

EQUINE GINGIVITIS, PERIODONTAL DISEASE AND DIASTEMATA CASES

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Safia Barakzai, Alistair Cox discuss approaches to dealing with this common condition, and look at the various treatment options available to practitioners

EQUINE periodontal disease is a common and painful condition, the aetiology and pathology of which are poorly understood. The periodontium comprises the alveolar bone, periodontal ligament (PDL), peripheral cement and gingiva ([Figure 1](#)).

Gingivitis is defined as inflammation or recession of the gingiva, without any loss of the tooth's attachment apparatus. Periodontal disease is defined by inflammation or loss of the periodontal tissues. Both diseases are reversible (depending on severity), because these tissues have remarkable regenerative capacities.

In humans, periodontitis is caused by specific periodontopathogenic microorganisms. It results in destruction of the PDL and alveolar bone, with gingival recession and periodontal pocket formation. It is differentiated from gingivitis by the presence of a periodontal pocket (rather than the normal gingival sulcus) and clinically detectable loss of the tooth attachment to the alveolar bone. It represents the extension of inflammation beyond the gingiva to the connective tissues of the tooth. Periodontitis is always preceded by gingivitis, but gingivitis only progresses to periodontitis in susceptible individuals.

In contrast to humans, equine periodontal disease is considered to be almost exclusively a secondary disease process, which is theorised to result from physical and mechanical disorders of

tooth growth, eruption or wear. A study of donkey dental pathology found concurrent gross dental abnormalities in 71 per cent of skulls with diastemata (Du Toit et al, 2009).

An exception to this is the (usually minor) periodontal disease associated with the canine (04) teeth, especially the lower canines, where calculus build-up leads to gingival inflammation and, in some cases, mild periodontal disease. A mild, transient periodontitis is also observed around the permanent cheek teeth at the time of their eruption. This is rarely clinically significant and resolves spontaneously once the teeth are fully erupted.

A postmortem study of equine periodontal tissues found plaque does accumulate in the interdental space in most horses, and can be associated with erosion and fracture of peripheral cementum (Cox, 2010). The same study also questioned previous theories that anaerobic bacteria are commonly associated with equine periodontal disease – in swabs taken from affected interdental sites, no aerobic bacteria were cultured, but heavy growths of mixed aerobic bacteria were cultured. Spirochetes were also identified in four horses with periodontal disease by Warthin-Starry staining of gingival sections.

Diastemata

The four equine cheek teeth rows are under rostrocaudal compression, which is achieved by diametrically opposed angulation of the rostral and caudal cheek teeth, causing the six teeth in each row to work as a single grinding unit.

Continued eruption of the angulated cheek teeth usually maintains this tight occlusal contact until late in life. A diastema is the presence of a detectable interdental space. These diastemata can occur in young horses due to:

- dental buds being overcrowded and displaced;
- dental buds developing too far apart;
- insufficient angulation of the rostral and caudal teeth; or
- possibly inadequate peripheral cementum deposition at the interdental spaces.

Equine cheek teeth narrow towards their apices, and in older horses, the decreased rostrocaudal length of the erupted crown plus reduced angulation of the teeth can result in diastemata, often in multiple sites. Dental loss may cause a diastema, if migration of remaining teeth occurs towards the defect (Vlaminck, 2007), although a study showed the remaining teeth usually migrate in an “en bloc” fashion.

The prevalence of clinically significant diastemata in young horses is estimated to be between

three to six per cent. In contrast, diastemata are reported to be present in up to 86 per cent of aged (more than 15 years old) horses and donkeys, and this is likely to be due to the reduced rostrocaudal length of the cheek teeth and reduced angulation of the teeth that occurs with age.

Diastemata and periodontal disease

The presence of diastemata allows food impaction and stagnation. Disease progression is considered to be due to factors such as physical pressure, food stagnation and decay, bacterial overgrowth and the inflammatory response.

Food impaction in the gingival sulcus/periodontium has two effects: firstly, forces of mastication acting upon the impacted placed on the periodontal structures and, secondly, the trapped food material decomposes, providing a medium for bacterial overgrowth, and, potentially, a change in the bacterial flora from normal gingival sulcular bacteria, to periodontopathogenic bacteria.

Periodontal pockets usually start within the interdental space and then progress rostrocaudally, buccolingually and may deepen towards the dental apex. The gingival and sulcular epi- Peripheral cement Gingiva Tooth Alveolar bone Periodontal ligament thelia may become grossly inflamed, ulcerated or necrotic ([Figure 2](#)). In very severe cases (usually in older horses), deep periodontal disease can lead to apical infection, osteomyelitis of the supporting bones and orocutaneous or orosinus fistulae. The end stage of periodontal disease is dental loss.

Clinical detection of diastemata

Visualisation of diastema usually requires a dental mirror or an oral endoscope. Careful palpation of the buccal and lingual margins of the teeth, paying particular attention to the junctions between teeth, may reveal interdental spaces or impacted food material with a foetid smell, indicating it has been present for some time.

A dental pick with a long shaft or high-pressure intraoral lavage systems can be used to clean out diastema, and a periodontal probe should be used to investigate the depth of the gingival sulcus and any periodontal pockets.

Open-mouthed oblique radiographs (150 ventrolateral-lateral for the maxillary arcade and 100 dorsolateral-lateral for the mandibular arcade), taken with a gag placed between the incisors, are particularly useful for diagnosing diastema. They can also be useful for monitoring the progression (or regression) of the disorder over time. Studies evaluating correlation between alveolar crest lysis and sclerosis and severity of periodontal disease have found no significant associations, but have shown that lysis of the alveolar crest may be a “normal” age-related change (Cox, 2010).

Treatment of diastemata and periodontal disease

Diastemata can be difficult and frustrating to treat, with no curative treatment currently available.

Small diastemata, which tend to impact with food more readily, are usually more problematic than larger diastemata, from which food more easily moves in and out. Food impaction in diastemata is further potentiated by the presence of any excessive transverse ridges (ETR) on opposing teeth because the ETR pushes more food into the interdental space and potentially widens the diastema. If such ETRs are prominent, they should be reduced, bearing in mind that some ridge pattern is normal and excessive removal of dental tissue reduces the tooth's lifespan.

Impacted food can be removed from the diastemata at dental examination using a long-handled dental pick or a high-pressure lavage system. However, it is questionable whether this treatment alone will allow for anything but a transient improvement, because the diastemata will rapidly re-fill. Some veterinarians advocate filling the cleaned out diastemata with dental impression material, which may provide a temporary seal and allow the gingival tissues a chance to heal. Salt or dilute chlorhexidine mouthwashes are easily administered by owners and can be useful to reduce secondary periodontal disease. The role of antibiotics for equine periodontal disease is debatable – due to the frequently mixed bacterial population in the gingival sulcus, a broad-spectrum antibiotic should be used. However, if steps are not taken to mechanically prevent food re-impacting, antibiotics alone are unlikely to be efficacious in the long term.

Periodontal disease caused by diastemata due to displaced teeth often improve with reduction of the affected tooth, but in advanced cases, extraction of the affected tooth may be indicated.

Another proposed method for a more permanent reduction in the volume of impacted food is to widen the diastemata using a series of rightangled burrs (Dixon et al, 2008). This treatment was more effective for primary diastemata than diastemata associated with displacements (secondary diastemata), with 72 per cent of horses with primary diastemata showing complete remission of signs compared to 48 per cent of horses with secondary diastemata (Dixon et al, 2008). Diastemata widening is not without risk, and pulpar exposure can occur, which usually results in apical infection of the damaged tooth (Dixon et al, 2008).

Orthodontic correction (using wires placed around adjacent teeth to compress diastemata) is still in the preliminary stages of investigation and may prove useful in the future, particularly in younger horses with developmental diastemata.

Dietary modification can be very efficacious in reducing quidding and improving weight gain in horses with diastemata. Affected horses usually have most difficulty masticating longfibre foods, such as hay and other types of forage, which require a longer time to chew prior to swallowing. Shortchopped foods, such as grass, alfalfa and grain, are managed much better and thought to not become trapped as easily in the enlarged interdental spaces. It is obviously important to maintain calorific intake with the new feed regime, and an easy way to increase the diet's energy content is to add one to two cups of vegetable oil to each feed.

Horses with developmental diastemata carry a better prognosis than other causes of diastemata (Dixon et al, 2008). Additionally, horses with few diastemata are more often responsive to treatment than those with diastemata in multiple sites. Often a period of changed diet during continued eruption of the cheek teeth, with or without diastema widening, allows resolution of developmental diastemata, because further eruption and compression of the cheek teeth row reduces the size of the interdental spaces. However, occasionally, very severe diastemata in young horses may necessitate their destruction on humane grounds, due to continued oral pain and quidding, despite frequent treatment.

Due to a combination of diastemata and other abnormalities of wear, especially enamel overgrowths, many, if not most, older horses suffer from secondary periodontal disease. Treatment includes promotion of normal masticatory activity by mechanically levelling the dental arcades to alleviate painful overgrowths (must be done in stages) and to allow free lateral jaw movement.

Additionally, very loose or diseased teeth should be orally extracted and antibiotic therapy administered (such as IM penicillin). With dietary management, such old horses can be satisfactorily maintained after loss of many, if not most, of their teeth.

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