



Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 51 Month: December Year: 2014

Answer Sheet

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Clinical History: A 2.5 year-old, 377 kg, black and white Gypsy colt with a history of a 24 hour diarrhea and colic.

Necropsy Findings: Body and post mortem conditions were good. The rectal mucosa was protruding through the anus (rectal prolapse). The ocular and gingival mucosae were slightly pale. Multifocal petechiae and ecchymoses were identified in the mediastinum, thymus, pericardium, parietal and visceral pleura. The lungs were soft and pink, with numerous hemorrhages deeply in the parenchyma. The distal esophagus had muscular hypertrophy. The stomach contained small amounts of foul smelling fluid. The most severe lesions within the alimentary canal were seen in the jejunum and ileum (below).

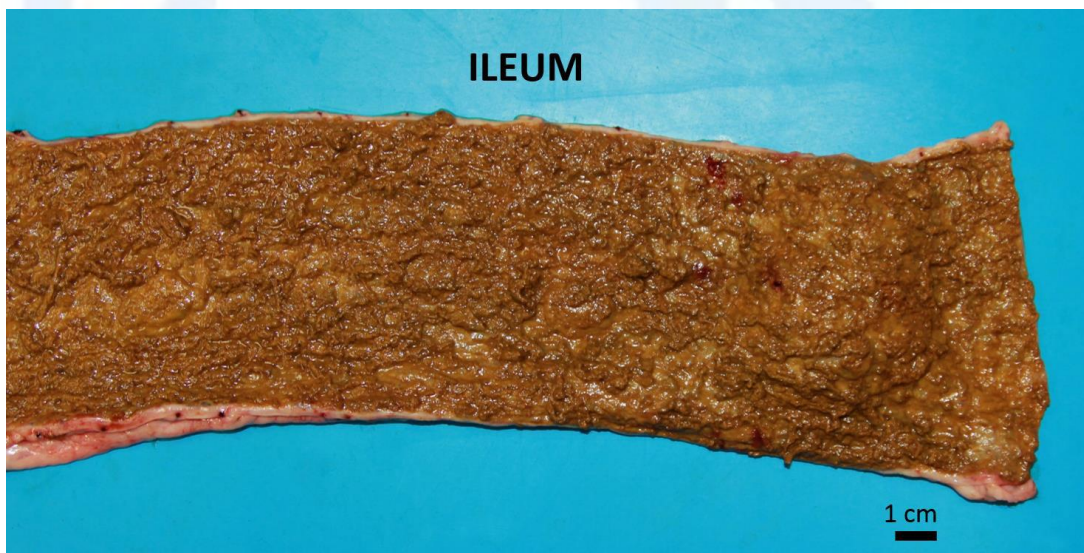


Figure 1. Ileum. ileocecal valve to the right.

Diagnosis:

1. Ileitis (fibrinonecrotizing (pseudomembranous), diffuse, severe.
2. Possible etiologies:
 - a. *Salmonella spp.*, *Clostridium perfringens* type C, *Clostridium difficile*, *Ehrlichia risticii*, *Lawsonia intracellularis*, *Equine coronavirus*
3. Etiology in this case: Presumptive *Clostridium difficile* based on isolation of this microorganism from the small intestine and negative *Salmonella* PCR and *C. perfringens* toxins (alpha, beta, epsilon) ELISA results.

Typical Gross findings:

Enterocolitis associated with *Clostridium difficile*:

- Foals small intestine is usually affected and sometimes accompanied by lesions in the large intestine.
- Adults' large intestine is usually affected but occasionally the small intestine may be involved.
- Multifocal, segmental, or diffuse intestinal necrosis, hemorrhage; congestion; often with marked gelatinous edema of the large intestine and abundant bloody or green watery contents
- Ulcerative and pseudomembranous enteritis/colitis has been reported

Typical microscopic findings:

- Combination of mucosal necrosis, mucosal and/or submucosal thrombosis, mucosal and/or submucosal hemorrhage, submucosal edema, mucosal and/or submucosal congestion, mucosal and/or submucosal neutrophilic infiltration, fibrinonecrotic pseudomembranes, occasionally "volcano lesions" (neutrophils and fibrin exuding through the tip of ulcerated intestinal villi) and occasionally numerous Gram positive rods on the superficial mucosa.

Discussion: *Clostridium difficile* is a very important cause of entero-colitis and diarrhea in humans and animals. Both in humans and horses *C. difficile* associated disease is commonly associated with antibiotic therapy and hospitalization, but can happen in the absence of these predisposing factors, in which is referred to as "community-associated *C. difficile* disease". Other less understood possible predisposing factors associated with the presentation

of this disease are: stress, change of diet, transportation, starvation, nasogastric intubation and surgical or medical treatment. This bacterium may carry two main virulence factors (Toxins A and B), both of which are believed to be involved in disease production. In this case, lesions were present mostly in the jejunum and ileum, and were less severe in the cecum and colon, which is somewhat unusual as the disease in the adult horse typically affects the large intestine and spares the small intestine. Anaerobic culture of the cecal contents yielded growth of *Clostridium difficile*, suggesting a role of this microorganism in the development of the disease (the carrier rate of *C. difficile* in normal horses is usually very low); however, its toxins were not identified in the ileum contents by ELISA and therefore the diagnosis cannot be confirmed. Salmonella PCR was negative on ileum contents. A toxin panel for *Clostridium perfringens* toxins (alpha, beta and epsilon) on samples of small intestine was also negative. According to the recent literature, *C. difficile* culture positive/toxin negative cases of enteritis or enterocolitis suggest, but do not confirm *C. difficile* associated disease, as the gold standard for confirmation is toxin detection.

References:

Diab SS, Songer G, Uzal FA. *Clostridium difficile* infection in horses: a review. *Vet Microbiol* 2013, 167: 42-49.

Diab SS, Rodriguez-Bertos A, Uzal FA. *Pathology and diagnostic criteria of Clostridium difficile enteric infection in horses. Vet Pathol* 2013, 50: 1028-1036.

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Please send your comments/questions to the whole LCPG list by hitting "reply to all".

A final document containing this material with answers and a brief discussion will be posted on the C. L. Davis website by the end of the current month (http://www.cldavis.org/lcpg_english.html).