

Dental Conditions Affecting the Geriatric Horse

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Objectives

- To describe characteristics of a geriatric mouth
- To describe treatment of horses with a geriatric mouth
- To describe aspects of client education, including recommendations on feeding, that may benefit a horse with a geriatric mouth

Key Points

- The importance of geriatric dentistry is increasing because more horses are retained into their third and fourth decade of life.
- Maintaining a healthy oral environment by providing regular dental maintenance prolongs life.

Horses are classified as geriatric when they become 18 to 20 years old. Horses may be said to have a geriatric mouth when “expired” or “worn-out” teeth first appear. Worn-out teeth may first appear in horses as young as 16 years old or in horses as old as 25 years old. Periodontal disease occurs with greater frequency in aged horses than in young horses and is found in 60% of horses over 20 years old.

Old horses are commonly presented for a dental examination because of weight-loss, but in addition to having a high incidence of dental disease, old horses also have a high incidence of neoplasia; Cushing's disease; and hepatic, cardiac, pulmonary, and renal disease, which can result in weight-loss. Old horses suffering from weight-lose should not only receive an oral examination, they should also receive a complete physical examination, including, if indicated, appropriate laboratory tests.

Cheek teeth are formed in tightly packed rows or arcades, each functioning as a single unit. Normally, the cheek teeth remain in tight contact at their interproximal spaces as they erupt, but because the teeth taper from crown to apex, constant eruption eventually causes the area of occlusal surface of each tooth to decrease. This decrease in occlusal surface area contributes to declining ability of the horse to properly chew high fiber foods.

Gingivitis and periodontal disease develop when cheek teeth fail to maintain contact at the interproximal space (IPS). Small periodontal pockets appear first at interproximal spaces and may progress to stage 3 or 4 periodontitis, necessitating extraction of affected teeth.

Expired Teeth

- The reserve crown is finite, and eruption and wear are relentless.
- If the horse lives long enough, the cheek teeth become worn smooth.

The first pair of teeth to expire is usually the upper nines. These teeth are the first permanents in wear (around 1 year). The infundibular enamel is the portion of the tooth first to wear away, leaving a depression in the middle of the occlusal surface, a process is called “cupping” or “cupping out.” The rostral infundibulum usually cups out before the caudal infundibulum, and the peripheral enamel “ribbon” is usually the last enamel to wear away. The second pair of teeth to begin cupping is usually the upper tens, and after it, the upper elevens. The lower sixes may precede the upper tens in enamel loss. The lower sixes (and all lower cheek teeth) tend not to cup; rather, the entire enamel ribbon within the tooth loses its infolding and thickness and the tooth becomes excessively worn by the opposing tooth. A close examination of slightly cupped lower teeth, seen in geriatric or younger horses, often reveals less enamel in-folding of the slightly cupped teeth when these teeth are compared to adjacent lower teeth. Regardless of which teeth lose their enamel, the correction should be aimed at maintaining the normal height of the dominant, opposing teeth.

Sometimes the entire upper arcade “cups out”. Some enamel remains present on the buccal and palatal sides of the upper teeth, but all of the infundibular enamel of all the teeth in the arcade has disappeared. The buccal and palatal edges of these teeth are prominent and may have points sharp enough to irritate the cheek, as well as the dorsum of the tongue. Because peripheral enamel is present, the horse still retains some grinding ability (Fig. 1).

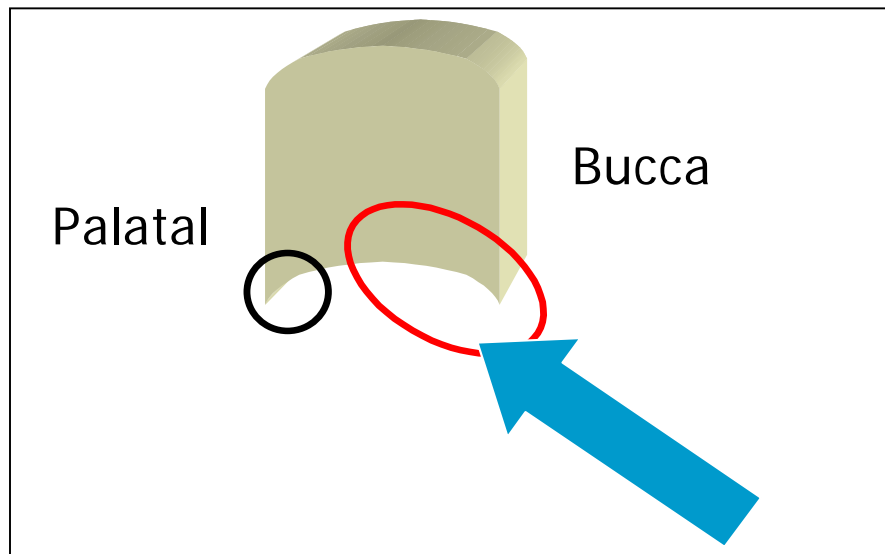


Figure 1. A diagrammatic illustration of a cupped out upper cheek tooth. The arrow is the direction of the mandible during the powerstroke. The red oval area indicates the area of occlusion during the powerstroke. A sharp palatal lip develops if this portion of the tooth is out of occlusion during the powerstroke. Cheek teeth may separate on the powerstroke before occlusion can occur on the palatal 1/3 of the tooth.

To treat affected horses:

- Remove sharp points only from the buccal and palatal sides of the arcade. Avoid removing occlusal enamel unless a portion is dominant.
- Measure excursion to molar contact (EMC) distance. Incisor reduction is indicated when excursion to molar contact distance exceeds 18 to 20 mm.
- Excessive incisor reduction may increase occlusal forces, causing teeth edges to fracture. The average EMC distance for a 450 Kg horse is 12.3 mm, but avoid returning EMC to this distance, if the EMC is greater than 20 mm. A 1-mm incisor reduction, usually performed on the upper incisors, but may be divided into 0.5 mm reductions from the upper and lower incisors, may reduce the EMC by 4 to 5 mm. Repeat the 1-mm incisor reduction in 6 months after reassessing the wear of the cheek teeth.
- Horses with this type of wear pattern usually quid and have long fecal fiber length. If incisor reduction is indicated, mastication of high fiber food will not improve by floating only the cheek teeth.
- Worn out teeth that are loose and painful should be extracted (i.e., teeth affected with stage 3 and 4 periodontitis).

Periodontal Disease

The incidence of gingivitis, periodontal pocketing, and periodontitis increases as horses age, and is high in horses over 15 years old. Early detection and treatment is critical to sustaining teeth until the teeth no longer have enamel for grinding. Untreated periodontitis results in destruction of alveolar bone and tooth loss.

As upper cheek teeth begin to cup out, occlusal margins may fracture off, creating peripheral spaces that trap food, leading to gingivitis and periodontitis. Treatment is to smooth off the prominent remaining piece of tooth to eliminate sulci that can entrap food. Hand tools with a short (i.e., 1-inch) solid carbide blade can be used to smooth off a section of tooth, but for smoothing off the corner of a tooth, a rotating burr, either on a straight or right-angled shaft, is needed. Powdered metronidazole or doxycycline tablets should be applied to inflamed gingiva after slightly abrading the gingiva with a curette or gauze.

Food packs into the IPS because of diastema formation (plural = diastemata). Diastemata are classified as either open or closed (valved). Unlike valved diastemata, open diastemata have no tooth-to-tooth contact at the occlusal surface. Forage can cycle into and out of open diastemata, depending on the width of the space and the size of fibers in the forage, whereas valve diastemata always retain forage. Open diastemata form when compression between teeth is lost by eruption. Closed diastemata develop secondary to deviated or rotated teeth, or periodontal pockets at the IPS, when gingival recession and erosion of cementum create a space at the gingival margin. Both types of diastemata cause considerable pain when forage is trapped. Fermentation of trapped food by

anaerobic produces a characteristic foul odor, which may sometimes be noted only intermittently. Affected horses commonly quid.

Horses with diastemata can be treated by enlarging the diastemata (diastema burring) or by producing conditions favorable for healing of periodontal pockets, which entails removing trapped forage, cleaning the pockets, and preventing forage from re-entering the pockets.

Treatment:

- The pockets are cleaned using a combination of hand instruments and water spray or air abrasion.
- Cleaned pockets are filled with doxycycline gel (Doxirobe™ Pfizer) or plaster of Paris mixed with a small portion of powdered metronidazole or doxycycline tablets. Doxycycline gel is applied in liquid form and so is usually covered with impression material to hold it in place while it sets into a gel. If pockets can be kept free of food for several weeks, the gingiva may heal and be partially restored. The plaster sets in about 5 minutes and supplies a calcium rich, slowly dissolving, antibiotic-impregnated filler. Plaster of Paris is less expensive than doxycycline gel and is retained longer.
- Diastema burring should be done on selected cases after other treatments have failed to control periodontitis. Teeth should be stable and should have some grinding ability left. Diastema burring is discussed in another paper published in the proceedings of this meeting.
- Changing the diet to processed hays (i.e., chopped or coarsely ground hay) reduces the likelihood of forage retention in the diastema.
- Weekly lavage of the mouth with dilute chlorhexidine, preferably chlorhexidine gluconate (10 mL in 1 gallon water) controls periodontitis for an extended time.

Incisor Reduction

About one percent of horses that I have examined during the last 4 years, that had normally shaped incisors, required incisor shortening. All the horses were at least 12 years old. About 10% of horses require incisor leveling, because one or more incisors is missing, malerupted, or abnormally worn (causing incisor slant). To determine if incisor shortening is needed, the EMC distance(s) should be measured. To measure the EMC distance, the following steps are followed:

- The horse's chin is elevated to eye level with one hand placed under the chin (Fig. 2).
- Starting with the mandible in the normal resting position (Fig. 3), the mandible is pushed to one side until the upper and lower incisors begin to separate. This distance between the resting position and the point at which the incisors begin to separate is measured using the center points as a marker (Fig. 4). The center points are the IPSs of the central (101/201 and 301/401) incisors.



Figure 2. Hand positions for measuring EMC

- This step is repeated by pushing the mandible to opposite side.
- These measurements represent the part of the chewing cycle in which the incisors are in occlusion. The average distance (to one side) (obtained by measuring this distance in about 2000 horses by the author) is 12.3 mm [standard deviation (SD) = 3.1 mm]. These horses had normally shaped incisors, were a known age and had no or minimal cheek teeth malocclusions.
- 12.3 mm is the mean EMC distance for a 450Kg horse. Large breed horses have longer heads and thus have a slightly greater EMC distance (i.e., about 15 mm), because the incisors are farther from the temporomandibular joint. Miniature horses have a shorter mean EMC distance (i.e., 5-6 mm).
- The EMC distance can be used to determine if an incisor reduction is needed. Horses with an EMC 3 SD above the mean are considered candidates for incisor reduction. Some caveats are as follows:



Figure 3. In the photograph on the left, both upper and lower incisors are in the resting position. The IPS between 301/401(lower center point) is centered directly below the IPS between 101/201 (upper center point). The IPS between 301/401 in the right picture is offset about 2 mm to the horse's left. About 20 to 25% of horses have offset center points, even though the labial borders of the upper and lower corner incisors are flush. In the example, above the left borders are flush, but the right borders are not.

- Reductions should be limited to a maximum of 3 mm per total reduction to minimize the chance of pulpal exposure. The reduction may be divided between the upper and lower incisors.
- A horse with an EMC of 18 to 24 mm may need an incisor reduction, if it has other signs of dental problems, such as decreased cheek teeth angle of occlusion (AO), quidding, or long-stem fiber in the manure, even after being floated.
- The change in the EMC per 1 mm reduction is about 3.5 to 4 mm for horses with a normal AO, but can be as much as 6 mm if the AO is 10 degrees. The flatter the angle of occlusion, the more the EMC is reduced for each millimeter the incisors are shortened. A little reduction goes a long way, and I recommend changing the EMC no more than 8-10 mm during one session.



Figure 4. Same horse in Figure 3- right side. EMC distance is measured from position on the upper incisors directly above the resting point of the IPS between 301/401 (blue line). Measure from the blue line to the red line, which represents the position of IPS between 301/401 when the upper and lower incisors begin to separate. The left and right distances are equal, each measuring 11 mm. If measurement is made from IPS to IPS, the difference between right and left distances is about 4 mm.

The horse has a DOA (decreased angle of occlusion) if the EMC distance is excessive (i.e., 20 mm or more) or if the incisors separate only two mm or less for every 1 cm of excursion past molar contact. In either case, the incisors should be reduced, if most of the teeth still contain some enamel. The angle of occlusion may return to normal if sufficient reserve crown is present.

Step or Wave Mouth

A wave-mouth or step-mouth in a geriatric horse usually develops secondary to loss of teeth, when the opposing teeth are not reduced regularly. Tall teeth can be reduced 3 to 4 mm per reduction or back to the height of adjacent, normal teeth, if the shortening does not exceed 4 mm. If long-standing, a wave-mouth or step-mouth can be only partially corrected. Even in old horses, it is possible, although unlikely, for a viable pulp horn to project above the gingival margin, and for this reason, overall crown reduction should be limited to 3 to 4 mm. Additionally, undetectable indirect pulp exposure can occur via

thermal insult, if the reduction comes within 2 mm of the pulp horn. Tall teeth that occlude against expired teeth should be reduced only enough to eliminate occlusion. After reduction of a wave, the mandible increases its rostral/caudal motion sometimes restoring occlusion on the rostral edge of the tall teeth. This “newly acquired” occlusion should be eliminated because it places too much grinding force on a small portion of the arcade. Remember:

- Vigorous floating of tall teeth may loosen the tooth. Motorized floats using solid carbide or diamond wheels are less likely to loosen teeth.
- Tall teeth opposing a totally worn out tooth (worn down to gingiva) should be reduced enough to allow forage to travel unimpeded through the mouth.
- Short teeth have no reserve crown, and so, a normal clinical crown cannot be re-established.
- The primary goal of reducing a step-mouth or wave-mouth is to make the horse comfortable.
- Avoid heroic treatments.
- Consider spacing the treatment over several visits.

Sedation

Old horses usually do not need heavy sedation for treatment of dental disease, unless the disease is painful. Horses that require dental extraction because of grade 3 or 4 periodontitis, often need a large dose of butorphanol to ameliorate pain enough just to apply the extractors, even though the affected tooth is easily removed. The head should be supported, but the atlantooccipital joint should not be so overextended that the horse collapses.

- Auscultate the heart to detect cardiac abnormalities that may preclude the use of sedation.
- Decrease the dose administered to old horses; administering small doses, as needed, is better than administering one large dose. Butorphanol’s analgesic effect lasts about 10 minutes.
- An old horse may not appear to be heavily sedated while receiving dental work, but the horse may be unable to stand when left unstimulated.
- 10 to 20 mg yohimbine or 100 to 200 mg tolazoline usually reverses an alpha-2 agonist enough to allow the horse to walk. My initial dose for reversal is 1 to 2 mg yohimbine per 100 lbs or 10 to 20 mg tolazoline per 100 lbs. I may give additional reversal agent in 15 minutes, if indicated, at one-half the initial dosage.

Client Education

Explain to owners what you can and cannot do for the geriatric horse. Dental corrections may be a small part of the overall care of these horses. Proper diet is a large part of keeping a geriatric horse healthy, when its ability to grind feed is reduced or absent. Remember:

- Grinding ability may be reduced or absent.
- High quality protein and high energy density in a high fiber complete “senior” feed may be needed.
- Chopped hay or beet pulp may have to be substituted for baled hay.
- Feeds must be processed to replace the loss of grinding ability.
- Daily rinsing of the mouth with plain water or dilute chlorhexidine solution may be required for horses with uneven arcades and diastemata to prevent fermentation of feed trapped in periodontal pockets.
- Weekly oral rinsing with dilute chlorhexidine solution is very effective in controlling low-grade periodontal disease.