In cooperation with

What Is Your Diagnosis?

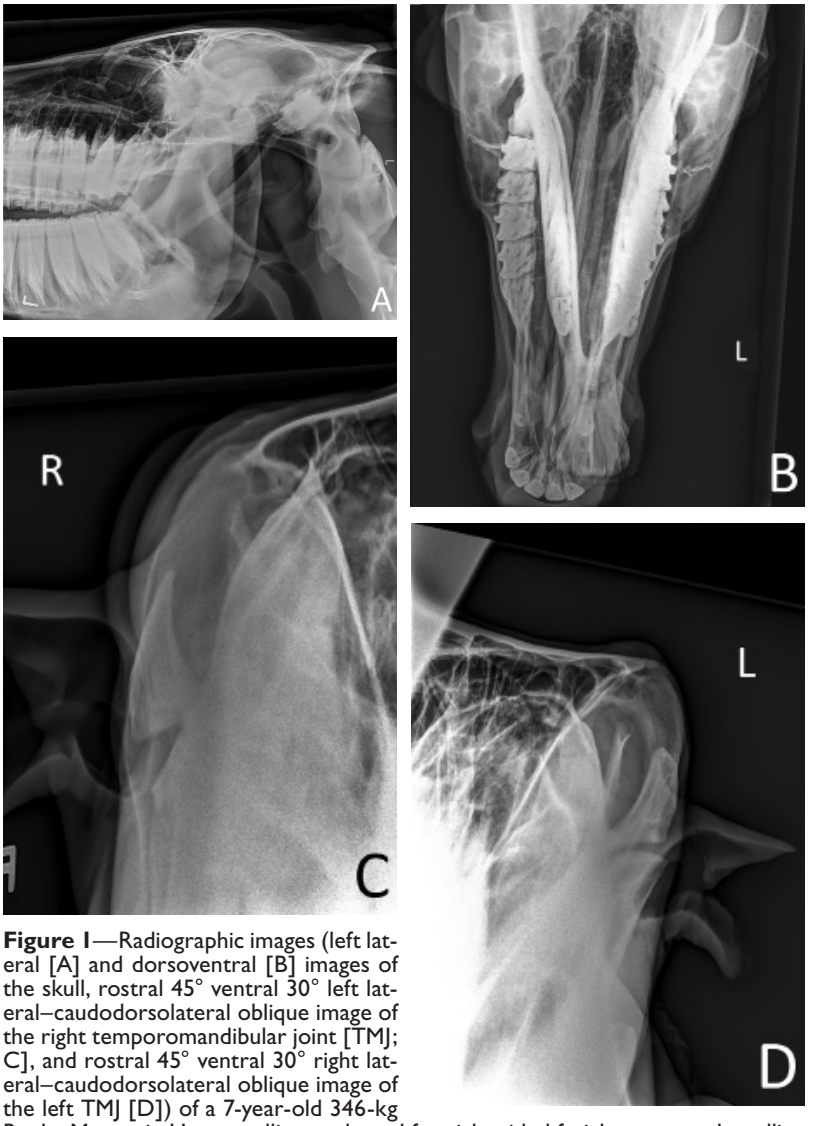

Figure 1—Radiographic images (left lateral [A] and dorsoventral [B] images of the skull, rostral 45° ventral 30° left lateral–caudodorsolateral oblique image of the right temporomandibular joint [TMJ; C], and rostral 45° ventral 30° right lateral–caudodorsolateral oblique image of the left TMJ [D]) of a 7-year-old 346-kg Rocky Mountain Horse stallion evaluated for right-sided facial trauma and swelling 2 days prior to presentation.

History

A 7-year-old 346-kg Rocky Mountain Horse stallion was admitted for evaluation of a suspected mandibular fracture. The owner reported the patient suffered facial trauma during a thunderstorm 2 days prior to presentation. The referring veterinarian prescribed flunixin meglumine (1.1 mg/kg, IV, q 12 h) 1 day prior to admission.

On physical examination, the horse had a dropped jaw that was deviated leftward. The mouth could not be closed manually, and the horse resisted manipulation of the jaw. Moderate swelling was noticed over the right masseter muscles and temporomandibular joint (TMJ) region. There was marked periorbital swelling, exophthalmia, and severe corneal edema of the right eye. Pupillary light reflex and the dazzle and menace responses were absent in the right eye. Findings for all other cranial nerves were clinically normal. Left lateral and ventrodorsal radiographic images of the skull were obtained. Because the ventrodorsal projection did not include the TMJ region, a more caudal projection was attempted but not feasible without sedating the horse. Therefore, a rostral 45° ventral 30° left lateral–caudodorsolateral oblique (R45°V30°LeL-CdDRtLO) image of the right TMJ and a rostral 45° ventral 30° right lateral–caudodorsolateral oblique 3(R45°V30°RtL-CdDLeLO) image of the left TMJ were obtained **(Figure 1)**.

Formulate differential diagnoses, then continue reading.

Diagnostic Imaging Findings and Interpretation

Radiographic examination of the skull revealed rostrodorsal displacement of the right mandibular condyle with respect to the corresponding mandibular fossa and leftward displacement of the bodies of the left and right mandibles with respect to the maxillary dental arcades **(Figure 2)**. On the R45°V30°LeL-CdDRtLO projection, the right mandibular condyle was superimposed over the right temporal bone in a dorsomedial direction. The right coronoid process was also displaced medially. On the R45°V30°RtL-CdDLeLO projection, the left mandibular condyle articulated with its corresponding temporal bone; however, the left TMJ was incongruent, characterized by mild widening of the joint space laterally. Soft tissue swelling surrounding the right periorbital region was also evident (Figure 2).

This report was submitted by Carley A. Wigley; Marc A. Seitz, DVM; W. Wade Won, DVM; and Robin L. Fontenot, DVM, MS; from the Department of Clinical Sciences, College of Veterinary Medicine, Mississippi State University, Mississippi State, MS 39762.

Address correspondence to Dr. Fontenot (rfontenot@cvm.msstate.edu).

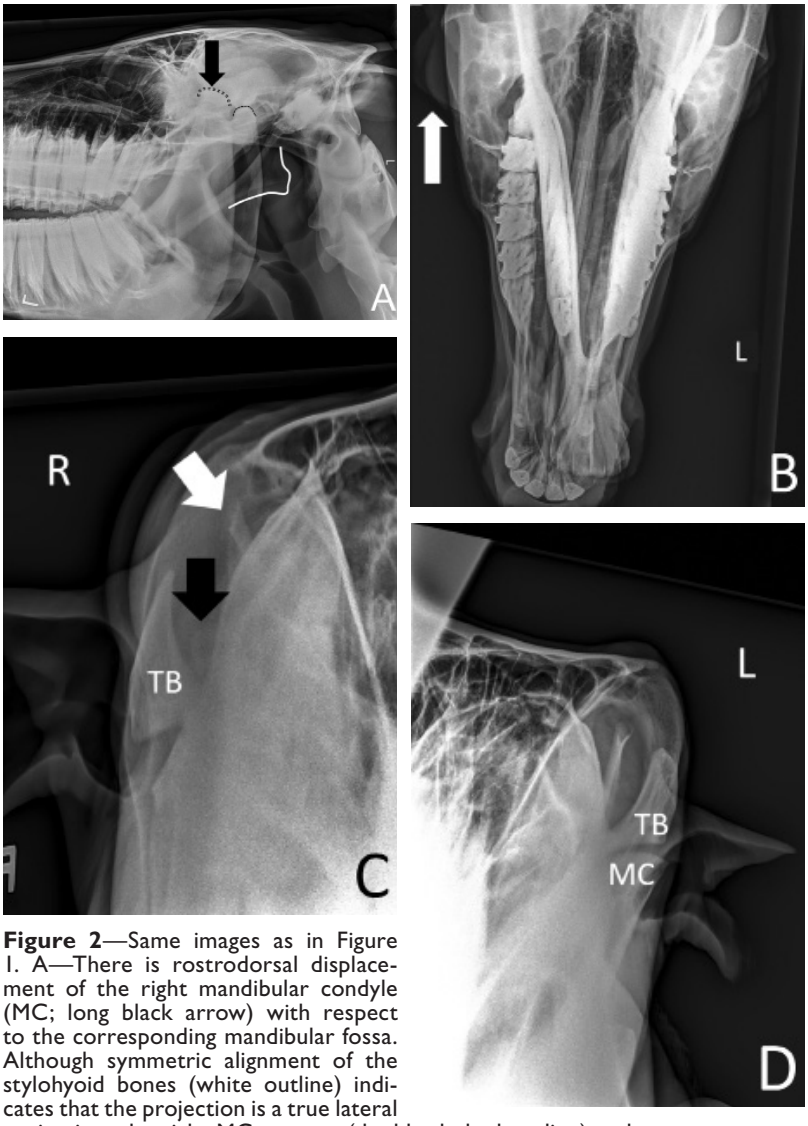

Figure 2—Same images as in Figure 1. A—There is rostrodorsal displacement of the right mandibular condyle (MC; long black arrow) with respect to the corresponding mandibular fossa. Although symmetric alignment of the stylohyoid bones (white outline) indicates that the projection is a true lateral projection, the right MC process (double-dashed outline) and ramus are more rostral than the left MC process (single dashed line) and ramus. B—The bodies of the left and right mandibles are displaced leftward with respect to the maxillary dental arcades, and there is soft tissue swelling in the right periorbital region (long white arrow). C—The right MC (short black arrow) is superimposed over the right temporal bone (TB) in a dorsomedial direction. The right mandibular coronoid process (short white arrow) is also displaced medially. D—The left MC articulates with the corresponding TB; however, the left TMJ is incongruent, characterized by mild widening of the joint space laterally.

On the basis of these findings, luxation of the right TMJ was suspected. The incongruent left TMJ was likely a result of luxation of the right TMJ. Differential diagnoses for the soft tissue swelling in the right periorbital region included hemorrhage, edema, and cellulitis.

To further evaluate soft tissue structures and because concurrent fractures could not be excluded with radiography alone, the horse underwent general anesthesia for skull CT in dorsal recumbency. A 16-slice CT scanner was used to obtain transverse, sagittal, and dorsal plane images and 3-D reconstructions. Findings on CT confirmed the presence of a rostrodorsal luxation of the right TMJ and revealed a short oblique fracture of the right coronoid process and a transverse fracture of the right mandibular condyle **(Figure 3)**. Additionally identified were a focal comminuted fracture of the caudal right maxillary bone, thickening of the right masseter and pterygoid muscles, and lateral deviation of the right globe with respect to the orbit. The final diagnoses were traumatic fractures of the right mandibular and maxillary bones with luxation of the right TMJ. Hemorrhage, edema, and cellulitis remained differential diagnoses for the surrounding soft tissue swelling that contributed to exophthalmos of the right eye.

Treatment and Outcome

While the horse was anesthetized, closed manual reduction of the right TMJ was performed as previously described[1] by placing a mouth gag between the upper and lower molars on the right side, then applying pressure to the rostral aspects of the jaws to close the mouth. After the procedure, CT of the skull was repeated and revealed reduction of the right TMJ **(Supplementary Figure S1)**. The right mandibular coronoid process fracture was also reduced with improved alignment; however, the fractures of the caudal aspect of the right maxilla and right mandibular condyle remained unchanged, as did the soft tissue swelling in the right periorbital region.

The horse recovered from anesthesia without complication and was eating normally within 24 hours afterward. Treatment with flunixin meglumine (1.1 mg/kg, IV, q 12 h) was continued. Cryotherapy and laser therapy with a class 3b laser were performed over the right TMJ to reduce pain and inflammation. Because of the severity of exposure keratitis of the right eye, a full tarsorrhaphy was performed to protect the eye from further trauma. Despite this, the corneal ulceration progressed and resulted in corneal perforation, and a standing transpalpebral enucleation was performed. The horse then received trimethoprim sulfadiazine (30 mg/kg, PO, q 12 h) for 3 weeks postoperatively to prevent surgical site infection.

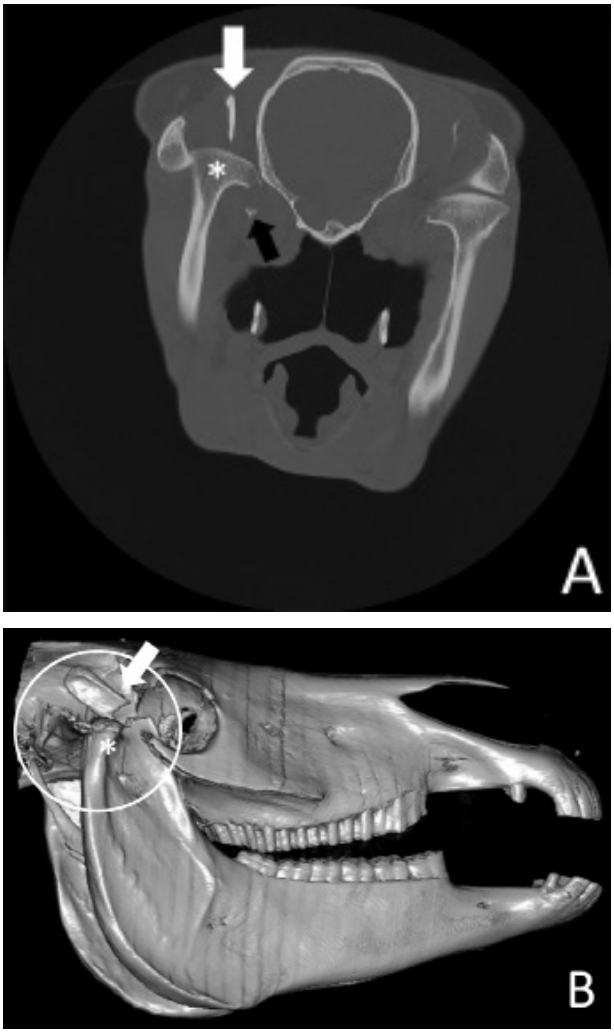

Figure 3—Noncontrast transverse (A) and 3-D (B) CT images of the skull of the horse described in Figure 1. A—At the level of the right TMJ, the right MC process (asterisk) does not articulate with the right TB. A mineral dense fracture fragment of the right mandibular coronoid process (white arrow) is displaced medially, adjacent to the temporal fossa. A mineral dense fracture fragment of the right MC process (black arrow) is displaced ventromedially. No abnormalities are evident in the left condylar process and its articulation. The horse's right side is toward the left of the image, and the image is displayed in a bone window (window width, 4,000 HU; window level, 500 HU) obtained with settings of 120 kVp, 200 mA, 4,500-millisecond exposure time, 2-mm slice thickness, and 18-cm field of view. B—Portions of the zygomatic bone, zygomatic process of the frontal bone, and zygomatic process TB have been digitally removed to better show the fractured right coronoid process (white arrow) and rostrodorsal displacement of the right mandibular condylar process (asterisk) away from right TB mandibular fossa (encircled).

Comments

Temporomandibular joint luxations are uncommon in horses. To our knowledge, there has only been 1 reported case of TMJ luxation in a horse that was successfully treated by closed manual reduction.[1] In horses, TMJ luxation is most commonly described as a result of ventral and rostral traction on the lower jaw following entrapment.[2] Clinical signs of TMJ luxation in all species include decreased range of motion of the lower jaw, malocclusion, masticatory difficulties due to dysphagia, and signs of inappetence and pain.[3,4] A unique clinical sign seen in horses with TMJ luxation is exophthalmos and trauma to the eye caused by cranial displacement of the mandibular coronoid process into the posterior aspect of the orbit at the time of luxation.[1] This can lead to blindness, globe rupture, or both, and, as was the case for the horse of the present report, necessitate enucleation of the eye.

Evidence of TMJ luxation can be subtle on survey radiographic images and is most easily recognized on the lateral projection. For the horse of the present report, the right mandibular condylar process and ramus were more rostral than those structures of the left mandible on a true lateral radiographic image, the positioning for which was evident by symmetric alignment of the stylohyoid bones. It should also be noted that on true lateral projections, magnification artifact from the jaw further from the imaging plate can also lead to mild apparent displacement of the mandibular rami. In this case, the degree of displacement is more than would be expected for magnification artifact. In addition, evidence of TMJ luxation includes a more pronounced visualization of the retroarticular process and widening at the joint space.[1] In a TMJ of a clinically normal horse, the mandibular condylar process is seated in the mandibular fossa; however, in a hose with TMJ luxation, the mandibular condylar process is positioned on the articular tubercle.[1] Radiographic oblique projections, such as R45°V30°RtL-CdDLeLO and R45°V30°LeL-CdDRtLO for the left and right TMJ, respectively, may also aid in the diagnosis of luxation or subluxation because these projections decrease superimposition of other osseous and soft tissue structures over the TMJs,[5] as they did for the horse of the present report. Also consistent with our findings in this horse, radiography, in general, is insensitive for the diagnosis of concurrent fractures due to superimposition of other structures and needed radiographic projections may not be feasible in painful or noncompliant patients.

Compared with radiography, CT has superior contrast resolution and removes the superimposition of structures. In the horse of the present report, CT was integral for several reasons. First, it confirmed complete luxation of the right TMJ. Second, CT was necessary for the diagnosis of multiple concurrent mandibular and maxillary fractures. Third, CT allowed improved characterization of the extent and severity of the right periorbital soft tissue abnormalities. Finally, CT provided rapid confirmation of successful reduction of the right TMJ following closed manual reduction.

Potential sequelae of TMJ luxation include osteoarthritis, masticatory dysfunction, dental malocclusions, and reoccurrence of TMJ luxation. For the horse of the present report, it was not deemed necessary to address the fractures apart from the degree of improved alignment with manual reduction. At 6 months after TMJ reduction, the owner reported that the horse was able to masticate normally and was in good body condition.

References

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Supplementary Materials

Supplementary materials are posted online at the journal website: avmajournals.avma.org.