

Diagnosis and Management of Colic associated with Chronic Enteric Inflammation in Horses

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Abstract: Colic is defined as an abdominal pain and chronic enteric inflammation is a severe life-threatening disease occurs due to infiltration of inflammatory cells which is characterized by diarrhea, weight loss, poor body condition and recurrent colic. Horses are monogastric animals. They are hindgut fermenters making them an increased risk to colic. Proper diagnosis and management can reduce the risk of chronic enteric inflammation and associated colic in horses.

Keywords: Colic, Risk factors, Chronic enteric inflammation

Introduction

Colic is defined as a symptom of a disease characterized by 'pain in the abdomen' originating from GIT. It occurs worldwide and is the first cause of death in adult horses. It mainly occurs due to accumulation of gas, displacement of intestine, impacted food, parasites etc. Incidence rate is ranging between 4.2-10.6 % per year. About 76 % of cases are mild and 24 % of cases are severe and requires surgery. Mortality rate ranges between 0.5-0.7 % and case fatality rate between 6-13 %.

Overall prevalence in India is 11.42 %. It has been seen that the Kathiawari breed are more susceptible followed by Marwari breed and others. Highest prevalence is in between 5-10 years of age (58.33 %), which is followed by horses less than 5 years of age (33.33%) and more than 10 years of age (8.33%). Males are more susceptible than females. Spasmodic colic (75%) is the most

common type of colic followed by impaction colic. But, in Equine fairs that takes place in India, impaction colic (65 %) is more common. This is mainly because animals used to travel long distances without adequate feed and water and also there are changes in feed in between two places.

Risk Factors related to Colic

- **Intrinsic factors:** Breeds like Arabian horses, Thoroughbreds and Standardbreds of 2-10 years of age are frequently affected. Geriatric horses are most susceptible.
- **Diet and feeding practices:** Increased concentrated feed, indigestible grasses or sudden change in diet also predisposes the animal to colic.
- **Managemental factors:** Decreased water intake without constant access to water, increased duration of stabling per day or change in stabling or exercise schedule reduces intestinal peristalsis, which ultimately results in colic.
- **Others:** Exposure to cold, wet stormy weather, presence of internal Parasites like tapeworms, large strongyles, cyathostomes or any history of colic or recent colic surgery can cause recurrent colic.

Chronic Enteric Inflammation

Colic may be classified as spasmodic, tympanic, obstructive and inflammatory, of which inflammatory colic is most life-threatening when it progresses to chronic state. Chronic enteric

Inflammation is the inflammation and dysfunction of the intestines, occurs mainly due to infiltration of inflammatory cells like eosinophils, lymphocytes, macrophages, plasma cells or basophils into the mucosa or submucosa of intestine, characterized by diarrhea, weight loss, poor body condition and recurrent colic. They are genetic in Standardbred group of horses. Most of the cases are idiopathic and give an abnormal immune response to intestinal bacteria or diet. Other causes involve bacterial infections (*Mycobacterium paratuberculosis* and *M. avium*), fungal infections (*Aspergillus fumigatus* and *Histoplasma capsulatum*), food allergies and parasitic infestations (heavy cestode or small strongyle).

Patho-physiology

Hindgut of horse not only works as a fermentation vat, but also stimulates immune response, protects against pathogens and neutralization of toxins. It develops a barrier in the gut which prevents entry of pathogenic microbes into the gut. During abnormal immune response or in immuno-compromised animal, there is destruction of gut barrier which results in invasion of etiological agent through the mucosal or submucosal layer. This triggers release of inflammatory cells and there is infiltration of inflammatory cells into the affected area.

Types of Chronic Enteric Inflammation in horses

- **Granulomatous Enteritis (GE):** It is characterized by infiltration of macrophages, lymphocytes, epithelioid and giant cells in the intestine that form granulomas.
- **Lymphocytic Plasmocytic Enterocolitis (LPE):** In this, the lamina propria is infiltrated by lymphocytes and plasma cells
- **Multisystemic Eosinophilic Epitheliotropic Disease (MEED):** It is caused due to allergic reactions by food or internal parasitism, characterized by eosinophilic infiltration of the intestine and other organs (liver, skin & lungs).
- **Idiopathic, Focal, Eosinophilic Enterocolitis (IFEE):** In this type, eosinophilic infiltration is restricted to the intestine.

Diagnosis

- **Step 1:** History of gluten rich diet, more amounts of concentrated diet, less water availability etc. Physical examination

reveals elevated heart rate and respiratory rate with degree of pain and increased capillary refill time (more than 3 sec). Blood biochemistry shows hypoalbuminemia, hypoproteinemia, and elevated liver enzymes in all types. Besides this, anemia and neutrophilia are more common in GE and eosinophilia is mainly seen in MEED and IFEE.

- **Step 2:** On transabdominal USG, increased thickness of small intestine can be noted. Abdominocentesis is done to rule out presence of strangulating lesions, peritonitis, abdominal abscesses and abdominal neoplasia. In most cases, normal transudate is found in peritoneal fluid cytology.
- **Step 3:** Absorption test is done using oral D-xylose or glucose. Malabsorption is common in GE, LPE and IFEE, whereas, normal absorption is seen in case of MEED. Besides this, rectal biopsy is done in case of GE and LPE, but it cannot diagnose MEED and IFEE because eosinophilic infiltrates are found normally in the rectal mucosa of healthy horse. So, needle biopsy of livers in case of MEED (for liver fibrosis) and exploratory celiotomy for IFEE (circumferential mural bands are found) are done.

Management of Colic associated with Chronic Enteric Inflammation

- **Management of colic-**Analgesics (Phenylbutazone @ 4.4mg/kg IV or Flunixin @ 1.1 mg/kg IV), Sedatives (Xylazine @ 0.2mg/kg IM), corticosteroids, fluid therapy and diet of frequent small meals of a pelleted complete ration are used.
- **Management of Chronic Enteric Inflammation-**High-fiber or specialized commercial diets low in non-structural carbohydrates (glucose, fructose, lactose, sucrose or starch) should be given. Anti-inflammatory agents like corticosteroids (Dexamethasone and Prednisolone) and Azathioprine are used. For reducing infection, Metronidazole is used. Sucralfate and misoprostol are used for protecting gastro-intestinal lining. Gut health promoters like probiotics and omega-3 fatty acids are used. For controlling parasitism, larvicidal dosage of Fenbendazole

(10mg/kg) PO, once daily for 5 days should be given.

In case of MEED, along with the above treatment, Antihistamine (hydroxyzine hydrochloride) @ 2mg/kg,

PO BID and a triple antibiotic ophthalmic ointment (neomycin, bacitracin and polymyxin) every 8 hours are used. In IFEE, resection of diseased segment of intestine is indicated.

Table 1: Comparison among different types of chronic enteric inflammation in horses

| | GE | LPE | MEED | IFEE |
|---|--|--|---|--|
| Main symptom | Weight loss | Weight loss | Weight loss, Dermatitis | Colic |
| Location | Small Intestine | Small Intestine | Large colon | Small Intestine |
| Cell type (in intestine) | Aggregation of macrophages and epithelioid cells | Infiltration of lymphocytes and plasma cells into the lamina propria | Infiltration of eosinophils, lymphocytes and macrophages into the mucosa and submucosa layers | Infiltration of eosinophils and lymphocytes into all layers of intestine |
| Anaemia | Common | Rare | Rare | Rare |
| Hypo-albuminemia | Common | Rare | Rare | Rare |
| CHO absorption test | Malabsorption | Malabsorption | Normal absorption | Malabsorption |
| Rectal biopsy | Diagnostic | Not diagnostic | Diagnostic | Not diagnostic |
| Distribution of intestinal lesions | Diffuse | Segmental/diffuse | Segmental/multifocal | Segmental/diffuse with circumferential mural bands |
| Villous Atrophy | Constant | Constant | Rare | None |
| Other organs affected with gross lesions | Skin and mesenteric lymph nodes | Mesenteric lymph nodes | Skin, oral cavity, esophagus, salivary glands, liver, lungs, pancreas and mesenteric lymph nodes. | None |

Advancement in treatment: Fecal Microbiota Transplant (FMT) is approved in humans with *C. difficile* infection. Recently it has gained interest in small animals, ruminants and horses. In this, fresh feces from healthy donor are introduced to the recipient via enema. But, due to the long small colon in the horse, FMT via enema may not be effective. So, Naso-gastric intubation provides better result in horses. This technique has been used in small group of animals. Future studies should

aim to address this limitation by using large sample sizes, optimal donor selection, dosing, and administration protocols, as well as the long-term safety and efficacy of FMT in horse.

Prevention and Control

Highly digestible food should be provided. Smaller portions of food should be feed frequently throughout the day to increase digestion and absorption. High fiber diet (Eg- Beet pulp) to be

provided to decrease the burden on small intestine since fiber is fermented in large intestine. Simple diet that contains soluble fiber i.e., rice bran mixed with oil should be given since it will increase energy supply. If there is hypoproteinemia, then at least 14 % crude protein and supplementation of amino acids may be recommended.

Conclusion

Colic cases are increasing day-by-day due to improper management by their owners. Although many of the cases respond favorably to conservative medical management, but prevention should be the initial step. Owner should feed the animal on a regular schedule with less grains and fats in the diet. As horses are continuous grazers, mangers should be always filled with feedstuffs and they should get continuous supply of water throughout the day. Regular deworming program should also be practiced for effective parasite control.

References

- Bland, S. D. (2016). Equine colic: a review of the equine hindgut and colic. *Veterinary Science Development*, 6(1). <https://doi.org/10.4081/vsd.2016.6223>
- Boshuizen, B., Ploeg, M., Dewulf, J., Klooster, S., Bruijn, M. D., Picavet, M. T. & Delesalle, C. (2018). Inflammatory bowel disease (IBD) in horses: a retrospective study exploring the value of different diagnostic approaches. *BMC veterinary research*, 14: 1-8. <https://doi.org/10.1186/s12917-018-1343-1>
- Durham, A. E. (2010). Conditions affecting gastrointestinal tract health. In *The impact of nutrition on the health and welfare of horses* (pp. 145-160). EAAP Wageningen. https://doi.org/10.3920/978-90-8686-711-0_030
- House, A. M., & Warren, L. K. (2016). Nutritional management of recurrent colic and colonic impactions. *Equine Veterinary Education*, 28(3), 167-172. <https://doi.org/10.1111/eve.12543>
- Kalck, K. A. (2009). Inflammatory bowel disease in horses. *Veterinary Clinics: Equine Practice*, 25(2): 303-315. <https://doi.org/10.1016/j.cveq.2009.04.008>
- Mullen, K. R., Yasuda, K., Divers, T. J. & Weese, J. S. (2018). Equine faecal microbiota transplant: Current knowledge, proposed guidelines and future directions. *Equine Veterinary Education*, 30(3): 151-160. <https://doi.org/10.1111/eve.12559>
- Reinemeyer, C. R., & Nielsen, M. K. (2009). Parasitism and colic. *Veterinary Clinics: Equine Practice*, 25(2): 233-245. <https://doi.org/10.1016/j.cveq.2009.04.003>
- Rhodes, D. M. & Madrigal, R. (2021). Management of Colic in the Field. *Vet Clin: Equine Practice*, 37(2): 421-439. <https://doi.org/10.1016/j.cveq.2021.04.010>
- Scantlebury, C. E., Archer, D. C., Proudman, C. J. & Pinchbeck, G. L. (2011). Recurrent colic in the horse: Incidence and risk factors for recurrence in the general practice population. *Equine Veterinary Journal*, 43: 81-88. <https://doi.org/10.1111/j.2042-3306.2011.00383.x>
- Van der Kolk, J. H., Van Putten, L. A., Mulder, C. J., Grinwis, G. C. M., Reijm, M., Butler, C. M., & von Blomberg, B. M. E. (2012). Gluten-dependent antibodies in horses with inflammatory small bowel disease (ISBD). *Veterinary Quarterly*, 32(1), 3-11. <https://doi.org/10.1080/01652176.2012.675636>
- Vitale, V. (2022). Inflammatory bowel diseases in horses: What do we know?. *Equine Veterinary Education*, 34(9): 493-500. <https://doi.org/10.1111/eve.13537>
- Wang, M., Xie, X., Zhao, S., Ma, X., Wang, Z., & Zhang, Y. (2023). Fecal microbiota transplantation for irritable bowel syndrome: a systematic review and meta-analysis of randomized controlled trials. *Frontiers in immunology*, 14, 1136343. <https://doi.org/10.3389/fimmu.2023.1136343>