A scoring system for gastric ulcers in the horse

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Summary

Five investigators familiar with gastric ulcer disease in horses met to establish a scoring system that could be utilised in future studies. Slides of gastric lesions were viewed and discussed and a scoring system established that required the nonglandular and glandular portions of the stomach to be graded separately. Each portion of the stomach (glandular and nonglandular) received a score for number of ulcers present and a score for severity of ulcers which resulted in each stomach receiving 4 separate scores. After the grading system was developed, each investigator independently graded 16 horses with gastric ulcer disease that had been previously recorded on video tape. The results of each investigator's scores were then compared. There was a variability between observers in the scores for severity of both nonglandular and glandular lesions but the variability was not significant. The variability between observers for the number of nonglandular lesions was also not significant. This implied that there was consistency between the 5 observers in the way severity of lesions was scored and the number of glandular lesions. However, there was a significant variability between observers for the number of nonglandular lesions which implied agreement on this observation was more variable.

Introduction

The availability of diagnostic endoscopes of adequate length to visualise the gastric mucosa has resulted in an increased appreciation of the ante mortem prevalence of gastric ulcers in foals and mature horses. Of 183 foals examined by gastroendoscopy, 51% had visible gastric lesions (Murray 1989). Gastroscopic examination was performed on 146 horses age 1–24 years and 66% had visible gastric lesions (Murray et al. 1988). More recently, in an endoscopic survey of Thoroughbred race horses 81% of 185 were reported to have visible gastric lesions (Vatistas et al. 1994).

Unlike most species, the horse's stomach contains a large nonglandular portion covered by stratified squamous epithelium. The glandular portion is similar to other species and comprises cardiac, fundic and pyloric regions. The junction between glandular and nonglandular mucosa is the margo plicatus. The unique anatomy of the horse stomach probably plays a role in the high prevalence of gastric ulcers reported. Most investigators agree that the most common location is on the nonglandular mucosa, along the margo plicatus on the lesser curvature. This area appears endoscopically to be the most dynamic portion of the nonglandular stomach i.e. the margo plicatus in this area can be observed frequently to traverse from ventral to dorsal and back to ventral over the lesser curvature. It is also the area of nonglandular mucosa most exposed to gastric acid. In the authors' experience, the majority of equine gastric ulcers in the glandular region of the stomach are associated with the use of nonsteroidal anti-inflammatory drugs.

Although a high prevalence of gastric ulcers has been reported in horses, there is not an adequate scoring system to describe the lesions present. Gastric ulcer scoring systems have been used in man (Visick and Lund 1948; Visick 1948; Goligher et al. 1978; Lanza et al. 1981; Robinson et al. 1989) and dogs (Jenkins et al. 1991). However, these grading systems are inadequate in the horse because of the 2 distinct regions. In a comparison of endoscopic findings in horses with and without clinical signs (Murray et al. 1988) lesions were characterised by anatomical location and by a combination 4 point scoring system for number and severity. By combining severity and number of lesions, this scoring system may, under some circumstances, under or over estimate ulcer severity. For example, multiple superficial ulcers may have a higher score than a more clinically important focal deep ulcer. In a recent study, (Murray et al. 1996) a 10-point scoring system was utilised to characterise gastric lesions in Thoroughbred racehorses. In the 10-point system, emphasis was placed on depth and severity of the lesions, with less emphasis on ulcer number.

In horses, ulcers are frequently reported as present or not present. The development of a valid ulcer scoring system would decrease ambiguity in ulcer scoring and enhance the ability to understand the clinical importance of gastric ulcer disease in horses. In addition, a valid and repeatable scoring system would enhance the ability of investigators to compare the effects of various agents on gastric ulcer healing and to compare the results of studies conducted by different investigators.

The objectives of this study were to develop an endoscopic scoring system for equine gastric ulcers and to investigate its use by comparing scores of different investigators on video tapes of equine gastric ulcer cases.

Materials and methods

The 5 authors of this report met in Stillwater, Oklahoma to exchange gastric scoring ideas, review the literature on ulcer healing, and develop a grading system that could be utilised in future studies. Many slides of gastric lesions were viewed and 1
The results of each investigator's scores were then compared. After the grading system was developed, each investigator independently graded 16 horses with equine gastric ulcer disease that had been previously recorded on video tape. The results of each investigators scores were then compared.

**TABLE 1: Gastric lesion scoring system**

<table>
<thead>
<tr>
<th>Lesion number score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No lesions</td>
</tr>
<tr>
<td>1</td>
<td>1–2 localised lesions</td>
</tr>
<tr>
<td>2</td>
<td>3–5 localised lesions</td>
</tr>
<tr>
<td>3</td>
<td>6–10 lesions</td>
</tr>
<tr>
<td>4</td>
<td>&gt;10 lesions or diffuse (or very large) lesions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesion severity score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No lesion</td>
</tr>
<tr>
<td>1</td>
<td>Appears superficial (only mucosa missing)</td>
</tr>
<tr>
<td>2</td>
<td>Deeper structures involved (greater depth than No. 1)</td>
</tr>
<tr>
<td>3</td>
<td>Multiple lesions and variable severity (1.2 and/or 4)</td>
</tr>
<tr>
<td>4</td>
<td>Same as 2 and has active appearance (active = hyperaemic and/or darkened lesion crater)</td>
</tr>
<tr>
<td>5</td>
<td>Same as 4 plus active haemorrhage or adherent blood clot</td>
</tr>
</tbody>
</table>

discussed. After the grading system was developed, each investigator independently graded 16 horses with equine gastric ulcer disease that had been previously recorded on video tape. The results of each investigators scores were then compared.

**Statistical analysis**

Validity of the severity scores was tested using the Cochran's Q test where k = 5 observers and n = 16 horses. Variability between observers for the number of lesions was analysed by the Friedman two-way analysis of variance. A value of P<0.05 was considered significant.

**Results**

The group agreed that the glandular and nonglandular portions of the stomach should be graded separately. It was also determined that the number of ulcers present should have a separate score from the severity of the ulcers. This resulted in each stomach receiving 4 separate scores as presented in Table 1. A severity score of 1 was used for those lesions that appeared superficial with the possible involvement only of the mucosa (Fig 1). These lesions do not have raised edges and dark hyperemic ulcer craters. Typically, the interior of the lesion has a pink appearance. These lesions may have mild haemorrhage without increasing the severity score, especially if the stomach is significantly inflated. Gastric insufflation or trauma from the endoscope can sometimes cause mild haemorrhage in these lesions. A severity score of 2 is used for those lesions that appear deeper than number 1 severity and probably include structures deep to the mucosa. These lesions typically have raised edges and the ulcer crater usually has a pink, granulation tissue-like appearance (Fig 2). A severity score of 3 is used for those stomachs with multiple lesions that are of different severity. To receive a severity score of 3, there must be at least 1 lesion present that would receive a score of 4. Severity score of 4 is for those stomachs having primarily lesions that obviously have structures deep to the mucosa involved and have an active appearance (Fig 3). Active appearance is typically a hyperaemic or darkened, necrotic appearing lesion crater. Severity scores of 5 are recorded the least often. These lesions must have the severity of lesion score 4 but also have active haemorrhage or adherent blood clots.

The 16 cases utilised in this study contained representative lesions of all scoring categories. There was a variability between observers in the scores for severity of both nonglandular and glandular lesions. The variability was not significant for either of the scores (nonglandular P>0.90, glandular P>0.20). The variability between observers for the number of glandular lesions was also not significant (P>0.20). This implied that there was consistency between the 5 observers in the way they score severity of lesions and the number of glandular lesions. The variability between observers for the number of nonglandular lesions was significant (P<0.05). This implied the agreement between observers regarding the number of nonglandular lesions was more variable.

**Discussion**

There is a paucity of information on the progress of gastric ulcer healing, correlation of endoscopic appearance and healing and endoscopic appearance and clinical signs in horses. In one study, 11 ponies with flunixin-induced gastric ulcers were randomly divided into 2 groups (MacAllister and Sangiah 1993). One group was treated with 4.4 mg/kg of ranitidine per os q 8 h and the second group received corn syrup as control. Ponies were evaluated gastroscopically every 3–5 days until healing took place or for a maximum of 40 days. Ranitidine-treated ponies did not heal at a faster rate than corn syrup treated ponies. However, gastric lesions were not scored in this study and although the authors attempted to include only those ponies with similar ulcers, the groups may not have been of equal severity. In another study to evaluate the effects of sucralfate on healing of equine gastric ulcers (Borne and MacAllister 1993) a similar ulcer scoring system to the one reported here was utilised to evaluate 12 ponies with gastric ulcers. In addition to evaluating the number and severity of gastric ulcers in the glandular and nonglandular mucosa, this study also evaluated the percentage of mucosa that appeared to be inflamed. The significance of mucosal inflammation in equine gastric ulcer disease is unknown and was not included in the scoring scheme reported here. Until more data to show otherwise are available, we believe it is important to evaluate both glandular and nonglandular mucosa separately and to separate the number of ulcers from the severity of ulcers. Physiological differences between the glandular and nonglandular mucosa and an apparent difference in healing rates between the 2 preclude the use of combined scores.

In a comparison of endoscopic findings in horses with and without clinical signs (Murray et al. 1988) lesions were characterised by anatomical location and a combination score for number and severity. The severity was based partially on the presence of haemorrhage. We did not consider the anatomical location to be a major factor in ulcer severity or healing with the exception of differentiating between glandular and nonglandular lesions. We also placed minimal emphasis on minor haemorrhage unless it was associated with an apparently deep lesion. Only one report in the veterinary literature (Traub-Dargatz et al. 1985) describes significant haemorrhage associated with equine gastric ulcers. In this report, a 9-week-old Arabian foal with a congenital cardiac defect was found dead, apparently of exsanguination from an otherwise subclinical gastric ulcer. In the author's experience, there is rarely clinically significant haemorrhage from gastric ulceration in horses. However, it is not uncommon to observe haemorrhage from equine gastric ulcers during endoscopy. The lesions involved often appear to be quite superficial. Some of these haemorrhages appear to be caused by gastric insufflation with stretching of the lesion and frequently by trauma from the endoscope during the gastroscopic examination.
In a recent study (Murray et al. 1996) on the factors associated with gastric lesions in Thoroughbred racehorses, a 10-point scoring system was utilised. This scoring system improves upon the former 4-point system by having separate descriptions for glandular and nonglandular lesions and allowing a greater spread of lesion scores. It places less emphasis on the number of lesions present but number and severity scores remain combined.

The effect of equine gastric ulcer numbers, size, and depth on clinical signs or healing rates has yet to be determined. Intuitively, one would suspect that like any other wound, a small ulcer would heal faster than a large one. Although there are no supporting data for this in horses, an analysis of gastric ulcer healing studies in man (Maton 1991) determined that irrespective of the drug used, healing was slower in patients with large ulcers than in those with small ulcers. Considering this size-related healing rate, it would be optimum to measure gastric ulcers in horses as a factor of severity. However, measuring ulcer size in horses routinely is technically challenging. Equine ulcers, especially those in the nonglandular mucosa, tend to be very irregular in shape and would require many measurements to determine the actual size. Transendoscopic measurement of gastric ulcers in horses has been reported (MacAllister et al. 1994). In this study, lesions were measured by premarked polyethylene tubing passed through the endoscope biopsy port and placed across the ulcer. These ulcers were experimentally induced with electrocautery and were circular such that only one measurement was necessary for each lesion. It would be much more difficult to use this method on clinical cases or other experimentally induced lesions because of the number of lesions present and the irregular borders. In the future, computerised image analysis could prove to be an appropriate method of determining ulcer size.
Histopathological evaluation is the only definitive determinant of ulcer depth. However, the authors believe depth should be evaluated endoscopically and considered in any ulcer scoring scheme. In the authors’ experience, endoscopically determined ulcer depth may be an important factor in the rate of healing i.e. superficial ulcers heal at a faster rate than deeper ulcers. It also appears that active ulcers (ulcers in the formation stage or those becoming more severe) have a typical endoscopic appearance. They have dark, necrotic appearing or hyperaemic craters. As healing begins, the lesion craters become more pink and often develop a granulation tissue-like appearance. Superficial ulcers erosions infrequently develop the dark and necrotic appearing ulcer craters regardless of their stage of development or healing.

Utilising the grading system and statistical analysis described here, there was significant variability between observers only on the number of ulcers in the nonglandular mucosa. This is not surprising considering the variability of size and shape of ulcers in this region. It is often difficult to determine where one ulcer ends and the next begins.

Further studies are indicated to determine if the equine gastric ulcer scoring system developed in this study correlates with healing of gastric ulcers and to determine if there is an association of ulcer score with clinical signs of gastric ulcers in horses.

References