A Meta-Analysis of Intestinal Lesions Observed in Necropsies Involving 524 Equine Subjects

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Colonic lesions (colitis) may lead to impaired performance in horses and may also contribute to colic, the number one cause of death in American horses. Colic cases referred to surgery result in death in up to 30% of incidents. The meta-analysis described here aims to increase awareness of this under-reported but surprisingly common pathology.

Since 2003, we have performed semi-regular necropsies on horses at abattoirs in Texas and later in Quebec. In all of these studies, a specific protocol has been followed, allowing us to group the observations into a large-scale meta-analysis.

The general methodology in all studies was the same. After the horses were euthanized, we collected a fecal ball to help us evaluate various fecal blood tests (FBTs), including guaiac and antibodies, against gross observations. The horses at the abattoirs in all the studies included a mix of breeds, representing riding, range, race and show horses, as well as animals bred for meat consumption or kept as pets. Immediately after the horse was euthanized, the digestive tract was removed and the stomach and colon were tied off for separate examination. The stomach was split open and a longitudinal incision was made along the entire length of the colon so both could be laid out for observation. Both gastric and colonic lesions were noted and graded. Gastric ulcers were categorized according to the Practitioner’s Simplified Scoring System on a scale from 0 to 3:

1. Intact mucosal epithelium (can have mild reddening and/or mild hyperkeratosis)
2. Small single or small multifocal lesions
3. Large single or large multifocal lesions or extensive superficial lesions
4. Extensive (often coalescing) lesions with areas of apparent deep ulceration

Due to the dearth of research on colonic ulcers, a corresponding colonic ulcer grading scale did not exist. We therefore applied the Practitioner’s Simplified Scoring System to the colon for purposes of this study. The scoring system does not specifically reference bleeding or the presence of blood in its descriptions of ulcers at any score. We therefore assume that ulcers of grade 2 or higher represent those where whole blood (hemoglobin) is present. Grade 1 ulcers, while not bleeding per se, may be associated with seeping of albumin at the point of injury.

Although different versions of the FBT were tested in these studies, the observational data were collected using similar procedures, allowing us to aggregate them into an effective meta-analysis. We collated the observations from over 1,000 necropsies in our database and grouped them by equivalent protocols. The largest coherent group that included colonic quadrants yielded a population of 524 horses that we could aggregate and categorize by ulcer grade and location.

Our Analysis

We found that only 16% of the animals had a perfect score of zero with no noted lesions. Another 40% had small lesions, often petechiation and pitting caused by parasites. The number of horses with moderate to severe ulcers was a surprisingly high 44%:

These scores were collected by colon quadrant according to this standard numbering scheme:

Q1: left ventral colon
Q2: left dorsal colon
Q3: right ventral colon
Q4: right dorsal colon

The colonic lesions were not equally distributed among these quadrants:
Notice that the score for Q4, the right dorsal quadrant, is not over-represented and in fact is less than the average score for Q3, the right ventral quadrant. Veterinarians familiar with right dorsal colitis (RDC) may be surprised to see such a high level of involvement in other quadrants. In this analysis, right-dorsal lesions account for less than a third of the visualized lesions. Although the treatment for RDC typically involves discontinuance of NSAIDs and feeding greater fiber, the treatment for these other ulcers of indeterminate etiology is unknown.

In this multi-year study, we observed more colonic ulcers than have been reported in the literature. Colonic ulcers are difficult to visualize, so data are sparse. Colonoscopies are ruled out, because evacuating the horse for scoping endangers the patient. Ulcers are difficult or impossible to discriminate on x-rays, MRIs or ultrasound. What we know is largely due to colic surgeries and necropsies. From our practice, we expected to see some cases of RDC, and were not disappointed, but we were intrigued to find multiple types of lesions throughout all quadrants of the colon.

A New Syndrome

Hindgut acidosis, colonic ulcers, obstructions/impactions and other colonic pathologies represent a syndrome similar to the more familiar equine gastric ulcer syndrome (EGUS). We propose a new acronym for this concurrence of symptoms: ECUS, for Equine Colonic Ulcer Syndrome.

Although the exact etiology is unknown, problems in the fore- and hindgut are likely to be related to the heavy application of energy-dense feeds in the service of heightened performance. This may lead to disruptions of the normal flow of digesta and the specific microbial populations that have coevolved with the horse to deal with low-energy roughage. The unnatural amount of starch in such a regimen overwhelms the ability of the stomach and small intestines to process it, and it overflows into the hind gut, creating blooms of carbohydrate-loving, acid-producing bacteria like lactobacillus. This can lead to a lowered pH which is caustic in itself, but it also creates an environment that encourages the growth of pathogens that can lead to further discomfort, poor performance, colic, laminitis and even death.

Unfortunately, very little is known about ECUS other than NSAID-induced right dorsal colitis (RDC). Nevertheless, several years ago, we began to suspect a hidden incidence of colonic ulceration when we noticed a higher than expected prevalence of subclinical anemia and protein-losing enteropathies in poorly performing equine athletes. To investigate the prevalence of possible subclinical colonic ulcers (colitis), we undertook a necroscopic study that, over the period of eight years, has now encompassed over 1,000 horses. The studies have demonstrated that colonic ulcers/lesions are real and often severe. In a meta-analysis of the gross necroscopic observations of horses at abattoirs in Texas and Canada, we show that the overall prevalence is greater than 80%, and more severe lesions (grade 2 or worse) exist in over 44% of the animals.

This study demonstrates that a majority of horses presenting at abattoirs, including leisure and performance horses, are afflicted with some kind of colitis. These findings raise questions about the specific causes of colitis, the effect of colonic ulcers on performance, and their role as a contributing factor in colic.

Conclusion

We aggregated the data from over 1,000 necropsies conducted in abattoirs in Texas and Quebec over a nine-year period starting in 2003. From that we report on a meta-analysis of 524 horses with identical protocols. Starting with our first study, we discovered that – in addition to gastric ulcers – horses suffered from colonic ulcers at rates exceeding 60%. Colitis may lead to impaired performance in horses and can also lead to colic. The meta-analysis described here shows that on average, horses suffer moderate to severe ulceration in 44% of cases. Finally, we argue that the set of conditions described here represents a syndrome we propose to call ECUS, for equine colonic ulcer syndrome.
1 Andrews FM. *Overview of Gastric and Colonic Ulcers*. Kentucky Equine Research.


