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Occurrence of small intestinal volvulus in a terrier puppy—a case report

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PEER REVIEW

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Comments

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on results of surgical post mortem
observation and histological analysis.
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ABSTRACT

Volvulus is the torsion of an organ around its root. In dogs, volvulus of the stomach is well known, but volvulus of the small intestine is rare. A dead 3-month-old female terrier puppy was presented for postmortem examination. According to owner statements, the puppy was depressed, lethargic and had abdominal pain, abdominal distension, severe diarrhea and vomiting a few hours before death. With gross and histopathologic studies, the death of this puppy was indorsed to small intestinal volvulus, subsequent infarction, peritonitis and likely acute toxemia and/or septicemia. The present case is going to be the first recorded case of small intestinal volvulus in dog in Iran.

KEYWORDS

Small intestine, Volvulus, Puppy, Histopathology

1. Introduction

Volvulus is the rotation of a segment of the intestine >180° clockwise or anticlockwise on its mesenteric axis^[1]. Compressions of thin-walled veins in the mesentery lean towards to happen before the influx of arterial blood is obstructed. The tissues, such as the intestine, mesenteric lymph nodes, and mesentery, are normally drained by the obstructed veins, becoming congested and edematous, and large amounts of fluid can be trapped, causing hemodynamic stress. In addition, the lumen of the involved intestinal segment is obstructed and, over time, can become severely distended with bloody fluid and gas and also leads to segmental intestinal infarction and breakdown of the mucosal barrier^[2]. This barrier break consents diffusion of intestinal bacteria and toxins into the peritoneal cavity and systemic circulation^[1,3]. Without intervening surgery, the

death of the animal usually occurs quickly^[2–4]. Even with surgical intervention, death from hypovolaemia, sepsis and toxic shock is the usual consequence^[1,3,5].

Intestinal volvulus is likely to happen in all animals^[2,6]. It has been documented most commonly in horses, swines, and suckling ruminants, with different predisposing factors reported^[2]. In dogs, it is a rare disorder. A specific caused for mesenteric volvulus in dog is not usually evident, but it has been reported in association with treatment for worm infestation, parvovirus infection, intussusception, vigorous exercise, closed abdominal trauma, concurrent gastric dilatation–volvulus, gastrointestinal foreign bodies, lymphocytic–plasmacytic enteritis, ileocolic carcinoma and exocrine pancreatic insufficiency^[3].

If the intestinal volvulus exists at time of necropsy and the lesions are not obscured by postmortem changes, the diagnosis is usually readily made via gross examination.

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The intestinal twist may reduce before the necropsy is performed, typically during transport and handling of the body. A probable diagnosis can be made by finding a sharply demarcated area of congested and edematous bowel and mesentery with distention of the intestinal lumen by blood and gas, potentially accompanied by ascites or peritonitis. In cases with loss of the twist, differentiation from peracute *Clostridium perfringens* type B enteritis and intestinal incarceration is needed[2].

According to author's knowledge, this is the first report of occurrence of small intestinal volvulus in a terrier puppy in Iran.

2. Case history

On September 2009, a dead 3-month-old female terrier puppy was presented to Department of Pathology for postmortem examination. It had been housed in a kennel on its own and belonged to a breeder. According to owner statements, the puppy was depressed, lethargic and had abdominal pain, abdominal distension, severe diarrhea and vomiting a few hours before death. No previous diseases had been recorded. The owner wanted to know what had caused the death of the dog. Necropsy was done and for histopathologic studies, samples were obtained and referred to Department of Pathology. The samples were fixed in 10% neutral-buffered formalin, dehydrated and embedded in paraffin wax. Paraffin-embedded sections were stained with hematoxylin and eosin.

3. Results

Gross examination revealed the abdomen contained fibrino sanguineous fluid. The jejunum and small part of ilium were involved in the volvulus with formation of loops (Figure 1).



Figure 1. Note to small intestinal volvulus with adjacent viable jejunum, small part of ilium and also infarcted small intestine.

The affected loops were intensely edematous, congested and hemorrhagic. Loops were infarcted, and fluid content and gas distended their lumen. On incision, brownish fluid oozed from the lumen. The mesenteric blood vessels were

engorged. The intestine proximal to the strangulation point was dilated with ingesta, whereas the distal part was empty. The stomach and other abdominal viscera were in their normal position and were normal in size. No other significant findings were found upon the end of the necropsy.

Histopathologic examination revealed mucosal, lamina propria and submucosa necrosis, focal interstitial hemorrhages, venous congestion and fibrin deposition. Scattered population of degenerate inflammatory cells were also present in these parts. Throughout the tunica muscularis, there were Zenker's necrosis and interstitial hemorrhage. The entire serosa was markedly expanded by inflammatory cells especially neutrophils (Figure 2).

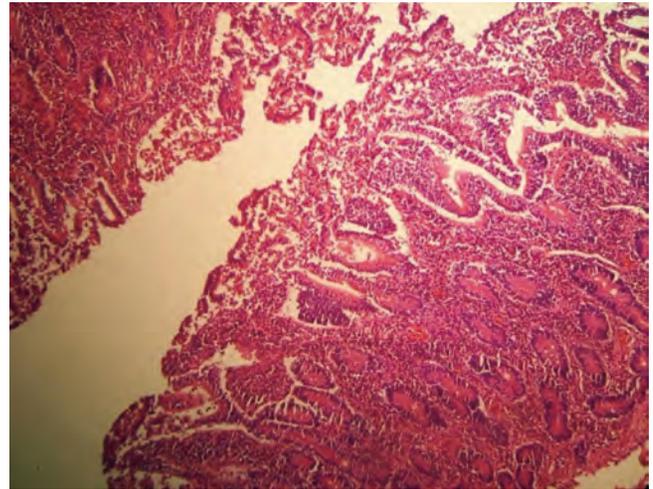


Figure 2. Note to necrosis of epithelial mucosa, diffuse hyperemia, hemorrhage and also infiltration of inflammatory cells inter Lieberkuhn glands (H&E $\times 100$).

The death of this puppy was indorsed to small intestinal volvulus, subsequent infarction, peritonitis and likely acute toxemia and/or septicemia.

4. Discussion

Mesenteric volvulus is a rare, acute, and often fatal condition in dogs. It occurs when there is a twisting of bowel on its mesenteric axis, which is different from intestinal torsion where the bowel twists on itself[3,7]. Death usually occurs due to shock and endotoxemia, secondary to intestinal necrosis, euthanasia, or surgery[7].

Mesenteric volvulus has no pathognomonic clinical signs, although the presentation often contains weakness, recumbency, abdominal pain and distension and shock in acute cases and also there may be a history of vomiting, diarrhea, hematemesis, or hematochezia that were in agreement with present case[7,8].

In literature, most of the reported dogs with mesenteric volvulus were adult (median age four years, nine months) male, medium- to large- breed dogs and German shepherd dogs have been observed to be the most commonly affected breed[3]. Although present case was a female terrier puppy.

In necropsy examination, we found no evidence of any abnormality in other organs like stomach, liver, pancreas or gastrointestinal foreign bodies that can be associated with intestinal volvulus. But this case did not received parvovirus

vaccine and this virus may be related to happening of volvulus in this puppy.

Where mesenteric volvulus exists for a more prolonged period, edema of the intestinal wall, hemorrhage and epithelial necrosis occur. Strangulated loops develop turgid and permeable, and blood accumulation within the intestinal lumen. Within 8 to 12 h, the intestine reaches maximal distension and its color changes to greenish–black. When volvulus or torsion persists, hypoxia of the intestinal wall results in devastation of the mucosal barrier, and the bacterial population grows rapidly and their toxins diffuse through the wall into the peritoneal cavity. Bacteria can be readily absorbed from the peritoneum and enter the systemic circulation. By the time these changes are present, lesions are irreversible and the prognosis is poor^[3,8,9]. In addition, major tissue damage not only happens during the period of ischemia, but also when the ischemia is dismissed and the tissues are reperfused. The pathogenesis of this condition is reperfusion leading to oxygen–derived free radicals releasing^[3].

The diagnosis of intestinal volvulus is not easy because clinical signs are non–specific and the patient's condition deteriorates rapidly. If there is suspicion of intestinal volvulus following radiography, the vet would recommend to do an emergency laparotomy. If rapid action is taken, it is possible that the prognosis for intestinal volvulus might be more favorable than is currently believed. Premedication with oxyradical scavengers before surgery might also reduce reperfusion injury and increase survival^[3,9].

When a systematic necropsy is not done in all animals died suddenly without any apparent cause, the true incidence of intestinal volvulus may be misjudged. Usually these cases are usually diagnosed as intoxications, cardiovascular failure or gastric dilatation–volvulus^[9].

According to gross and histopathologic study, small intestinal volvulus in a terrier puppy was diagnosed and the authors believe that the present case is going to be the first recorded case of small intestinal volvulus in dogs in Iran.

Conflict of interest statement

We declare that we have no conflict of interest.

Comments

Background

The volvulus is a serious problem in animal health, leading to some unspecific symptoms bringing the animal to suffering and death. The case report brings us new information on volvulus occurrence in a terrier puppy and will turn richer knowledge on this important area of veterinary.

Research frontiers

The study did not present a great innovation in its science field, but it is an important report of a clinical case, whose results and appointments may provide basis for future surveys in this medical area to veterinary.

Related reports

The presented data are in accordance to those from other studies, as Junius *et al.* (2004) and Cicco *et al.* (2011). But, the study here presented brings us the clinical information based on surgical and histological observations, showing the alterations came from volvulus in different levels of organization.

Innovations & breakthroughs

The histopathological studies complemented the information of pathological anatomy and a report of one new case always increases the information of the disease, being an important source for veterinary in the clinical practice.

Applications

The results of the present study may give veterinarians important information on the volvulus clinical development and its consequences to the animal health, reinforcing the importance of the early diagnostic and surgical correction of it.

Peer review

The present study is important to change the clinical practice, based on results of surgical post mortem observation and histological analysis.

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