Cheek Teeth Abrasions Created with Contact between the Lateral Edges of the Molars and the Adjacent Buccal Mucosa in Equids: A Potential Association with Palatal Instability and Intermittent Dorsal Displacement of the Soft Palate

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Abstract: Cheek teeth abrasions had been recognised as one of the most common traumas associated with dental structures in horses. It had been widely accepted that these abrasions were in the main a consequence of overly sharp lateral edges on the molars or cheek teeth. An association between the degree of sharpness and the severity of this trauma had been demonstrated. There had been however, an inability to directly associate the presence of this trauma with the incidence of these sharp edges. These abrasions had also been commonly noted in horses presenting with symptoms of palatal instability with or without progression to dorsal displacement of the soft palate. Observations, post upper airways surgery (palatoplastys) revealed a marked decrease in the incidence and or severity of these lesions. The possibility that in certain situations an association between the presence of cheek teeth abrasions and certain upper airways conditions could exist is discussed.

Keywords: Mouth breathing, buccal cavity, horse, dentistry, floating, cheek teeth.

INTRODUCTION

Cheek teeth abrasions in horses are in general recognised as a consequence of overly sharp dental margins [1-6]. They are also regarded as a cause of pain and discomfort to the horse. A survey of 199 horses appeared to demonstrate an increase in the severity of these lesions in line with an increase in the degree of sharpness of the dental edges [7]. This survey however did not explore the overall incidence of sharp enamel in a normal population, which would have included horses without cheek teeth abrasions. Another larger survey failed to directly associate the presence of these lesions with sharp dental edges [8]. Logically there had to be another factor or factors that could contributed to the incidence of these lesions.

It had been postulated that palatal instability (PI) occurred when the oropharyngeal seal (OPS) mechanism was disturbed or broke down [9,10]. Dorsal displacement of the soft palate (DDSP) could then follow. With a breakdown of this seal and certainly in cases where the palate was fully displaced, air could be taken orally during inspiratory efforts [9]. Indeed when air exited the mouth during periods of DDSP, visual billowing of the cheeks about the bit was often evident [11]. Within the airways during inspiratory efforts, a negative or suction pressure was created. If air was simultaneously being drawn through the buccal cavity and oropharynx then a similar negative pressure would exist. This negative pressure would then act upon the soft tissues of these two compartments.

MATERIALS AND METHOD

Records from a series of 379 horses that presented with symptoms of PI, with or without associated DDSP, and that subsequently underwent an oral palatopharyngoplasty were examined [12,13]. There were 221 males (6 entires) and 158 females. Ages were from 2 years to 8 years. Average age was 3.5 years. The presence and extent of cheek teeth abrasions were recorded during preoperative examinations. Grade I abrasions were contained within an area of 4 cm^2, grade II - 8 cm^2, grade III - 12 cm^2 and grade IV - greater than 12 cm^2 (see Figures **1** and **2**). In cases where buccal mucosa were re-examined postoperatively (minimum six months), a comparison of both the incidence and severity of these lesions was made.

RESULTS

Two hundred and fifty-three (253) of 379 horses (67%) showed evidence of cheek teeth abrasions. Of these 44 (17%) had unilateral lesions whilst 209 (83%) had bilateral lesions. One hundred and six (106) horses (42%) had grade I lesions. One hundred and seven (107) (42%) had grade II, 34 (13.5%) grade III and 6 (2.5%) grade IV (see Figure **3**).

Seventy two (72) horses which had presented preoperatively with varying grades of buccal abrasions were re-examined at least 6 months post operatively.

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Figure 1: Grade III abrasions. (Photo with kind permission, Kirsten Jackson, dentalvet.com.au).

Forty-eight (48) of these showed no evidence of cheek teeth abrasions. Twelve (12) had significant reductions in the extent of mucosal trauma whilst in 12 cases there was no significant change.

	Area of trauma (Lesions contained within)
Grade I	4 cm^2
Grade II	8 cm^2
Grade III	12 cm^2
Grade IV	>12 cm^2

Figure 2: Grading system.

	No of horses
Total (study)	379
Cheek teeth associated trauma	253 (66.7%)
unilateral trauma	44 (11.6%)
bilateral trauma	209 (55.1%)
Grade I	106 (28%)
Grade II	107 (28.2%)
Grade III	34 (9.0%)
Grade IV	6 (1.5%)

Figure 3: Incidence of buccal trauma.

DISCUSSION

A common perception with regard to cheek teeth associated mucosal abrasions and trauma is that sharp dental margins are the primary inciting factor. Certainly an association between the severity of these lesions and the degree of sharpness of enamel points had been demonstrated [7]. However this study did not include horses that presented with sharp dental margins without buccal mucosal trauma [7]. Several studies of significant horse populations failed to directly associate the presence of these abrasions with the incidence of sharp dental margins [4,8].

In a survey of 450 working horses in Egypt it was determined that 53.7% had some form of oro-dental disease [4]. Of these 64.2% had buccal mucosal injuries and 85.9% of these were attributed to enamel overgrowths or points [4]. This equates to 29.6% of the total population having some form of buccal mucosal injury associated with sharp enamel. Almost eighty percent (79.8%) of affected horses presented with sharp enamel points which was 42.7% of the total population [4]. Only nine horses in this population had had any prior dental examination or treatment and none of these nine by a veterinarian or qualified equine dental technician [4]. Importantly the incidence of sharp enamel was significantly greater than that of any associated mucosal injuries.

In another study 120 of 321 (37%) of horses that presented with mucosal abrasions did not have sharp enamel [8]. In addition of the 388 horses that did present with sharp enamel, 187 (48%) did not have mucosal abrasions [Tolpeznikovs 2006].

In this study (horses presenting with symptoms of PI with or without progression to DDSP), the incidence of mucosal trauma adjacent to the cheek teeth margins was 67% which was more than twice the incidence in the prior study of 450 horses. The grading system for severity was not dissimilar to that introduced by Allen in 2004 [7]. Allen (2004) recorded a halving of cases from grade I to II whilst in this study they were similar.

There is still a considerable debate as to whether horses elect in certain situations to take air orally. Horses are obligate nasal breathers. However rather than a horse face the full consequences of airways compromise that occurs with dynamic pharyngeal narrowing or collapse, it seems logical that it would seek to supplement its supply by any means available. Taking air orally is the only alternative to the nasal route. Indeed a 1997 study (Holcombe *et al*.), where PI was experimentally induced by severing the tendons of the tensor veil palatini muscles, resulted in a reduction in nasopharyngeal inspiratory negative pressures despite the nasopharyngeal diameter being significantly narrowed [14]. Logically there had to be another source of inspired air and the only orifice through which this could be facilitated was the mouth.

During inspiratory efforts, significant negative or suction pressures are applied to all components of the airway including the soft tissues of the nasopharynx. These pressures can result in partial or complete collapse of these tissues. If air were to be taken orally during inspiratory efforts, the resultant negative pressure would similarly exert a suction force upon the soft tissues of the buccal cavity, which includes the cheeks. The cheek mucosa would then be drawn onto the edges of the dental arcade resulting in varying degrees of trauma. Both the frequency of oral breathing with PI and DDSP and the degree of sharpness of the enamel points could contribute to the incidence and severity of lesions.

Of the limited number of horses in this study (72) that were subject to re-examinations, only 33% showed evidence of mucosal trauma postoperatively. In addition 16% of these had significant reductions in grade of trauma.

Interestingly when abrasions that were present preoperatively were still present at six months or longer postoperatively, as was the case with 24 horses, the clinical outcomes were often poor. For this reason the presence or absence of these abrasions postoperatively had become one of several means of assessing surgical outcomes.

As much as there are no doubt multiple reasons for the presence of buccal mucosal trauma adjacent to the cheek teeth in horses, the observations made in this study would suggest that conditions such as PI and DDSP could be considered as potential contributing factors. The notion that a horse would not seek to acquire air via the oral passage during periods of nasopharyngeal airway narrowing or collapse, needs re-evaluation. Horses like any other species will invariably do whatever is required to survive.

DISCLOSURE

The author reports no financial or other conflicts related to this article.

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