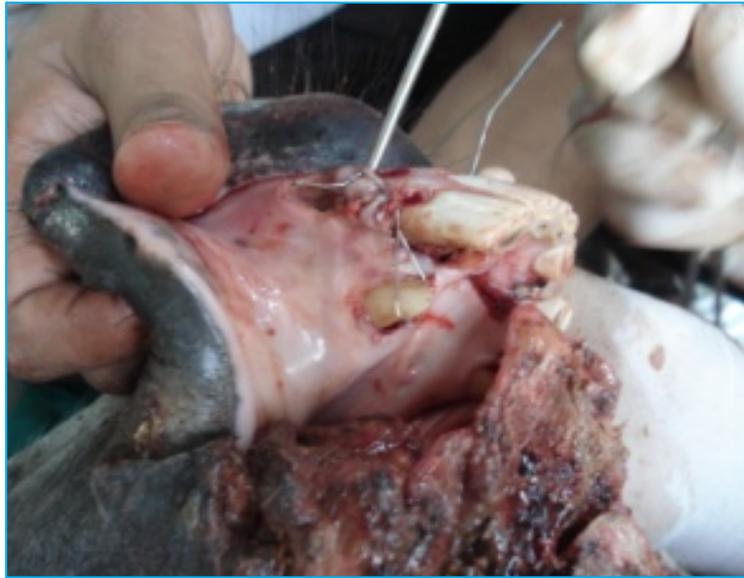


Fig.3. Repair of mandibular fracture with cross pinning and cerclage wiring



Fig.4. Photograph of the animal after mandible fracture repair



Fig.5. Photograph taken after suturing of wound



Fig.6. Complete healing of the wound after 3 month with mild lip drooping