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Treatment of Periodontitis Associated with Diastema Formation in the Horse-an Alternative Approach

J. L. Carmalt[1], **B. A. Rucker**[2] and **D. J. Rach**[3]

[1]Department of Large Animal Clinical Sciences, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK, Canada; [2]Lebanon, VA, USA; [3]Moore & Co. Veterinary Services Ltd., Balzac, AB, Canada.

Diastemata are abnormal spaces between cheek teeth. Feed packing into these spaces leads to fermentation and putrefaction with a resultant periodontitis. Pain, hyperemia, and gingival recession can be seen early in the disease process. Treatment at this stage can prevent the development of further pathology and restitution of normal tissue. Diastema drilling (or burring) is a technique designed to widen the interproximal spaces between teeth to promote "cycling" of feed through the space and prevent fermentation. The case series shows successful use of this new technique involving 24 diastemata in nine horses.

1. Introduction

The equine diastema [1] and associated periodontal disease [2,3] has been described as one of the most painful conditions of the oral cavity and one that is difficult to treat. The terminology concerning the equine diastema has recently been revised to include a subdivision into open or closed (valved) [4]. The former term describes an abnormal gap between cheek teeth, which allow ingress and egress of feed material. In the latter case, feed material can ingress; however, egress is restricted. In this situation, putrefaction of the feed occurs with subsequent gingival recession as an indicator of early periodontal disease.

The incidence of diastemata has been variably quoted as 1%, 3.7%, and 21.9% of all equine dental conditions [5-7]. In the former case, examination was performed on live animals, whereas those presented in the other two articles are the results of necropsy examination. The widely differing incidence may be caused by fact that diastemata are difficult to appreciate in the live animal, unless one is specifically looking for them. Approximately 20% of horses presented to the authors for referral and primary care dentistry are affected. In the majority of cases, these are not painful, with little clinically apparent gingival or periodontal pathology (i.e., open diastemata, 99%), and therefore, require no intervention.

This paper describes the use of a new technique in which 24 diastemata were drilled (burred) in nine horses with considerable success.

2. Materials and Methods

The case records of horses presenting to three treatment facilities were reviewed. Horses with periodontal disease associated with the presence of a diastema and characterized by gingival recession, hyperemia, and pain were included in the study (n = 9). Horses presenting with loose teeth, in addition to a diastema (or diastemata), were excluded.

Veterinarians with considerable experience in the field of equine dentistry examined all horses. A thorough oral examination was performed under sedation with the aid of a full-mouth speculum and a head-mounted flashlight. Both visual and manipulatory examination of the teeth (rostro-caudal, bucco-lingual, and dorso-ventral pressure) and their associated structures were performed in all cases. Routine dental floating was performed using a power dental instrument [a] in all cases. Subsequent to this, diastema drilling was performed using a standardized protocol [8] under either heavy sedation alone, sedation and infraorbital-nerve analgesia, or general anesthesia.

Success of treatment was determined by subsequent oral examination by the same veterinarian and by detailed questioning of the owner at the time of the follow-up examination. Clinical restitution of the gingival tissue, reduction or absence of gingival hyperemia, and a lack of pain on digital pressure determined the success of the treatment.

Horses that subsequently had a tooth (or teeth) removed were considered treatment failures.

3. Results

Nine horses with 24 diastemata fit the case criteria (Table 1). Horses had a mean age of 21 yr (range, 7 - 29 yr). There were five mares and four geldings. The most common clinical signs were quidding (6/9), weight loss (3/9), and oral odor (2/9). Some horses presented with more than one clinical sign (5/9). Other clinical signs included slow eating and resisting bit placement (1/9 in each case). One horse had no clinical signs and had the presence of a diastema noted on oral examination during routine floating. Twenty-four diastemata were drilled (burred). Three horses had one diastema, four had two, one had five, and one had eight. There was no statistically significant increase in the number of diastemata with age. The diastema was not a function of tooth loss in any of the horses.

Table 1. Diastema Anatomical Position and Associated Clinical Signs

Age	Breed	Sex	Position	No.	Diastema Signs	Outcome
17	Arab	F	107/8 207/8	2	none	sold
27	QH	G	208/9 308/9	2	quidding	success
29		F	106/7 110/11 206/7 207/8 210/11 310/11 409/10 410/11	8	weight loss/odor	success
25	Chic	F	106/7 107/8 110/11 208/9 410/11	5	quidding/odor	success
7	App	F	310/11 410/11	2	weight loss/quidding	success
25	QH	G	108/9	1	slow eating	success
22	TB	F	209/10	1	quidding/resist bit	success
11	QH	G	108/9 208/9	2	weight loss/quidding	success
24	QH	G	108/9	1	quidding	success
QH, Quarter horse; Chic, Chicoteague Island Horse; App, Appaloosa; TB, Thoroughbred.						

Seventeen of 24 diastemata were present in the maxillary arcades with the remainder (7/24) between the mandibular teeth. There was an even distribution between the 100 and 200 arcades with nine and eight diastemata, respectively. This was also the case in the mandibular teeth with three in the 300 and four in the 400 arcades, respectively. The most common position for maxillary diastemata was the interproximal space between 108/9 and 208/9 (three each). Mandibular diastemata were found more caudal in position, present between 310/11 (two) and 410/11 (three).

Of the nine horses treated using this method, seven (78%) were treated under standing sedation. The most common narcoleptic combination included 25 mg acepromazine [b], 200 mg xylazine [c], and 10 mg butorphanol [d] delivered as a single IV dose. One horse was sedated as above and a modified infraorbital foramen nerve block performed using 10 ml (xmg) mepivicaine [e]. One horse was placed under general anesthesia using total IV anesthesia (TIA) for 15 min because of his fractious nature; the procedure was performed in under 7 min.

The clinical signs presented by all horses were resolved. Weight gain ensued in those animals that were underweight. Repeat oral examinations revealed the presence of clinically healthy gingiva, no hyperemia, a lack of pain on digital pressure, and feed material that could easily be removed from the widened interproximal space (Fig. 1 and Fig. 2).

Figure 1. Immediately post-diastema drilling. - To view this image in full size go to the IVIS website at www.ivis.org . -

Figure 2. Four weeks post-treatment. - To view this image in full size go to the IVIS website at www.ivis.org . -

4. Discussion

Several options have been proposed for the treatment of diastemata. Becker [9] described a technique, which involved making a small groove, that tipped toward the palate in the maxilla and toward the tongue in the mandible. The purpose of this was to aid in the egress of feed material into the oral cavity and prevent stagnation. The same author [9] also described removal of one of the teeth involved in the diastema as a treatment option; however, he noted that mesial drift after this procedure also created problems. Greene and Basile [10] described removal of impacted feed material using water and baking soda under pressure followed, in some cases, by the placement of dental impression material to prevent immediate reimpaction of feed. In some cases, repeat treatment was required, a concern which has been previously voiced by Dixon et al. [1].

In our cases, the resolution of gingivitis combined with clinically apparent improvements in mastication as determined by an absence of quidding was achieved. Widening the diastema allows feed material in and supports its egress; thus, the gingiva can be healed and the pain ended in one treatment.

Because of dental tissue removal, care should be taken not to enter the pulp cavity. This is not a major concern, because the pulp cavity is at a depth of 3 - 5 mm below the surface of the enamel [f]. In horses with a closed diastema, only ~2 mm will be removed from each tooth bordering the abnormal space at the top. Because of the shape of the diastema, this will be less as the depth from the occlusal surface increases.

A significant amount of heat is generated during the drilling process, a concern ameliorated by the use of a continuous flow of water. Although experimental in vitro trials using motorized dental tools attest to the heat generation, there is no evidence to suggest that this has any physiological effect on dental eruption rates or longevity of the crown [11].

The authors recognize that careful case selection has improved the success rate of this treatment. No horses exhibiting signs of periapical disease, loose teeth, or severe dental pain were included in this study. One author has attempted this in the past (DJR) without success [g]. These horses all required dental extraction within 6 mo and were found to have feed material packed into the apices of the teeth at the time. The rationale for drilling in these cases was to investigate whether drilling resulted in restitution of the periapical ligament and tooth salvage and was performed with the owners' understanding that this would probably not be successful. Subsequent to this, case selection eliminated these horses, and tooth removal was the treatment of choice.

The authors recognize the limitations of a small case series in spite of the technique's early successes. In our cases, the resolution of gingivitis combined with clinically apparent improvements in mastication as determined by an absence of quidding in horses without periapical disease and loose teeth was achieved. Widening the diastema allows feed material in and supports its egress; thus, the gingiva can be healed and the pain ended in one treatment. There is clearly a need to evaluate the procedures efficacy in a larger number of horses.

Footnotes

a. PowerFloat, D&B Equine Enterprises Inc., Calgary, Alberta, Canada.
b. AcéPro 25, MTC Pharmaceuticals, Cambridge, Ontario, Canada.
c. Rompun, Bayer Inc., Etobicoke, Ontario, Canada.
d. Torbugesic, Ayerst Laboratories, Montreal, Canada.
e. Carbocaine, Upjohn Animal Health, Orangeville, Ontario, Canada.
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