

Recognition and Treatment of Equine Periodontal Disease

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Periodontal disease is a common finding in domestic horses. An understanding of the etiology, pathogenesis, and treatment options of periodontitis can help veterinarians prevent one of the primary causes of equine tooth loss. Author's address: Equine Veterinary Care of Nevada, P.O. Box 5780, Sparks, NV 89432. © 2002 AAEP.

1. Introduction

It is widely accepted that periodontal disease is the most common cause of tooth loss in small animal and human dentistry. The empirical observations of the authors and other experienced practitioners indicate the same is true in horses. Equine periodontal disease has been documented in the veterinary literature for many decades and continues to be a significant cause and/or result of dental pathology.¹⁻⁶ Whether the tooth has excessive crown or excessive wear, periodontitis is commonly associated with cheek teeth malocclusions. Equine practitioners should have a thorough understanding of the equine periodontium, be able to recognize periodontal disease, know how to prevent the development of periodontal disease, and implement treatment options once periodontal disease is established.

2. The Periodontium

Periodontal means "around or near the tooth" and periodontics is the study of the supporting structures of the tooth. The periodontium includes the gingiva, periodontal ligament, alveolar bone, and cementum.

The gingiva is the soft tissue that surrounds the tooth and covers the bone. The rapid turnover of the gingival tissue enables the tissue to remain healthy and viable despite the abrasive nature of equine mastication. It is composed of the marginal (or free) gingiva and the attached gingiva. The marginal gingiva is unattached and the space between the gingiva and tooth is referred to as the gingival sulcus. In horses, the depth of the normal sulcus should be less than 5 mm.⁷ If periodontal disease results in attachment loss, the space is referred to as a periodontal pocket. The attached gingiva adheres to the tooth in the bottom of the sulcus (the epithelial attachment) and its attachment to the bone is facilitated by dense, fibrous attachments to the periosteum.

The periodontal ligament functions as a "shock absorber" enabling the tooth to be firmly suspended within the alveolus while permitting a slight amount of movement. The complex arrangement of the fibers in the periodontal ligament is composed of dense collagen bundles aligned in various directions. These tight bundles run from the alveolar bone to the cementum of the reserve crown and roots. The embedded portions of the bundles, referred to as

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Sharpey's fibers, are integral in accommodating the progressive eruption of hypsodont teeth.⁴ It is believed that the Sharpey's fibers have the ability to detach and reattach as the reserve crown erupts.^f Continuous fibroblastic production of these collagen bundles occurs within the periodontal ligament.⁸ This process also facilitates the continuous eruption of the horse's tooth. Severe periodontal disease results in loss of the ligament's attachment and usually proceeds to tooth loss.

The alveolar bone is constantly remodeling to accommodate the changing shape of the erupting reserve crown. The lamina dura is the thin layer of compact, radiodense bone that lines the alveolus and to which the Sharpey's fibers attach. The remaining alveolar bone surrounding the lamina dura is indistinguishable from the mandibular or maxillary bone. The most prominent aspect of the alveolar bone is termed the alveolar crest. It lies beneath the gingival margin and is important in evaluating the severity of periodontal disease in small animals.⁹

Cementum, produced by cementoblasts, is the tooth structure to which the periodontal ligament attaches. The cementum is composed of ~65% inorganic (predominantly hydroxyapatite crystals) and 35% organic and water components. The organic component is predominantly collagen fibers that provide a degree of flexibility.⁸ Coronal cementum covers the reserve and exposed crown. The subgingival cementum is living tissue and a component of the periodontal attachment complex. The cementoblasts receive their nourishment from the periodontal ligament's vasculature. Continuous cementum deposition enables the attachment of new Sharpey's fibers to the tooth's reserve crown and roots. The exposed crown is covered by supragingival cementum. Having lost its periodontal blood supply, it is considered inert tissue and functions to protect the underlying dentin and enamel. The exposed cementum also contributes to the size and strength of the aged hypsodont tooth.⁸ Infundibular cementum is found within the infundibuli of the maxillary cheek teeth and incisors.

3. Equine Periodontitis

Periodontal disease in small animals is well documented and the primary cause is generally accepted to be the accumulation of calculus and plaque.¹⁰ Calculus accumulation is not uncommon in the horse and typically involves the lower canines and incisors. Gingivitis is common in these cases and is considered reversible: once the calculus is removed, the inflammation resolves. Gingival recession may result and the calculus should be removed. In the authors' opinion, calculus accumulation on the incisors and canine teeth rarely leads to the development of severe periodontal disease or tooth loss. Gingivitis is a transient sequela of eruption and a common finding during the shedding of deciduous teeth.¹¹

Severe calculus accumulation can occur in the horse. These cases are often predisposed by unique

factors including systemic disease, significant malocclusions (affecting normal mastication), and diets high in concentrates and low in long-stemmed feed. These cases may progress, resulting in the loss of the alveolar attachment and ultimately loss of the tooth.

The authors believe that destruction of the periodontium is the most common cause of equine tooth loss. Clinically significant periodontal disease occurs predominantly in mature horses, with an incidence of 60% in horses over 15 yr of age.¹² An intraoral mirror^{a,b} enables the practitioner to obtain a unique perspective and is invaluable when evaluating the cheek teeth arcades. Destruction of the periodontal tissues enables bacteria to invade the periapical tissues resulting in septic pulpitis and tooth loss. The shearing forces generated during mastication contribute to the maintenance of healthy periodontium.¹³ Conditions that limit normal occlusion and mastication often result in secondary periodontal disease.

Most experienced practitioners believe the primary cause of equine periodontal disease is malocclusion. This leads to abnormal wear, unnatural chewing patterns, dental malpositioning, the inhibition of normal mastication, and the creation of diastema between the normal tightly aligned teeth. These conditions often enable food impaction into the interproximal spaces. The result is bacterial colonization and fermentation, hyperemia, edema, gingival recession, and periodontal pocket development. It is common for this condition to lead to the progressive destruction of the periodontal ligament and alveolar bone resulting in eventual tooth loss. The inflammatory process creates a vicious cycle, perpetuating itself as well as the destruction of the periodontal tissues.⁴

As the geriatric's reserve crown nears expiration, the roots become exposed and diastema commonly develop between the cheek teeth.⁵ The smaller root diameter provides a space for food impaction and precedes natural tooth loss in most old horses.

Teeth experiencing excessive wear have a shorter crown and the occlusal surface is usually closer to the gingival margin than those teeth possessing appropriate exposed crown. It is logical that the closer the occlusal surface is to the gingival margin, the greater the potential for periodontal trauma during mastication.

"Angular malocclusions" (hooks, ramps, waves, shear, or step mouth) generate forces that can shift teeth out of their normal position within the arcade.^{11,12,14} This movement can create diastema that collect feed material and may progress to severe periodontitis and tooth loss. Adjacent teeth then migrate into the space created by the extraction or tooth loss. If this occurs, interproximal spaces will be created placing the adjacent teeth at risk of developing periodontal disease.

The key to prevention of clinically significant equine periodontal disease is to prevent the forma-

tion of malocclusions which limit or compromise normal occlusion and mastication. This philosophy incorporates the need to diligently monitor young horses while the deciduous and permanent teeth are erupting. It is important to correct minor malocclusions as they develop, and manage maleruption, malalignment, and malformation. This requires twice-annual exams in young horses, the use of a full-mouth speculum, and appropriate annual dental care throughout the horse's life. The management and treatment options for malocclusions have been described in the veterinary literature.¹⁴⁻²²

Horses with periodontal disease may exhibit no significant signs or halitosis, hypersalivation, unnatural chewing patterns, or poor body condition. Abnormal chewing patterns are common in young horses with retained caps and mature horses with severe malocclusions or soft-tissue trauma. The practitioner should be cautious to avoid removing deciduous teeth prematurely, as the procedure results in the loss of the permanent tooth's infundibular blood supply. Veterinarians should perform preprocedural blood work in those patients with evidence of systemic disease. The administration of antibiotics is a valuable adjunct when performing some dental procedures. The authors advocate the use of non-steroidal anti-inflammatory drugs prior to most dental procedures.

4. Treatment of Periodontitis

Visualizing the mineralized accumulation originating at the gingival margin readily identifies calculus deposition. Calculus is most commonly found on the canines, incisors, and buccal aspect of the cheek teeth. The removal of calculus is easily facilitated by the use of a sickle scaler, ultrasonic scaler, or air abrasion.^{b,c,d} The most common sequela to calculus accumulation on the incisors is the recession of the attached gingiva. Although clinically significant, this condition rarely results in severe periodontitis or tooth loss. Despite the large amounts of calculus that can accumulate on the canines, mild gingivitis is the most common finding postscaling. The authors believe that the potential for tooth loss, as a result of calculus accumulation, is highest when the premolars and molars are involved. The removal of calculus from the cheek teeth requires the use of extended length instruments and care should be given to prevent excessive soft-tissue trauma.

The presence of a diastema, enabling feed to become impacted between the teeth, identifies horses at risk of tooth loss due to periodontal disease. This condition results in inflammation, gingival regression, and the formation of periodontal pockets. Further tissue erosion enables more feed to pack in the pockets and the cycle perpetuates itself. A periodontal probe^{b,c} should be used to measure the depth of the pocket and enable the practitioner to evaluate the effectiveness of the treatment regimen.

Quality dental care, appropriate crown reductions, and necessary extractions should be the first

phase in treating a horse with periodontal disease. The removal of severely diseased teeth eliminates periodontal pockets and potential sources of sepsis. Pulling a tooth out of occlusion will eliminate the abnormal forces acting upon it. Many mild cases of periodontal disease caused by feed impaction will resolve after the diastema is cleaned and an appropriate crown reduction is performed. In these cases, the tooth will move back into its normal position and the interproximal space will resolve.

The removal of the impacted feed is necessary to arrest the destructive cycle. The use of: a hand scaler or dental probe, flushing with 60-ml syringe using 0.1% chlorhexidine solution, and an elongated water pick has been described.^{4,6,23,24}

The authors have modified a portable dental system that incorporates an extended length "prophy handpiece."^b This handpiece uses water and medical grade baking soda, under pressure, to produce a powerful slurry that removes the feed material and debris from the interproximal spaces and periodontal pockets. In cases without significant periodontal pockets, this may be all the treatment necessary. Severe cases appear to benefit from the placement of a barrier to prevent immediate reimpaction of feed. In these cases, dental impression material^c has been used to create a mechanical barrier to prevent feed impactions and protect the subgingival periodontium. The placement of a perioceutic^e within a deep socket is an appropriate way to manage area specific infection and potentiate the reparative process.²⁵ Surgical resection has also been described.⁴ As the periodontal ligament is capable of regenerating, the authors believe that the disease may be reversible if diagnosed early and treated appropriately. Extraction may be the only option in cases where long-standing periodontitis has resulted in severe periodontal destruction. Questions remain as to the hypodont's ability to repair its periodontal tissues, to reestablish intraalveolar attachment, and to repair vs. rejuvenate tissue.

5. Results

In 12 cases, the correction of malocclusions, the extraction of diseased teeth, the removal of plant awns from the sulcus and calculus on the tooth, the elimination of interproximally impacted feed (with and without the use of a perioceutic and/or dental impression material), led to clinical improvement of the periodontium in all cases. Clinical improvement was defined as including at least one of the following: resolution of gingivitis, decreased depth of the periodontal sulci, decrease in tooth mobility, and the elimination of interproximal feed impaction. Some of these cases required repeat treatments at 2-4-wk intervals and reevaluation at 1-3 mo. Regardless of the medical options, some teeth could not be salvaged. In these cases, extraction was the preferred, most beneficial treatment option

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and resulted in clinical improvement following the removal of the diseased teeth.

6. Discussion

The equine dentition evolved into a system enabling the horse to eat large volumes of long stemmed, coarse and abrasive feed for 16–18 h each day. Domestication precludes most horses from using their dentition as designed. As a result of common equine husbandry practices, domestic horses are predisposed to dental pathology seldom encountered in feral horses or those that “graze for a living.”

Dr. J. F. Colyer reported that periodontal disease was evident in 166 of 500 skulls in horses that died the previous year in London. The article was published in the *Veterinary Record* in 1905 and indicated alveolar bone involvement in the 166 skulls.¹ Merrillat described alveolar periostitis and “peridentitis” in 1906, and Little published *Periodontal Disease in the Horse* in 1913.^{2,3} A new aspect of equine periodontal disease is the dedicated attempt by many practitioners to resolve the underlying etiology, and prevent tooth loss as a result of destruction of the periodontium. By combining proper equine dental procedures with modified instruments and techniques that have proven effectiveness in small animal and human dentistry, the practitioner has the ability to arrest the progressive destruction that often accompanies equine periodontitis. Specialized instruments are required to treat these conditions and the veterinarian should be prepared to acquire the knowledge and instrumentation necessary.

In most cases, equine periodontal disease is secondary to malocclusion and unnatural chewing patterns. Correcting or managing malocclusions improve mastication and alleviate many cases of periodontitis. The removal of foreign bodies (plant awns) or calculus will resolve most cases of localized gingivitis, resulting in the resolution of edema, hyperemia, and gingival recession. In the authors’ experience, removing feed impacted within interproximal spaces and gingival sulci prevent the progressive destruction of the periodontal tissues. In those cases where reimpaction is likely, placement of a perioceutic within the sulci and/or dental impression material within large interproximal spaces usually results in a reduction of the periodontal pocket depth and prevents further gingival recession.

A thorough understanding of the etiology of equine periodontal disease, diligent examination techniques to identify the presence and/or potential for periodontitis, a productive effort to alleviate the underlying causes, and regular follow-up procedures to prevent the reestablishment of precluding pathology may enable practitioners to prevent a primary cause of equine tooth loss.

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