

Behavioural and physical changes in equine patients after complete extraction of all incisors due to equine odontoclastic tooth resorption with hypercementosis

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Summary

Background: Equine odontoclastic tooth resorption and hypercementosis (EOTRH) is being increasingly recognised as a painful and debilitating condition in some affected horses, that can produce pain on prehension or result in infected, fractured and loose incisors. The only known way to completely alleviate the pain and secondary infection associated in many horses affected with EOTRH is by extraction of the diseased incisors. Currently, few large-scale clinical outcome studies have been performed.

Objectives: The purpose of this study was to determine if horses that are diagnosed with clinical EOTRH experience a statistically significant improvement in the quality of their lives after surgical extraction of all incisors and to determine if owners were satisfied with the results of the surgery.

Study design: A retrospective web-based survey was sent out to owners of horses diagnosed with EOTRH who had undergone extraction of all incisors in the previous 3 years.

Methods: Forty-eight surveys were completed, and the answers examined for statistical significance.

Results: Statistically significant differences were found in the horses' body condition, dropping of hay, speed of eating, general behaviour, resistance to bridling and headshaking. In addition, owners reported that horses were 'happier' after surgery and that total extraction improved quality and extended the life of their horse. Over 90% of owners would also elect to have the procedure performed on another horse in the future.

Main limitations: Retrospective surveys are prone to selection, recall and misclassification bias.

Conclusions: Owners were highly satisfied with the total extraction of all incisors as a treatment for horses affected by EOTRH. Survey results showed that post-extraction horses had improved body condition and exhibited better bridling and eating behaviours which are consistent with a decrease in dental pain. Owners felt that their horse was happier and that the surgery had improved the horse's quality of life.

KEYWORDS

horse, dentistry, hypercementosis, odontoclastic, resorption

INTRODUCTION

As horses live longer and thus suffer more dental disease, interest has grown in diseases of the geriatric horse as part of the general revival of equine dental studies. One disease that is becoming diagnosed more frequently is equine odontoclastic tooth resorption with hypercementosis (EOTRH; Baratt, 2016; Staszuk et al., 2008). EOTRH is a syndrome with no known inciting cause (Dixon et al., 2022). It is a progressive disease that generally starts with tooth resorption which weakens the periodontal health of the incisors and in some cases leads to hypercementosis (Henry et al., 2017). It predominantly affects equine incisors but is also documented to affect canine and cheek teeth (Moore et al., 2016; Smedley et al., 2015). Since EOTRH is progressive, this typically means that all incisors will ultimately be affected. There is no known cure for EOTRH; however, gingival inflammation and periodontitis are readily resolved by extraction of the affected teeth (Dixon et al., 2022). Once incisors show clinical and radiographical signs, it is common for practitioners to extract all incisors due to the progressive nature of the disease (Lorello et al., 2016).

Owners are often reluctant to pursue extraction of affected teeth because they do not recognise that the patient is showing signs of pain and/or do not see value in the surgery because they feel that the quality of the horse's life will not improve significantly. Retrospective studies following diseased cheek tooth extraction have shown that 50% of horse owners failed to recognise signs of dental pain in their horse until after the diseased teeth were extracted and the surgical site had healed. Ultimately, 96% of owners perceived that their horses benefitted from diseased cheek tooth removal due to their horse's improved biting, eating and general behaviour (Pehkonen et al., 2019). Similarly, surgeons who extract incisors in cases of EOTRH often hear anecdotal comments from the patient's owner describing how the horse's behaviour and physical condition improved post-operatively (Dixon et al., 2022). No studies appear to have attempted to quantify changes in behaviour and physical condition following extraction of all teeth in EOTRH-affected horses.

The purpose of this study was to obtain post-surgical feedback from the owners and caretakers of horses that have undergone full-mouth incisor extractions due to EOTRH. By studying the types of behaviours that were present before and after surgery, changes in quality of life can be assessed and veterinarians and owners can better understand both the behavioural changes associated with the progression of EOTRH and the benefits of full-mouth incisor extraction for treatment.

MATERIALS AND METHODS

A Qualtrics web-based survey was distributed by AVDC-boarded veterinarians or veterinarians in an AVDC-accredited programme to horse owners or caretakers who had previously elected to have whole mouth incisor extractions for treatment of pain and infection

caused by EOTRH. All horses had surgery between 3.0 years and 2.5 months prior to filling out the survey (Data S1). Only one survey was filled out per horse.

Data collected were then analysed utilising appropriate statistical tests in Microsoft Excel 16. Statistical difference in proportions was determined with two-sample z-tests for differences in proportions, while differences in means were determined using paired t-tests. A significance level of 0.05 was selected to determine statistical significance.

RESULTS

There were 55 respondents with 48 completed surveys. Multiple breeds were represented in the survey (Data S2) including 18 (37.5%) Thoroughbred and 9 (18.8%) Quarter Horses. There were 38 (79.2%) geldings, 9 (18.8%) mares and 1 (2.1%) stallion represented in the group. The mean age of the horse at the time of surgery was 22.4 years old, and the ages ranged from 16 to 34 years old. A complete sample description is provided in Data S2.

The survey found statistical significance in several behaviours when comparing before and after EOTRH surgery using two-sample z-tests for differences in proportions (Table 1). After the extraction of incisors, the number of horses reported to have a lower than desired body condition score (BCS) or weight was found to have reduced by more than 50%. In addition, reported signs of dental pain including dropping hay, eating more slowly, resistance to the bridle and headshaking when bridled showed a statistically significant decrease after the surgery. Finally, owners also reported less aggression towards them and the other horses in their group following surgery.

There were several other behaviours that trended towards showing improvement but were not statistically significant at the 5% level (Table 2). Owners reported that horses were more bright, alert and responsive after incisor extractions. In addition, they spent less time at the back of the stall avoiding social interaction and were slightly more interested in their surroundings. The percentage of horses quidding and with a withdrawn or intense stare also markedly decreased but was not statistically significant at the 5% level.

When owners were asked to rate their impression of their horse's happiness on a scale of 1–10 with 1 representing extremely unhappy and 10 signifying extremely happy, the average rating prior to surgery was 5.34. The increase to an average rating of 8.40 after the extraction of incisors was found to be statistically significant at the 5% level using a paired t-test (Table 3).

Simple descriptive statistical analysis was used to analyse data when owners were asked to rate their level of agreement with statements focused on benefits to the horse. Over 91% of respondents somewhat or strongly agreed that full mouth extraction of incisors improved their horse's welfare and would elect to have another horse's incisors completely extracted if it were recommended by a veterinarian after a diagnosis of EOTRH. Seventy-eight per cent of

TABLE 1 Statistically significant difference at the 5% level or better.

	Below desired weight or BCS	Drop more hay from mouth than normal	Horse ate more slowly than normal	Horse exhibited more grumpy behaviours	Horse was resistant to bridling	Horse shook or tossed head more when bridled
Before extraction	39.6%	31.3%	43.8%	25.00%	23.0%	14.6%
After extraction	18.8%	10.4%	16.7%	6.3%	4.2%	2.1%

TABLE 2 No statistical significance at the 5% level or better.

	Horse bright, alert, responsive	Spent more time at back of stall	Quidding	Interested in surroundings	Withdrawn or intense stare
Before extraction	83.3%	12.5%	18.8%	81.3%	14.6%
After extraction	91.7%	4.2%	6.3%	83.3%	4.2%

TABLE 3 Owner perception of quality of life.

	Horse happiness rating	
	Before surgery	After surgery
Mean	5.3	8.4
SD	2.1	1.8

owners also felt that the surgery extended the lifespan of their horse as well (Table 4).

Owners were shown an image of a horse with the characteristics of the equine pain face and asked to rate their agreement with a statement (Gleerup et al., 2015). Fifty per cent of owners agreed or strongly agreed that their horse exhibited the pain face more prior to surgery than 3 months after surgery (Table 5).

Simple descriptive statistical analysis showed that 63% of horses were being ridden prior to surgery. After the extraction of incisors, 56% of horses were still being ridden, although this difference was not statistically significant at the 5% level (Table 6).

DISCUSSION

Many horse owners are initially reluctant to pursue whole mouth extraction of incisors to resolve the painful inflammation and periodontitis resulting from EOTRH. They question how the horse will eat, if it can be ridden and what its quality of life will be like after such a surgery. Anecdotal and published evidence from many surgeons indicated that the surgical sites heal well, inflammation and periodontitis resolve and that horses often eat better than prior to extractions (Baratt, 2016; Dixon et al., 2022; Limone, 2020; Lorello et al., 2016). In addition, owners had anecdotally reported to surgeons that horses improved body condition and experienced a better quality of life.

The results of this survey confirm many of the previous anecdotal and published findings. The distribution of breeds, genders

and ages surveyed is consistent with what is currently published in the literature. There does not appear to be a breed or gender correlation, instead, it is more likely related to population characteristics unique to the survey (Limone, 2020). The survey responses indicated that horses were exhibiting many different signs of dental pain and/or chronic pain prior to extraction. All these signs of dental pain decreased after extraction, but only some decreases were statistically significant. Dropping hay, eating hay more slowly, bad-tempered behaviour, headshaking and avoiding the bridle were all recognised to be significantly lower after incisor extractions with a reduction of these behaviours ranging from 61 to 86%. Horse owners noted increases in horses acting bright, alert and responsive and more interested in their surroundings after incisor extraction, but no statistical significance was found in the results. Less quidding, less antisocial behaviour and less withdrawn or intense stares were also reported after extraction but were not statistically significant at the 5% level.

The reason for the lack of statistical significance for some of the questions may have been due to the relatively small sample size and the subjectivity of some of the parameters, with for example, some owners having difficulty recognising certain behaviours or facial expressions. In this study, none of the owners were specifically trained to recognise the subtle characteristics of equine pain that often go unrecognised or may have been confused by the question. Another possibility is that these horses had other confounding sources of pain, dental or otherwise, which continued to affect the horse's behaviour well after surgical healing was completed. In addition to extraction of all incisors, other dental treatments were also provided in many cases though it is not certain what impact these treatments may have had on physical and behavioural changes.

Previous work has shown that dropping hay (or haylage), slower eating times, headshaking, avoiding the bridle, were specifically related to cheek tooth dental pain and in many cases these behaviours were largely resolved with appropriate cheek tooth extraction (Pehkonen et al., 2019). Validated equine pain scales have also shown

TABLE 4 Agreement of owner perception.

	Extract again	Improved welfare	Extended life
Strongly agree	37	38	29
Somewhat agree	6	5	8
Neither agree nor disagree	0	2	7
Somewhat disagree	3	0	0
Strongly disagree	1	2	3
Total responses	47	47	47
% Strongly agree	78.7%	80.9%	61.7%
% Strongly or somewhat agree	91.5%	91.5%	78.7%

TABLE 5 Resolution of equine pain face after surgery.

	Horse showed pain face more prior to surgery than 90 days post-surgery	% of total
Strongly agree	8	16.7%
Agree	16	33.3%
Neutral	15	31.3%
Disagree	5	10.4%
Strongly disagree	4	8.3%
Total responses	48	
% Strongly agree or agree	50%	

TABLE 6 Usefulness.

Usefulness	Count	% of total
Ridden before extraction	30	62.5%
Ridden after extraction	27	56.3%

that a horse's brightness, alertness and responsiveness as well as facial expressions and social behaviour can also be used as reliable indicators of pain (Gleerup et al., 2015; Gleerup & Lindegaard, 2016; van Loon & Macri, 2021; van Loon & Van Dierendonck, 2017). In this survey, all the indicators of pain were improved 75 days post-operatively which indicates that complete extraction of all incisors is not detrimental to the horse's welfare and is likely to decrease behaviours that indicate pain. In addition, this work also shows that equine pain scales should be considered in conjunction with clinical and radiographic findings when considering surgical extraction. Furthermore, horse owners were very satisfied by the results of the surgery because over 90% would elect to have the incisors of another horse completely extracted if it were diagnosed with clinical EOTRH and felt that the quality of the horse's life could be improved. Almost 80% reported that the complete extraction of all incisors extended the life of their horse well. It was also notable that the number of horses being ridden before and after full-mouth incisor extractions did not change significantly.

Although it appears to be a radical surgery for resolving pain associated with EOTRH, whole mouth extraction of incisors decreases dental pain behaviours and horse owners had favourable impressions of its benefits for improving and extending the quality of life.

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CONFLICT OF INTEREST STATEMENT

No conflicts of interest have been declared.

ETHICS STATEMENT

The author has adhered to the Principles of Veterinary Medical Ethics of the AVMA.

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