Equine Enterolithiasis: A Review and Retrospective Analysis of 900 Cases (1973–1996)

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Enterolithiasis has become an important cause of surgically managed colic in many areas of the United States and around the world. An understanding of common clinical presentations, identification of horses at risk, appropriate surgical techniques, and prognosis following surgical treatment are essential to the successful management of enterolithiasis in horses. Authors' addresses: Depts. of Surgical and Radiological Sciences (Hassel, Snyder, and Yarbrough) and Statistics (Drake), University of California at Davis, Davis, CA 95616; 255 Johnston Dr., Douseman, WI 53118 (Langer).

1. Introduction

Colic that is due to obstruction of the large intestine by enteroliths is common in several geographical regions. Enteroliths have become the most common cause of surgically managed colic at our hospital in recent years. They also reportedly occur in several regions of the United States and around the world.[1,2] Proposed etiologic factors for the development of enteroliths include dietary or genetic factors contributing to increased mineral content and an alkaline pH within the colon, increased exposure to nidi, and conditions promoting ileus. A comprehensive and current review of enterolithiasis is necessary to update practitioners on the condition. The purpose of this study is to describe the dietary and management history, signalment, clinical signs, surgical findings, rate of reoccurrence, and outcome of surgical treatment of horses with colic that is due to enterolithiasis. A review of common techniques utilized in the surgical management of enterolithiasis is also reviewed.

2. Materials and Methods

Medical records from all horses with enterolithiasis confirmed by radiography, ventral midline celiotomy, or necropsy, admitted to the Veterinary Medical Teaching Hospital between 1973 and 1996, were reviewed. Nine hundred horses were presented to the University of California with enterolithiasis. Data extracted from medical records included age, breed, sex, physical and clinicopathologic exam findings, surgical or necropsy findings, and outcome. Additionally, details of dietary and management history, presence of postoperative complications, reoccurrence, and determination of affected siblings were collected from follow-up phone conversations with owners.

Gender and breed differences in the study and control hospital population were compared by using odds ratios with 95% confidence intervals. The age distribution between the enterolith and control population was compared by using an unpaired *t* test; *p* values of ≤ 0.05 were considered significant.

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3. Results

From 1973 to 1996, horses with enterolithiasis represented 15% (900/5977) of all horses presented for the treatment of colic, and 27.5% (666/2425) of all horses that underwent celiotomy for colic. Between 1973 and 1986, the number of horses with enterolithiasis represented only 6.6% (192/2913) of all horses presented for colic, compared with 21.6% (661/3064) during the 10-year period from 1987 to 1996. Arabian or Arabian crosses (353) and Quarter Horses (238) were the most common breeds affected. Arabians and Morgans were overrepresented and Warmbloods and Thoroughbreds were underrepresented in the study population, compared with the general hospital population. A sex predilection was not identified. Alfalfa hay comprised greater than or equal to 50% of the diet in 98% of horses with enteroliths. An evaluation of a control colic population revealed a trend toward reduced alfalfa intake in horses without enteroliths. The mean age of horses with enterolithiasis was 11.5 years (range 1–33 years), which was older than that of the hospital population (8 years). A reoccurrence of enterolithiasis was identified in 6% of the surgically managed horses, and 8.4% of horses for which follow-up was available had siblings affected. Of horses recovering from anesthesia, 96% (556/579) were discharged from the hospital. Teniotomy, a new technique that facilitates movement of enteroliths lodged within the proximal small colon, was successfully utilized in 15 cases. 92.1% of enterolith cases discharged from the hospital were alive 1 year postoperatively. Colonic rupture caused by an enterolith was identified on presentation or intraoperatively in 15.9% (135/900) of cases.

4. Discussion

The number of horses presenting with enterolithiasis has increased as a proportion of all colics and of the hospital population in recent years, and it is considerably higher than in previous reports. Previous reports describe enteroliths as being most common in horses 5–10 years of age.[3] This study indicated that enterolithiasis was most prevalent in older horses (mean age 11.5 years), but that it also affected animals as young as 1 year of age. In accordance with earlier reports, the Arabian remains the most commonly affected breed. Siblings of 8.4% of the horses were affected with enteroliths, lending further support to a breed predisposition for this condition. Survival rates following celiotomy for treatment of enterolithiasis were considerably higher than in previous reports.[3,4] This may be the result of improved surgical techniques and postoperative management practices. Surgical techniques that may facilitate stone removal and reduce the potential for postoperative complications include the use of a more cranially placed ventral midline incision, complete evacuation of feed and fluid material adjacent to enterotomy sites to minimize spillage, thorough exploration of the intestinal tract prior to closure, careful closure of enterotomies in the descending colon to minimize reduction in luminal diameter, and use of an antimesenteric teniotomy with enteroliths in the proximal small colon to improve surgical exposure and decrease the potential for peritoneal contamination during enterotomy.

The large number of horses requiring euthanasia because of intestinal rupture or because of financial constraints further supports the need for an increased study of the pathogenesis of enterolithiasis. Additional research is necessary to further characterize dietary, environmental, and genetic risk factors associated with the development of enteroliths, so that preventative measures can be implemented.

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