

Mouth Opening During Ridden Exercise in Sports Horses: An Evasive Behaviour, an Indication of Pain or Discomfort or a Physical Adjustment to Facilitate the Oral Passage of Air During Inspiratory Efforts

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Abstract: There had been mounting concern over the use of nosebands and in particular those regarded as being restrictive with the potential to cause stress to horses. It had been suggested that mouth opening during ridden exercise was primarily triggered by rider, tack, training or pain issues. At the same time the long held association between mouth opening and upper airways dysfunctions such as PI, DDSP and PD was being mostly ignored. It was therefore suggested that horses that were continually or intermittently attempting to open their mouths during ridden exercise should firstly undergo overground endoscopy to rule out upper airways issues, prior to exploring other potential causes. This particularly in light of more recent studies in sports horses as well as racehorses which had shown a high incidence of PI and DDSP in competition. If a dysfunction such as PI, DDSP or PD was diagnosed, then these issues should be addressed firstly. If successfully treated the need for tack such as a nosebands would be reassessed.

Keywords: Horse, nosebands, isthmus faucium, oropharyngeal seal, palatoplasty.

INTRODUCTION

In recent years there had been considerable research and conjecture with regard to the use of nosebands and other devices used to inhibit a horse's ability to open its mouth during ridden exercise. [1,2] Concern over the apparent stress induced by these devices and debate as to why a horse should open its mouth in the first place have been commonplace. Studies had demonstrated an association between the tightness or restrictive nature of these devices and stress levels [3,4]. Numerous issues such as those induced by tack or riders, incorrect training or pain had been suggested as possible triggers for this undesirable behaviour [5,6]. There were however other factors that were conjectured to encourage a horse to open its mouth whilst being ridden such as upper airways dysfunctions. Palatal instability PI [7,8], dorsal displacement of the soft palate DDSP [9,10] and pharyngeal dysfunction PD [11,12] were some of these. The application of nosebands to reduce the impact of these dysfunctions was commonly mentioned in the literature with reference to thoroughbred and standardbred racehorses [10,13]. More recently it had been recognised that these issues were also a common cause of poor performance in sports horses [11,14].

METHOD

The horse is of course an obligate nasal breather and has therefore developed mechanisms to facilitate this function. To prevent air passing through the mouth during periods of locomotion there are a series of seals or valves. Firstly the lip seal [15] then at the junction of the buccal and oropharyngeal cavities is the second seal at the Isthmus Faucium IF [16,17] and then at the caudal margin of the oropharynx is the third being the intrapharyngeal ostium IO Figure 1. During exercise all three seals should be closed. In addition a fourth seal at the entrance to the oesophagus referred to as the upper oesophageal sphincter UOS prevents air entering the gastrointestinal tract during inspiratory efforts. All four seals should be closed during periods of obligate nasal breathing. When eating, the lip seal is broken to allow food to enter the buccal cavity and then closed to prevent this feed material being lost. The food is masticated and then passed to the oropharynx through an open IF where a bolus is formed by the actions of the base of the tongue. At this stage the seal at the IO is closed and prevents the bolus entering the airway. During the act of deglutination the nasopharynx and larynx are constricted. The soft palate is displaced disrupting the seal at the IO and the UOS is disrupted facilitating the movement of the bolus into the oesophagus. At the same time the seal at the IF is closed to prevent the feed material being returned to the buccal cavity. Any alterations to this sequence, for example the seal at the IO being broken prematurely, would result in dysphagia.

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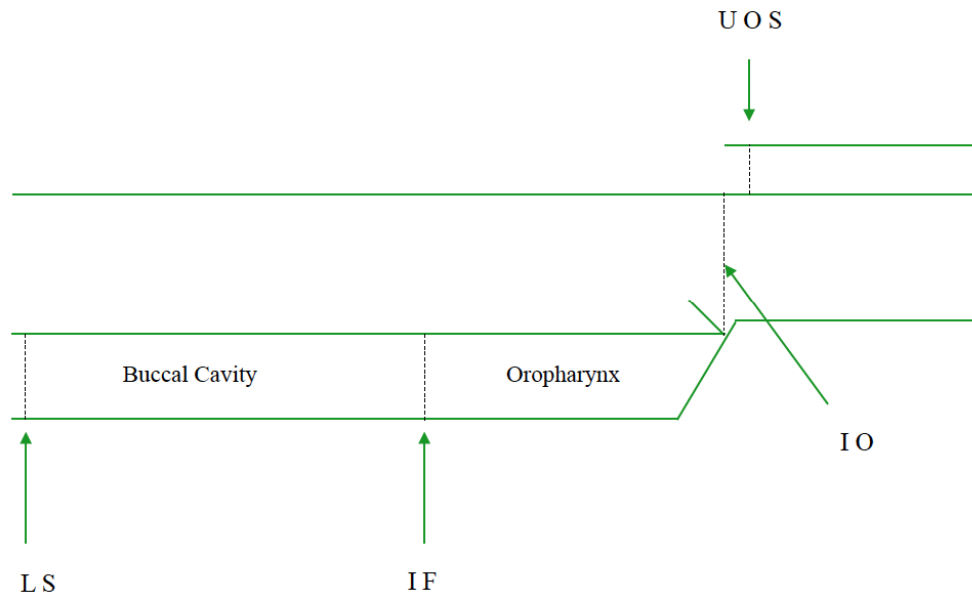


Figure 1: LS - Lip seal, IF - Isthmus Faucium, IO - Intrapharyngeal Ostium, UOS - Upper Oesophageal Sphincter.

Conversely during exercise all four valves or seals should be closed. A disrupted IO during exercise results in DDSP, a recognised upper airways dysfunction affecting nasopharyngeal air supply. It is also postulated that disruption of the seal at the IF causes a breakdown of the OPS mechanism [16,17] with resultant PI. PI has also been shown to reduce nasopharyngeal air supply [7,8]. Logically for air to enter the oropharynx to facilitate a period of PI, air must first enter the buccal cavity via a broken lip seal. It is at this time that mouth opening may be apparent. It has been postulated that a horse may actively take air orally during periods of PI to supplement reduced nasopharyngeal supply [17]. During PI the piriform recesses become channels for air instead of food to be delivered to the lateral surfaces of the epiglottis. Indeed a gap was often observed between the lateral free border of soft palate and the aryepiglottic folds during periods of axial deviation of the aryepiglottic folds ADAF [18]. This provided orally acquired air to supplement diminished nasal supply without the gross contamination that could potentially occur if the palate was fully displaced [17]. In other situations air entering the oesophagus due to an inherent weakness of the UOS during exercise could lead to airways turbulence and thence airways dysfunction. UOS weakness was not uncommon in cases that presented with a fourth branchial arch defect 4BAD [19].

DISCUSSION

Whilst investigations into upper airways issues and in particular those involving the pharynx had been

numerous, discussion had mostly concentrated on observations made during standing, treadmill or overground endoscopy. Common behavioural issues that were often apparent with horses that presented with (PI) [16,17] with or without progression to DDSP which included anxiety, nervousness, reluctance to enter competition or training arenas, 'pulling' or 'over racing', rushing, mouth opening and tongue or bit playing were rarely discussed. Unfortunately these altered behaviours could include actions dangerous to riders, such as horses that would rear or throw themselves on the ground when asked to move forward following the application of a tight noseband. Tongue ties which were postulated to reduce tongue retraction and nosebands used to prevent horses opening their mouths [20] were in common use in both racing and cross country events. They were applied with the belief that their presence would reduce the incidence of PI and DDSP. Veterinarians often recommended their application prior to the employment of any surgical or medical treatments for PI and DDSP. In these disciplines the association between mouth opening and poor breathing had existed for many years. More recently, this association between noseband usage and improved performance in racing and sports horse events had led to a marked increase in their application. This increase in many ways paralleled the introduction of flexible endoscopy to equine veterinary practice in the early 1980's [21].

The theory that horses could acquire 'supplementary' air via the oral passage to counter reduced nasopharyngeal supply was a logical one as it

seemed incredulous to maintain that an animal would choose to suffocate rather than compensate [17]. Indeed a common habit observed by many riders was that of horses opening their mouths as they pulled up following a maximal workout and appearing to take some air orally to aide in their immediate recovery. A harsh inspiratory noise was often evident and this was interpreted as being made by air being drawn through the mouth. An association between tightening nosebands and stress [3,4] seemed logical. A horse accustomed to taking air orally to compensate for reduced nasopharyngeal supply when under pressure in work or to aide in recovery, would have become anxious if this option was removed with the use of a restrictive noseband.

Tack including a variety of bits had been implicated in initiating mouth opening. In cases where the horse was quite obviously attempting to discharge the device the normal practice was to change the tack until a form that the horse was prepared to tolerate was found. It would be no different to an athlete selecting the most comfortable form of mouthguard.

It had also been suggested that mouth opening whilst under saddle, occurred in response to varying forms of pain. This theory could be tested in the individual by treating and removing the pain and then gauging the horse's response. For example floating teeth, regional analgesia and or analgesic medications. Buccal mucosal abrasions associated with sharp dental margins in the region of the third premolar and molars were often viewed as a cause of mouth opening. In this author's experience these lesions were often a consequence of the passage of air through the buccal cavity during periods of PI. The negative pressure created during inspiratory efforts would cause the cheeks and their mucosa to be drawn onto these edges.

Where a nervous, anxious or flighty horse had a tendency to open its mouth under saddle an association between this behaviour and improper handling or training was often made.

An alternative explanation for this occurrence could be the association between altered behaviour of a nervous or anxious nature and upper airways issues that had been previously reported in the literature [16,17]. The author often found that in these instances the issue lay more with the lack of a thorough medical investigation prior to implicating the trainer or rider in this altered behaviour. Improper riding or training

practice could certainly have exacerbated the situation but was rarely the cause. In support of this theory complete long term changes in behaviour and with this the removal of nosebands, had been recorded following successful resolution of upper airways issues [22].

CONCLUSIONS

It was the author's opinion that there were only two major explanations as to why a horse would attempt to open its mouth during ridden exercise. This in view of the fact that the horse was reliant on the maintenance of the four above mentioned seals to facilitate obligate nasal breathing whilst exercising to aide in it's survival. More specifically to prevent dysphagia and resultant contamination of the airways with oral material and feed which would compromise the horses ability to evade capture during flight.

The first of these being to expel a foreign substance or object which it found offensive. This may have been a piece of uncomfortable tack or a foreign object such as a stone or sharp burr. The second was to facilitate the passage of air orally during inspiratory efforts to supplement a depleted nasopharyngeal supply. A reduction in nasopharyngeal air supply had been recognised during periods of PI and DDSP. At or just prior to the point of exhaustion, a horse could elect to either supplement it's nasal supply with orally inspired air by breaking the seal at the IF or simply suffer the consequences of the depleted nasal supply.

In support of this theory it was normal practice to remove nosebands or other mouth closing devices following successful palatoplasty procedures (22) performed to address cases of PI with or without progression to DDSP.

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