EQUINE DENTAL DISEASE

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INTRODUCTION

Equine dental developmental abnormalities can involve tooth number, morphology, or position in the dental arcades. Abnormalities of dental development and eruption occur quite commonly in the horse and result in a wide range of clinical conditions. Some developmental dental abnormalities of a young horse may not cause the animal to exhibit clinical signs of dental disease until it reaches middle age. A congenital/developmental problem present at the time of tooth eruption often leads to acquired dental problems as the teeth continue to erupt and wear. Consequently, several different dental abnormalities, the origins of which are inter-related, are often present by the time the horse shows clinical signs of dental disease.

A detailed oral examination should include checking for the proper number and position of teeth. Since only the exposed crown of a tooth can be visualized in the oral cavity, many developmental defects may not be recognized simply by oral examination. If a developmental abnormality is suspected, the dentition should be examined radiographically to further delineate abnormalities.

SUPERNUMERARY TEETH

Supernumerary teeth are teeth in excess of the normal, expected number in any of the dental arches. This disorder has been referred to as polydontia or hyperdentition. Supernumerary teeth can be loosely grouped morphologically into two categories: 1) supplemental teeth that resemble teeth of the normal series in crown and root morphology but not always in size, 2) rudimentary or dysmorphic teeth that are abnormally shaped and smaller than normal teeth.

These extra teeth are usually encountered at the caudal aspects of the arcades, but supernumerary teeth can also occur lingually, buccally or rostrally to the arcades. Clinical signs caused by supernumerary cheek teeth are most commonly associated with dental overgrowths and diastemata, which often cause periodontal disease. Examination of a radiograph that encompasses the entire affected dental arcade is often necessary to recognize a supernumerary tooth.

Supernumerary incisors are reported more commonly in horses than are supernumerary cheek teeth. The main differential diagnosis for supernumerary incisors or cheek teeth is retained deciduous teeth. In some cases, determining
whether an extra tooth is a retained deciduous tooth or a supernumerary tooth is
difficult. Radiographic examination of the affected jaw may be indicated to
determine the identity of an extra incisor. A retained deciduous incisor has a
more mature root and a shorter reserve crown than that of the adjacent
permanent incisors.

Management of horses with supernumerary teeth is generally limited to regular
assessment of the dentition, coupled with aggressive floating to minimize the
opportunity for soft tissue damage caused by unopposed dental elongations or
sharp enamel points. If complications occur, such as severe periodontal disease
or paranasal sinusitis, the supernumerary tooth or displaced adjacent tooth
should be extracted and appropriate therapy undertaken to manage associated
disease.

OLIGODONTIA

Oligodontia is the condition where the number of teeth is less than normal.
Oligodontia can be caused by congenital absence of a tooth germ or by traumatic
loss of a tooth. Differentiating developmental oligodontia, caused by damage to
or displacement of a dental bud from injury from acquired loss of a tooth may be
difficult. Permanent tooth germs of a young horse can be damaged, displaced,
or lost when deciduous teeth or jaw bones are injured. Absence of a tooth in the
dental arcade, regardless of the cause, leads to dental drift, or tipping of adjacent
teeth. Lack of wear of the antagonist to the missing tooth can lead to dental
elongations and abnormal mastication. Radiographic examination of the
dentition is often necessary to confirm a diagnosis of oligodontia. Oligodontia
may be associated with other epidermal defects, such as faulty development of
hair and hooves.

DENTAL DYSPLASIA OR HYPOPLASIA

Dental dysplasia (i.e., abnormal growth and/or development of a tooth or teeth)
may result in an irregularly shaped tooth that does not fit properly into a dental
arch. The poor fit may lead to entrapment of food and periodontal disease.
Dental dysplasia can involve the abnormal formation of all tissues of the tooth or
only a single tissue. When enamel is dysplastic, however, the other calcified
tissues of the teeth, cementum and dentine, also become dysplastic because
enamel acts as the scaffolding and template for their deposition. Abnormal
morphology of enamel has been associated with branched pulp horns and
abnormally shaped teeth. Enamel hypoplasia can be caused by certain drugs or
chemicals administered to the dam during gestation, or it may be idiopathic.
Cemental hypoplasia usually involves the infundibular portion of the tooth but can
be seen as a defect of the peripheral cement of the coronal or reserve crown or
the roots.
ABNORMAL DENTAL ERUPTION

Abnormal dental eruption, or maleruption, is often seen after trauma to developing teeth or surrounding bones but has also been reported to be congenital or idiopathic. Cheek teeth can become vertically impacted when dental buds develop in crowded areas in the dental arcades. Teeth may become rotated or displaced due to developmental malpositioning of tooth buds or overcrowding before, during, or after eruption.

Dixon, et al, reported that 70% of displacements of cheek teeth were developmental and caused by overcrowding of the cheek tooth arcade at the time of eruption. These researchers frequently found that if a cheek tooth was displaced in one arcade, the same tooth in the contralateral arcade was also displaced. They concluded that the remaining 30% of displacements were due to abnormal positioning of the dental bud. They found that a tooth may fail to erupt if it is displaced horizontally to the adjacent teeth. Developmental diastemata, or abnormal spaces or gaps between cheek teeth, are often the result of insufficient angulation of rostrally and caudally located teeth toward the center of the arcade to achieve good compression of adjacent teeth. Dental buds with normal angulation that develop too far apart can also result in diastemata.

Malocclusion of incisors can be congenital, developmental, or acquired. Mandibular brachygnathism (i.e., parrot mouth, MALII or overjet) is a congenital incisor malocclusion, the origin of which is thought to be genetic. 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. If brachygnathism is discovered when the foal is young, orthodontic treatment may correct or at least improve the condition.

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A main consideration with an incisor overjet in the adult horse is the malocclusions of the cheek teeth that accompany this condition. The maxillary cheek teeth arcades of horses with an overjet are usually positioned rostrally to the mandibular cheek teeth arcades, causing a rostral overgrowth of the upper PM2s (i.e., 106 and 206) and a caudal overgrowth of the lower M3s (i.e., 311 and 411). These overgrowths must be reduced to allow proper lateral excursion of the jaw and mastication.

Prognathism (i.e., sow mouth, MALIII or undershot jaw) occurs with less frequency in the horse and is seen most commonly in miniature or dwarf breeds. Early detection and correction of the malocclusion in the foal may prevent the condition from worsening. The cheek teeth of a horse with prognathism should be evaluated for malocclusion caused by overgrowth of the upper M3s (i.e., 111 and 211) and the lower PM2s (i.e., 306 and 406).

Bony malformation or curvature of the skull can result in malocclusion of both the incisors and the cheek teeth. The most common malocclusion caused by bony
malformation of the skull is an offset or diagonal incisor bite. Some bony malformations, such as campylorhinus lateralis (i.e., wry nose), are obvious but subtle changes to the large bony plates in the head can be difficult to recognize.

Dental overgrowths associated with malocclusions should be corrected gradually to prevent dysphagia and pain caused by inadvertent exposure of pulp horns. Often, incisor malocclusion cannot be completely resolved, but regular maintenance may prevent it from worsening.

DENTAL DISEASE

Dental disease is grouped into five basic types: 1) abnormal occlusal wear patterns, 2) periodontal disease, 3) dental caries, 4) crown fractures, 5) disease of the dental pulp. All of these types of basic dental disease are interrelated, and horses with one of these diseases also have, to varying degrees, the other types of disease.

Proper alignment of the dental arcades is critical to the normal wear of the dentition. Historically, abnormal dental wear patterns have been described as elongations of the crown, descriptive terms of which include hooks, ramps, waves, steps, tall teeth, and excessively high transverse ridges. Elongations are usually found on a normal tooth that opposes an abnormal tooth in the opposing arcade, such as a damaged, misplaced, or missing tooth. This abnormal tooth, as well as the elongation, should be evaluated. Most elongations are reduced with float or grinding instrument. When reducing an elongation, care should be exercised not to cause iatrogenic damage to the tooth, such as pulpal exposure, thermal injury to the pulp, or fracture of the crown.

Periodontal disease is often a painful dental condition and is described as the leading cause of “quidding” in horses. A mild form of periodontal disease primarily affects young horses, 2½- to 5 years old, that are shedding deciduous teeth (caps) and erupting permanent incisors and premolars. A more severe and progressive form of periodontal disease is seen in mature horses and is the result of the chronic effects of diastemata, or spaces that develop between teeth that are not aligned properly in the arcade. Diastemata promote periodontal disease by allowing feed to become trapped between teeth. Diastemata can form secondary to developmental disease, such as when dental buds are spaced too far apart or are abnormally angulated so that the teeth in the dental arcade are not properly compressed. This is usually a progressive condition, which when left untreated, worsens. Spaces between teeth or teeth out of alignment also predispose to abnormal wear patterns on the affected and opposing dental arcades.

Treatment of horses with periodontal disease involves treating both the cause and the effects of the disease. Periodontal disease caused by feed trapped at the gingival margin of a diastema often improves after the diastema is thoroughly
cleansed using dental picks and/or irrigation. Correction of any associated abnormal wear pattern is also indicated. In more refractory cases, opening or widening of the diastema with a special burr or a right angle grinder may be necessary. This procedure may allow the horse’s masticatory actions to more easily channel food in and out of the diastema, thus preventing or reducing entrapment, stagnation, and decay of feed.

The severity of periodontal disease can be decreased using high pressure irrigation to clean periodontal pockets. After the pockets have been irrigated, the diastema is packed with a perioceutic agent, such as doxycycline gel or a powdered antibiotic. This technique places a high concentration of antibiotic in contact with the infected and inflamed tissues, and the packing acts as a temporary barrier to recontamination. This form of therapy may need to be repeated regularly to produce long-term, positive results.

Caries usually involves the cemental layer of the tooth but may progress in rare cases to affect enamel and dentine. Recent work by Gere and Dixon was shown peripheral dental caries is often associated with periodontal disease. The most common type of cemental caries involves the infundibular portion of the incisors or maxillary cheek teeth. The incisors have one infundibulum and the upper cheek teeth have two, and each infundibulum has a cup, or open portion, at the occlusal surface. The entire occlusal surface of the tooth is covered with cementum and enamel for several months after the tooth erupts, and as the tooth comes into wear, the cementum-filled infundibulum and dentine is exposed at the occlusal surface. Some degree of decay is always present at the occlusal surface of an infundibulum, because feed and other products of mastication are compressed into the ghost of the vascular canal.

An infundibulum contains dead cementum that is completely encased in a layer of enamel, which prevents the infundibular caries from contacting the dentine and pulp causing wide-spread inflammation or infection. True dental infection secondary to infundibular caries occurs only if caries penetrates this protective enamel layer. Developmental malformations of the infundibulum may weaken this enamel barrier, predisposing the dentine and pulp to exposure from infundibular caries. Infundibular caries may weaken a tooth whose infundibula are congenitally deformed or have an abnormally large vascular channel, predisposing the tooth to excessive attrition or mid sagittal fracture of the crown.

Infundibular caries and/or senile attrition are usually innocuous but can predispose to dental elongations on the opposing arcades (e.g., wave mouth). These abnormal wear patterns should be reduced regularly. To strengthen the tooth and delay the progression of infundibular caries, abnormally large infundibular vascular channels can be cleaned, partially packed and sealed with a dental composite material. No studies have looked at the efficacy of this treatment. As advanced diagnostic methods, such as computed tomography,
become more readily available to the equine practitioner, these abnormal infundibula can be more easily recognized.

Fracture of the exposed crown is often diagnosed while performing a complete oral examination. The most common fracture is a buccal slab fracture through pulp horns 1 and 2 on the upper cheek teeth. Less commonly, midsagittal fracture occurs through deformed and or decayed infundibula involving the upper cheek teeth. Lower cheek teeth fractures always involve connecting pulp horns. Fracture involving only the exposed crown of the tooth can usually be dealt with by removal of the loose fragment. Fracture involving the vital pulp or apical portion of a tooth, are more serious and almost always result in total tooth loss. Studies by Ramzan have shown that small occusal fissures seen on detailed endoscopic examination of the occlusal surface of the cheek teeth are not correlated to dental disease.

Infection of the dental pulp occurs primarily in horses 4 to 10 years old. Horses with infection of the pulp are presented because of clinical signs of associated inflammatory changes at the apical region of the tooth. The clinical signs of pulpal infection vary and depend on the involvement of structures adjacent to the apex of the affected tooth. Horses with infection of one of the lower first 4 cheek teeth develop swelling on the ventral aspect of the mandible over the apex of the affected tooth, and within this swelling, a draining tract usually develops. The last two lower cheek teeth are embedded in the portion of the mandible surrounded by the large muscles of mastication, and so infection of one of these teeth causes the surrounding muscles to swell. Exudate accumulated between the mandible and musculature may be seen during ultrasonographic evaluation of the soft tissues of the mandible.

The apices of the upper 2 to 3 cheek teeth are closely associated with the facial bones and nasal cavity, and so, when one of these teeth becomes infected, facial swelling usually results. The apices of the caudal three or four upper cheek teeth reside within the maxillary sinuses, and so, when one of these teeth becomes infected, purulent nasal discharge caused by secondary sinusitis usually results.

Because pulpal infection destroys the tissue responsible for the production of secondary dentin, the pulp horns and root canals of the affected teeth fail to fill with dentine as they normally would. In the later stages of pulpal infection, the affected tooth usually exhibits some degree of decay at the site of the pulp horn on the occlusal surface. This weakened, decayed area may predispose to fracture of the crown.

Administration of antimicrobial drugs has been successful in the treatment of horses with apical dental infection in its early stages, but the most common treatment of horses with an apically infected tooth is removal of the affected tooth, and treatment for associated bone or sinus infection. Teeth can be removed by one of three methods: 1) extraction via an oral approach, 2)
repulsion via an apical approach or, 3) elevation via a lateral buccotomy approach.

REFERENCES AND SUGGESTED READING MATERIAL


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