

Common Disorders of Incisor Teeth and Treatment

Thomas J. Johnson, DVM and Colleen M. Porter, DVM

Authors' address: Advanced Equine Dentistry, 6101 Katz Road, Grass Lake, MI 49240;
E-mail: johns910@msu.edu.

Malocclusions of incisors are genetic, developmental, or acquired in origin. Mandibular brachygnathism (parrot mouth) is a common incisor malocclusion the origin of which is usually genetic (Fig. 1). Many horses have some degree of overjet of the premaxillary incisors, but the overjet rarely causes a problem with prehension, unless the premaxillary and mandibular incisors totally lack occlusion. It is important to realize, that when the horse's head is in a normal grazing position, the incisors should occlude evenly, and as the head is raised the mandible moves in a caudal direction. Care must be taken not to interpret this caudal position of the mandible as an overjet when the head is in the raised position. Lack of incisor occlusion causes the premaxillae to rotate ventrally creating the "parrot mouth" (overbite) appearance. Trapping of the mandibular incisors behind the premaxillary incisors prevents proper lateral excursion. If brachygnathism is discovered when the foal is young, orthodontic treatment may correct the condition.¹ If orthodontic treatment is not an option, or if the overjet is mild, the overgrown portion of the teeth can simply be reduced with a hand rasp or power equipment. If the malocclusion is severe, the overgrowths should be reduced to allow free lateral excursion and proper occlusion of the cheek teeth (i.e., premolars and molars). If the overgrowths are severe, reduction must be staged over months to years to prevent damage to the sensitive pulp.

A main consideration with an incisor overjet is the cheek teeth malocclusions that accompany this condition. The maxillary cheek teeth arcades are usually positioned rostral to the mandibular cheek teeth causing a rostral overgrowth of the 106 and 206 and a caudal overgrowth of the 311 and 411. These cheek teeth malocclusions must also be addressed to allow for proper lateral excursion and mastication. The incisors should be examined before a full mouth speculum is applied to prevent the speculum from causing damage to maloccluded incisors. When working on incisors a 1.5 to 2 inch soft plastic pipe with an attached strap over the poll can be inserted into the interdental space between the incisors and premolars to hold the incisors apart as work is performed. Spool speculums and wedges can cause permanent damage to the cheek teeth and are often poorly tolerated by the horse.

A horse that masticates with its head in an elevated position may develop an acquired overjet, and so after correcting the overgrowths of the cheek teeth, the horse should be fed with its head lowered to grazing position to prevent reoccurrence of overgrowths. Likewise, large rostral and/or caudal hooks can eventually cause the mandible to displace caudally, resulting in an overjet. Correcting the overgrowths can return the bite to normal.

Prognathism or undershot jaw occurs with less frequency in the horse and is seen most commonly in miniature or dwarf breeds (Fig. 2). Early detection and correction of the

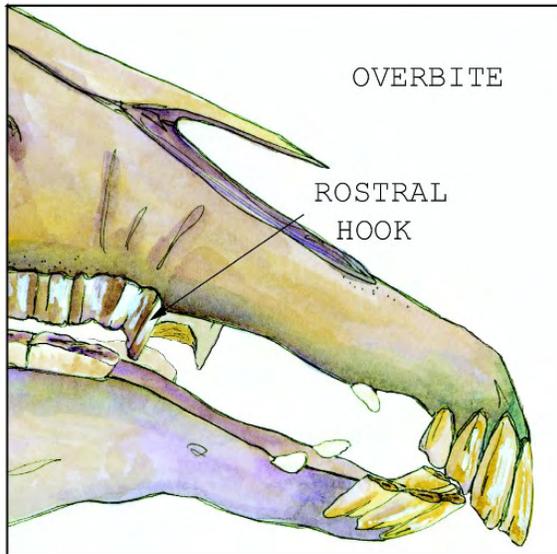


Figure 1. Brachygnathism with rostral premolar hooks.

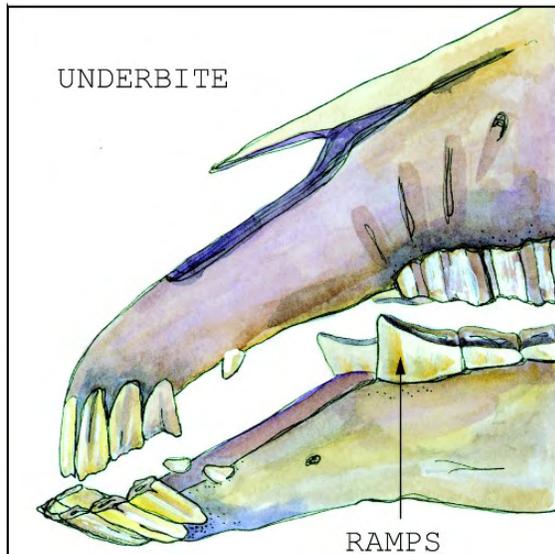


Figure 2. Prognathism with rostral premolar ramps.

malocclusion in the foal may prevent the condition from becoming worse or permanent. The central incisors tend to have the least occlusion, thereby creating a ventral curvature of the occlusal surfaces (i.e., a frown) when the incisors are viewed from the front. The premaxillary corner incisors and mandibular central incisors should be reduced to allow free lateral excursion. The cheek teeth should be evaluated for malocclusion caused by overgrowth of 111, 211, 306 and 406. Overgrowths of these cheek teeth can eventually force the mandible rostrally, worsening the prognathism.

Horses are sometimes affected with polydontia or supernumerary permanent incisors. These extra incisors generally do not cause problems for the horse, and due to the risk of damage to the adjacent permanent teeth, are usually not removed. These extra teeth should be reduced every six months to prevent them from overgrowing, which results in malocclusion from excessive wear of the opposing teeth.

Retained deciduous incisors are often wrongly thought to be supernumerary teeth. A deciduous incisor can usually be distinguished from a permanent incisor by its position, size, shape, and color (Fig. 3). The deciduous incisor is usually positioned labial to the permanent incisor and is smaller, more triangular, and whiter. These deciduous incisors can be extracted using a dental elevator, but care must be taken to extract the entire reserve crown and root of the tooth, because the root is often thin and fragile. Failure to remove a fractured root results in inflammation and pain, because the root becomes sequestered. The retained root can also prevent the permanent incisor from moving into proper position. Gingiva over the labial aspect of the root is incised to expose thin alveolar bone, which is removed with a dental elevator or osteotome to expose the reserve crown and root (Fig. 4). Often the permanent incisor is displaced caudal to the deciduous incisor and is trapped behind the adjacent incisors. The corners of the adjacent

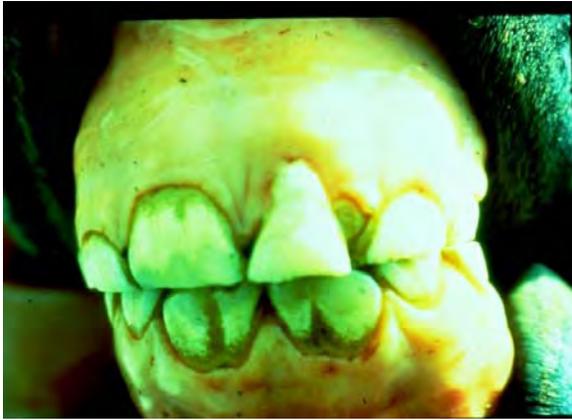


Figure 3. Retained deciduous incisor with permanent tooth trapped behind.



Figure 4. Retained deciduous incisor extracted.

incisors can be carefully filed or cut with a diamond wheel to provide room for the displaced tooth to migrate into a normal position. When filing the adjacent incisors, care must be taken not to damage the sensitive pulp.

Malerupted incisors of a young horse may become crowded and rotated, leading to uneven wear and malocclusion. Feed frequently collects around the malerupted incisors, causing a foul odor and periodontal disease. Filing or trimming adjacent teeth can create additional room for proper eruption of crowded teeth. A wider diastema can be created between two misplaced teeth to help prevent feed from collecting in the abnormal interproximal space. Care must be taken to avoid damaging the sensitive pulp by removing too much tooth or by creating excessive heat.

Oligodontia or absence of one or more teeth occasionally affects the incisors. Although oligodontia may occur as a developmental abnormality, it is often the sequelae of a previous trauma that has caused the permanent tooth bud to fail to develop. Overgrowth of the unopposed incisor in the opposing arcade should be removed every six months to prevent impairment of lateral excursion.

Bony malformations of the head can result in malocclusion of the incisors and cheek teeth. These bony malformations usually result in an offset or diagonal incisor bite. Some bony malformations, such as campylorrhinus lateralis (i.e., wry nose) are obvious, but subtle changes to the large bony plates in the head can be difficult to recognize. Observing the horizontal position of the eyes relative to each other, as well as the symmetry of the hard palate can be helpful. Often, with asymmetry of the bones in the head, one side of the hard palate is steep, and the cheek teeth of one side have a steeper than normal angle. Care must be taken when correcting the associated malocclusions, and overgrowths should be corrected gradually. Over correction of malocclusion caused by bony malformation can lead to dysphagia and pain. Often, incisor malocclusion remains, but regular maintenance may prevent it from worsening.

Acquired malocclusions of the incisors are often the result of trauma to the incisors, cheek teeth, or temporomandibular joint (TMJ). Damage to incisors results in overgrowth



Figure 5. Offset/diagonal incisors with corresponding sheared molar table angle.

of the opposing incisors. Damage to cheek teeth often results in lateral excursion in only one direction, which in turn results in an offset bite and diagonal wear of the incisors (Fig. 5). The cheek tooth malocclusion must be corrected, and the diagonal incisor bite corrected in stages.

Injury to the TMJ can also result in an offset or diagonal incisor bite. Small adjustments in the occlusion of the incisors and molars can be made over time, but if the TMJ has been injured or is malformed, the lateral excursion and bite do not usually return to normal. Radiographic examination of the TMJ is helpful when evaluating horses with an offset or diagonal incisor bite.

Normal incisor conformation imparts a straight or slight ventral curvature to the occlusal plane when the incisors are viewed from the front. Molar malocclusions frequently cause the incisors to wear unevenly, resulting in ventral or dorsal curvature of the occlusal surfaces, offset/diagonal bites, or irregular or stepped incisors (Fig. 6). The incisor and molar malocclusions should be corrected, but if they are severe, they should be corrected in stages. Uneven wear to the incisors caused by vices can result in malocclusion of the incisors. Horses that crib or rub their incisors on the stall, for example, can acquire a dorsal curvature or a diagonal bite.

Fractures of the exposed crown of the incisors most often occur from direct trauma. Loose or infected fragments should be removed, and the tooth repaired as soon as possible if the pulp is exposed. As an emergency measure, the exposed pulp can be covered with calcium hydroxide powder or paste until the tooth is permanently repaired. Calcium hydroxide paste^a is preferable to powder because it cures to form a hard, protective cap. A composite filling should be applied as a permanent repair. Damage to the labial surface of the incisor can lead to decay and infection of the pulp cavity. If recognized early, this surface damage can be repaired before it involves the sensitive structures of the tooth or migrates apically through the periodontal space.

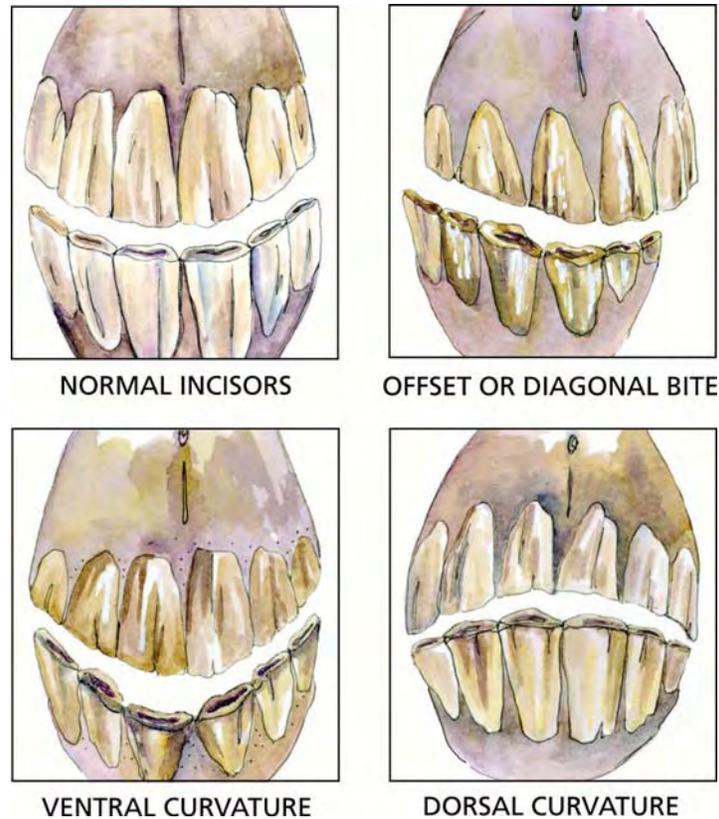


Figure 6. Incisor malocclusions.

Iatrogenic damage to the incisors generally results from damage caused by excessive reduction. Excessive reduction may result in septic pulpitis from accidental pulpal exposure. Delayed damage to the incisors can result from thermal injury inflicted by power instruments. Heat created by power instruments can cause pulpitis, which if severe enough, results in death of the adjacent pulp. Attrition of the tooth eventually exposes the damaged pulp cavity allowing feed and bacteria to enter the interior of the tooth (Fig. 7). Radiographs can be used to assess the integrity of the tooth, as well as that of the surrounding periodontal structures. If the apex of the incisor and surrounding alveolus become infected, a sinus tract that exits the gingiva develops, which is recognizable as a small, reddened pustule adjacent to the affected tooth (Fig. 8). Consideration must be given to the horse's discomfort and possible systemic infection caused by dental infection, and the horse should receive endodontic therapy or the tooth should be extracted²

Most incisor extractions or endodontic procedures can be performed with the horse lightly sedated after administering regional or local anesthesia. Premaxillary incisors can be desensitized by depositing 5 ml mepivacaine into the infraorbital canal of the affected side using a 20-gauge, 1½ inch needle and additional anesthesia can be obtained from the incisive canal found at the reflection of the lip and the gingiva, between the central



Figure 7. Needle inserted into open pulp of incisor reduced 2 yrs. prior. Both central incisors damaged.



Figure 8. Pustule above infected incisor.

incisors. Mandibular incisors can be desensitized by depositing 3 ml mepivacaine into the mandibular canal through the mental foramen of the affected side.

Periodontal disease involving the incisors generally results from feed collecting in valve type diastema. This problem is easily recognized by the large fibers of food collecting between the incisors and the associated odor. The affected horse can be treated by carefully using a motor-powered diamond wheel or a hand-powered hacksaw blade to widen the space between the incisors.³ Calculus can also cause gingivitis and periodontal disease of the incisors. Calculus can easily be removed with strong forceps or a dental scaler. After the cause of periodontal disease is resolved, the owner can use oral disinfectant to resolve the gingivitis.

Incisor reduction is rarely necessary in the course of normal dental maintenance in the horse. When the horse's incisors are centered and in full occlusion, the cheek teeth are normally in little or no occlusion. The amount of space between the cheek teeth when the mouth is centered and the length of time the incisors occlude during mastication varies immensely from horse to horse depending upon breed, conformation, and age. Moving the mandible laterally while forcing the cheek teeth together will allow observation of incisor occlusion and separation. As the cheek teeth come into occlusion the incisors will separate. The distance of excursion to molar contact is shorter in the young horse and there is normally more slide in the older horse. The median distance for excursion to molar contact in a study of 730 horses was 1.2cm in horses ranging in age from 1 to 27 years.⁴ When performing dental maintenance careful reduction of only the cheek tooth overgrowths, while leaving the normal occlusal surface untouched, most often ensures the incisors will not need to be reduced. If indiscriminate or generalized molar reduction is performed, the incisors will have to be reduced to bring the molars back into occlusion. This type of practice will shorten the lifespan of the teeth. One should check the excursion to molar contact during the initial exam and compare it to the measurement after molar work is completed. In the majority of cases if the molar work was done correctly this measurement should remain the same. Many practitioners performing dentistry believe that incisor overgrowth prevents the cheek teeth from obtaining proper

occlusion, but drastic alterations in the occlusion of the premolars and molars by over reduction of the incisors can result in undue stress on the cheek teeth. This altered occlusion can result in fractured or shifted teeth, diastemata, and excessive wear. Overly aggressive reduction of the incisors can also damage the sensitive pulp and lead to pulpitis, pain, and infection and death of the teeth. Whether reducing the incisors or cheek teeth, reduction should be staged, and the normal architecture of the teeth should be preserved.

References and Footnote

1. Easley J. Basic equine orthodontics. In: Baker GJ, Easley J, eds. *Equine Dentistry*, 2nd ed. Elsevier Saunders, 2005; 249-266.
2. Baker GJ. Endodontic therapy. In: Baker GJ, Easley J, eds. *Equine Dentistry*, 2nd ed. Elsevier Saunders, 2005; 295-302.
3. Dacre I, Dixon PM. A review of equine dental disorders. *The Vet J* 2004; 1-24.
4. Rucker BA. Incisor and molar occlusion: normal ranges and indications for incisor reduction. In *Proceedings*. American Association of Equine Practitioners 2004; 7-12.

a. Dycal®; Dentsply Caulk; Milford, DE 19963.ed.