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Management of Mandibular Fractures

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Take Home Message—Fracture fixation as it pertains to the equine mandible has two functions; provision of stability and restoration of dental occlusion. Not all fractures need to be repaired. If the fracture is to be repaired then AO/ASIF principles must be followed and beyond that, careful attention must be paid to dental and associated anatomical structures.

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I. INTRODUCTION

here are number of case-series and review articles published on the management of equine mandibular fractures.1-6 Treatment methodologies differ substantially in cost and for the most part these costs reflect the biomechanical properties of the implants used. There are significant variations in the ability of different fixation methods to withstand biomechanical loading and the most appropriate implant needs to be chosen for the situation at hand.7

II. INITIAL CONSIDERATIONS

The presence of incisor malocclusion, inability to close the jaw normally, excessive drooling anorexia or halitosis should alert the clinician to the possibility of a mandibular fracture. Anthropomorphically, these horses should be painful; however this is not always the case. When examining a horse after head trauma (a kick, being caught in a fence or feeder) it is important to consider fractures, even in the absence of overt pain. If a fracture is identified on gross examination of the mouth, it is still important to obtain good quality radiographs to determine the extent and direction of the fracture line, determine whether comminution has occurred and whether tooth roots are involved. If the fracture is open to the oral cavity any implant will become infected but this is not usually of significant concern.

When deciding on which fixation method to use, several important elements need to be considered. The tension side of the mandible (where implants will have the best biomechanical advantage) is the oral surface and therefore the closer the implant is to the mouth, the better it is able to overcome distraction forces.8 Gaps in the mandible (either missing bone fragments or missing teeth will substantially reduce the strength of the final construct (bone plus implant). For this reason, if there are loose cheek teeth, or if the fracture line goes through a cheek tooth, the author maintains the tooth in the alveolus at the time of fracture repair (in most cases). The tooth may have to be removed subsequently; however at the time of repair it provides important additional stability.

The mandible is essentially a box underslung from the cranium hinged at the temporomandibular joint. Due to this anatomical arrangement, the inciting trauma capable of creating a fracture on one horizontal ramus will likely have damaged the contra-lateral one as well (but not always). For this reason, it is important to examine the entire mandible and not focus on the obvious fracture site. In mandibular fracture repair simplicity is elegance. There is no need to interfere with a fracture that is inherently stable and where dental occlusion has not been compromised. Similarly, bone plates and orthopedic screws are superfluous when fractures can be managed with interdental or interfragmentary wires.

III. FIXATION METHODS

Fracture fixation methods can be broadly divided into extra- and intra-oral techniques. Extra-oral techniques are typically closed (i.e.: no large incision for implants) and therefore have a lower chance of infection. Removal is easier and stability afforded is good. There is less risk of tooth root compromise (assuming adequate intra-operative imaging), less cost and less technical experience necessary to place the implants. Types I and II external fixators have been used successfully as have pinless external fixators.3,9 The author has not used the latter technique, however the initial report stated that complications included a 30% incidence of fixator loosening, and 30% of horses had bone sequestration at the clamp site. Benefits to using this technique include minimal soft tissue trauma, no tooth root interference and no implants at the fracture site to potentiate infection. The author has used a Type I external fixator fashioned from 5.5mm cortical bone screws, the heads of which were incorporated in a stomach tube subsequently filled with polymethylmethacrylate to act as a rigid, lightweight side bar. In both cases screw loosening and side bar fracture resulted in implant failure and as such this methodology has been abandoned.

Intra-oral techniques would include cerclage wires, U-bar, dental acrylic splints and bone plates. The author has used cerclage wires extensively. Dynamic compression plates have
the greatest stiffness of any construct, but their strength (historically) has been influenced by placement relative to the tension side of the mandible. The locking compression plate (LCP) has screws that have a thread on their head which engage threads in the screw holes of the plate. It is essentially an internal external-fixator with a side-bar distance of zero, making it an extremely strong construct. The beauty of this fixation method is that the surgeon can move the implant away from the oral surface, avoiding the complications associated with oral placement and the tooth roots, but still have the strength to counteract the biomechanical forces placed upon it.

IV. SUMMARY

Equine mandibular fracture repair is often not simple. The myriad associated soft tissue and dental structures make surgical planning complicated. Despite these issues mandibular fractures can often be addressed successfully in the standing horse in a relatively cost efficient manner and result in long-term success.

REFERENCES


