

Lesions (ulcers and/or erosions) and desquamations location in the gastric mucosa from asymptomatic Quarter Horse foals: endoscopic survey

Localização de lesões (úlceras e/ou erosões) e descamações da mucosa gástrica em potros assintomáticos da raça Quarto de Milha: estudo endoscópico

CORRESPONDENCE TO:
Antonio Cezar de Oliveira Dearo
Departamento de Clínica Veterinária, Centro de Ciências Agrárias, Universidade Estadual de Londrina.
Caixa Postal 6001,
86051-970 - Londrina - PR
e-mail: dearoaco@npd.uel.br

1-Departamento de Clínica Veterinária da Universidade Estadual de Londrina - PR
2-Departamento de Medicina Veterinária da Universidade Federal de Viçosa -MG
3-Faculdade de Medicina Veterinária e Zootecnia da UNESP - Botucatu - SP

Antonio Cezar de Oliveira DEARO¹; Marco Aurélio Ferreira LOPES²; Waldir GANDOLFI³

SUMMARY

Gastric ulcer accounts for an important cause of abdominal discomfort in young horses. Concerning either the presence or absence of clinical signs and their variations, the lesions location in the gastric mucosa and complications resulting from ulcerative lesions, four clinical syndromes have been described in foals: 1) Asymptomatic or silent ulcers; 2) Symptomatic or active ulcers; 3) Perforated ulcers; and 4) Gastric or duodenal obstruction. With the aim of studying the distribution of lesions (ulcers and/or erosions) and desquamations from the non-glandular epithelium in the gastric mucosa of young horses and a possible relationship between both alterations (lesion/desquamation), sixty Quarter Horse foals without signs of gastric disease underwent gastroscopy. Foals were divided by age in four groups of 15 animals as follows: 1 to 30 days, 31 to 60 days, 61 to 90 days and 91 to 120 days. Lesions were most prevalent in the stratified squamous epithelial mucosa mainly adjacent to the *margo plicatus* along the greater curvature followed by squamous mucosa next to the cardia along the lesser curvature, glandular and non-glandular fundus and antrum. Regions of the fundus and *margo plicatus* were similarly affected by desquamations. There was no association between lesions and desquamations occurrence.

UNITERMS: Stomach ulcer; Endoscopy; Foals; Stomach; Ecdysis.

INTRODUCTION

Among the several gastrointestinal disorders responsible for monetary losses in the field of equine breeding, gastroduodenal ulceration accounts for a significant percentage of cases⁵. Disease on continuing investigation in human medicine, gastroduodenal ulceration in horses mainly occurs in suckling foals up to 4 to 5 years old^{33,37,45,46}.

Even though its aetioloogy is poorly understood, several factors are believed to be important in its genesis^{7,20,44,46}. Several microorganisms, such as *Escherichia coli*, *Salmonella* sp, *Clostridium* sp, *Proteus* sp, *Enterobacter* sp, *Campylobacter jejuni*, *Candida* sp, *Rotavirus* etc., have been isolated from affected foals, however is assumed that these organisms play a secondary role in the pathogenesis of ulcerations^{1,15,20,45,46}. Opposed to human beings, it hasn't been

isolated *Helicobacter pylori* (*Campylobacter pylori*) from horses with gastric ulcers^{13,14,35,39}. Other causes include trauma by either foreign bodies or *Gasterophilus intestinalis* larvae³⁸ and nonsteroid anti-inflammatory drugs^{9,17,40,41,42}.

Murray *et al.*³⁰ suggested that desquamations from the squamous mucosa (non-glandular mucosa) could expose the deep epithelial layers to the action of aggressive factors (HCl and pepsine) bringing about deeper lesions such as ulcers.

Currently, pathogenic pathways of gastric and duodenal ulcers in foals and adults horses remain unknown, however an imbalance between protective and aggressive factors is considered^{18,26,28,36}, although Baker³ refers that neither an excess of aggressive nor a deficiency of protective factors could be established in horses as yet.

Concerning either the presence or absence of clinical signs and their variations, the lesions location in the gastric

Table 1

Number and rate of Quarter Horse foals with gastric lesions (ulcers and/or erosions) in different regions of gastric mucosa according to age group.

Regions	Age Group (days)				Total Number and rate
	1 - 30	31 - 60	61 - 90	91 - 120	
Non-glandular	3	6	5	4	18 (69.2)
Glandular	0	1	0	1	2 (7.7)
Non-glandular and Glandular	1	0	4	1	6 (23)
Non-gland. fundus	0	4	2	1	7 (26.9)
Non-gland. MP	4	2	5	3	14 (53.8)
Non-gland. LC	1	3	3	3	10 (38.4)
Gland.fundus	1	1	3	2	7 (26.9)
Gland.antrum	0	1	2	0	3 (11.5)

Non-gland. = Non-glandular Gland. = Glandular MP = *Margo plicatus* LC = Lesser curvature.

mucosa and complications resulting from ulcerative lesions, four clinical syndromes have been described in foals:

- 1) Asymptomatic or silent ulcers;
- 2) Symptomatic or active ulcers;
- 3) Perforated ulcers; and
- 4) Gastric or duodenal obstruction^{4,5,19,25,28}.

The diagnosis of gastric ulceration should be based on anamnesis, clinical signs, response to therapy and gastroscopic examination, being the last the most objective and accurate means of diagnosis^{8,10,20,23,24,25,29,35,37,46}.

With the aim of finding out the behavior of "asymptomatic or silent ulcers" syndrome in horses bred under Brazilian conditions, this work has the purpose of establishing the distribution of gastric lesions (ulcers and/or erosions) and desquamations from the squamous mucosa and a possible relationship between both alterations (lesion/desquamation) in asymptomatic Quarter Horse foals up to 120 days old.

MATERIAL AND METHOD

Equipment

Gastroscopic examination was performed with a fiberoptic endoscope, 1.75 m long and 9.5 mm outer diameter*, light source with air/water pump (250W/24V)* and suction unit*. Gastroscopic findings were recorded through a photographic camera*.

Animals

Were utilized sixty Quarter Horse foals aged one to 120 days, of both sex, from four breeding farms located in

different towns of São Paulo State - Brazil.

Foals were divided in four age groups of 15 animals as follows: one to thirty days, 31 to sixty days, 61 to ninety days and 91 to 120 days.

The animals were not randomly selected but rather obeying either the veterinarians or farm manager indications according to foals availability and in agreement with the following criteria: do not have presented until the time of examination clinical signs compatible with gastric ulcer (bruxism, excessive salivation, dorsal recumbency etc.), do not have been submitted to antiulcerogenic therapies (antacids, acid secretion inhibitors etc.) and were not older than 120 days.

Information such as identification (name or number, sex, age, breed and weight) and location of gastric lesions and desquamations were recorded in a protocol way.

Procedure

By means of muzzling, animals were submitted to 12 or 16 to 18 hours of fasting before examination, except foals in exclusively milk feeding, which were submitted to four hours of fasting. Four people were utilized to perform the examination where two of them physically restrained the foal, one passed the endoscope through the foal's nostril and one was the endoscopist. Chemical restraint was carried out by injection of Romifidine[#] (0.04 to 0.08 mg/kg) intravenously, after routine antisepsis of jugular vein, five minutes before starting the examination. Gastroscopic technique was performed according to Brown *et al.*⁶, Adamson; Murray², Cudd; Wilson¹¹ and White⁴³.

*H.Ozawa - Import & Export.Co.

[#]Romifidine (Sedivet) - Boehringer Ingelheim

Gastrosopic Findings Classification

Gastrosopic findings were classified according to location in: non-glandular fundus, non-glandular adjacent to the *margo plicatus* along the greater curvature, non-glandular next to the cardia along the lesser curvature, glandular fundus and glandular antrum (Fig. 1).

RESULTS

The majority of foals stood well the examination. In spite of sedation, they showed little reluctance to passage of the endoscope through the nasal cavity. None of them showed any sign of abdominal discomfort to gastric insufflation. Fasting time was insufficient in 18 examined foals. About 10

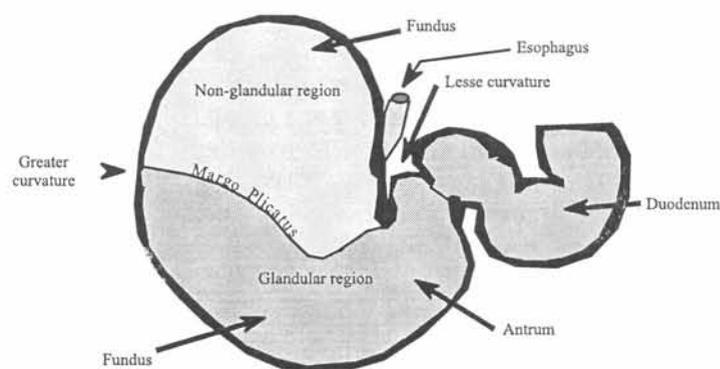


Figure 1

Cross-section of the equine stomach and duodenum illustrating the gastric regions.

to 40% of glandular mucosa couldn't be inspected in 14 (47%), 3 (25%) and 1 (5%) foals submitted to 12, 4 and 16 to 18 hours of fasting respectively.

Of the 60 examined foals, 26 (43.3%) showed lesions (ulcers and/or erosions) in the gastric mucosa. Non-glandular mucosa (squamous mucosa) was the most affected by lesions (92.3%), mainly along the greater curvature adjacent to the *margo plicatus* (53.8%). Eight animals (30.7%) showed lesions in the glandular region (Tab. 1).

Lesions located in the non-glandular region presented themselves as mucosal defects with clear edges and reddish bottom, in linear, circular and irregular shapes. Sometimes when a great deal of lesions adjacent to each other were located next to the *margo plicatus* they resembled to flow together giving rise large lesions. Bleeding lesions at the lesser curvature were presented in two animals between 61 to ninety days old. Glandular lesions presented themselves as mucosal defects with raised edges, hyperemic, and reddish bottom, sometimes with a fibrin cover. They had linear or circular shapes and most of them presented haemorrhagic. In an 87-day-old foal, were noted linear, haemorrhagic lesions placed radiately around the entire pyloric sphincter looking like lesions of human beings with reflux gastritis.

Desquamations were found out in 17 foals (28.3%) mainly those aged 1 to 30 (60%) and 31 to 60 days (40%). The regions of the fundus and *margo plicatus* showed similar rates of desquamations (Tab. 2)

All foals aged 1 to 30 days with squamous mucosa lesions also showed desquamations, while just in two foals aged 61 to 120 days lesions were associated with desquamations (Tab. 3).

Table 2

Number of Quarter Horse foals with squamous epithelium desquamation in different gastric regions according to age group.

Desquamations (Regions)	Age group (days) Total				Total
	1 - 30	31 - 60	61 - 90	91 - 120	
Fundus	4	2	1	1	8
<i>Margo plicatus</i>	4	2	0	0	6
Fundus and <i>margo plicatus</i>	1	2	-	-	3

Table 3

Number of Quarter Horse foals with gastric lesions (ulcers and/or erosions) in the non-glandular region along with desquamation or alone, according to age group.

Lesions in the nonglandular region	Age group (days)				Total
	1 - 30	31 - 60	61 - 90	91 - 120	
With desquamation	4	2	1	1	8
Without desquamation	0	4	8	4	16

DISCUSSION

Fasting periods indications according to Palmer³⁴ and Nappert *et al.*³³, of 12 hours to foals in solid feed and 4 hours to those in milk feed, showed insufficient in a great deal of animals. Lower fasting periods according to Cudd; Wilson¹¹ of 2 to 8 hours and Adamson; Murray² of 6 to 10 hours to young suckling foals on solids will result incomplete gastric emptying and partial inspection of gastric mucosa. Fasting periods insufficiency perhaps may be attributed to the means of which it was carried out inasmuch as muzzling could delay gastric emptying². Incomplete gastric inspection of the glandular mucosa in these animals must be faced as a limiting factor in evaluation of location of gastric lesions in this region as eventual lesions presented, couldn't be detected by gastroscopic examination. Apart from the partial inspection of the glandular mucosa, the same cannot apply to non-glandular mucosa as all fasting periods employed in this study enabled thorough inspection of the mentioned gastric region.

The unanimity of information between several scientific papers reviewed and that achieved in this study, concerning the location of lesions in the gastric mucosa, with an emphasis on the squamous mucosa adjacent to the *margo plicatus* along the greater curvature, either in foals^{1,12,22,30,31,32,38} or in adult horses^{16,21,27}, suggests this region as highly predisposed to the development of lesions such as ulcers and/or erosions. According to Rooney³⁸, the region of the *margo plicatus* could represent an anatomic *locus minoris resistentiae*. Although changes in lesions location along time haven't been analysed as done by Murray *et al.*³¹ by means of follow up gastroscopic examinations, where he could notice that the older foals the higher prevalence of lesions at the lesser curvature and lower at the *margo plicatus*, both regions didn't show significantly changes in prevalence of lesions as older foals were examined (Tab. 1).

The similarity in occurrence of desquamations between fundus and *margo plicatus* regions (Tab. 2) suggests the

desquamation process occurs in a regular way along the whole squamous mucosa without preference for one or another region. Even possible, the findings achieved do not allow to establish a relationship between lesions and desquamations occurrence as proposed by Murray *et al.*³⁰. Despite 100% of animals with lesions aged 1 to 30 days have also presented desquamations, the majority of foals from superior age groups mainly that aged 61 to 90 days even carrying gastric lesions, didn't show desquamations (Tab. 3). It must be emphasized that lesions not always occurred at the same region of desquamations (Tab. 1 and 2).

Even though several information concerning the gastric ulcers in foals have been recorded in the past few years by virtue of using long fiberoptics endoscopes and videoendoscopes as a diagnostic method, many points such as the preference of gastric lesions to locate at the squamous mucosa adjacent to *margo plicatus* along the greater curvature remain to be cleared up.

With the aim of clearing these and additional issues, mainly those involving the pathophysiology of ulcers and erosions in foals and adult horses, thorough studies about histology, physiology and aggressive and protective factors from equine gastric mucosa must be emphasized.

CONCLUSIONS

According to the results obtained some conclusions could be established:

- 1) non-glandular mucosa adjacent to the *margo plicatus* along the greater curvature was the most affected region by lesions followed by non-glandular region next to the cardia along the lesser curvature, non-glandular and glandular fundus and antrum;
- 2) desquamations are ordinary findings during the gastroscopic examination of young foals and are distributed along the entire non-glandular mucosa;
- 3) desquamations occurrence didn't show relationship to lesions occurrence.

RESUMO

A úlcera gástrica figura como uma importante causa de desconforto abdominal em equinos jovens. De acordo com a localização das lesões na mucosa gástrica, a presença ou ausência de sinais clínicos e possíveis complicações resultantes de sua ocorrência, quatro síndromes clínicas são frequentemente descritas em potros: 1) Úlceras assintomáticas ou silenciosas; 2) Úlceras sintomáticas ou ativas; 3) Úlceras perfuradas; e 4) Obstruções gástrica ou duodenal. Com o objetivo de se verificar a distribuição de lesões gástricas (úlceras e/ou erosões) e descamações do epitélio aglandular no estômago de equinos jovens assim como uma possível relação entre as alterações mencionadas (lesão/descamação) sessenta potros da raça Quarto de Milha não-portadores de sinais clínicos compatíveis com úlceras gástricas foram submetidos à gastroscopia. Os potros foram divididos em quatro faixas etárias de 15 animais cada uma, sendo: 1 a 30 dias, 31 a 60 dias, 61 a 90 dias e 91 a 120 dias de idade. As lesões ocorreram em ordem decrescente de frequência nas regiões aglandular próximo ao *margo plicatus* ao longo da curvatura maior, aglandular próximo à cárdia ao longo da curvatura menor, fundo glandular e aglandular e antro. As descamações do epitélio aglandular ocorreram de forma similar nas regiões de fundo e *margo plicatus*. Não houve associação entre a ocorrência de lesões e descamações.

UNITERMOS: Úlcera gástrica; Endoscopia; Potros; Estômago; Ecdise.

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Received: 20/08/1997

Accepted: 18/06/1998