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Acute Enteritis or Gastroenteritis in Young Dogs as a Predisposing Factor for Intestinal Intussusception: a Retrospective Study

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Summary

Various types of intestinal intussusception were diagnosed in 29 of 220 young dogs with acute enteritis or gastroenteritis, due to canine parvovirus (85 cases) or presumably to other infectious agents, inflammation or less common hypermotility and metabolic derangements (135 cases). As the other causes of the disease were excluded, acute enteritis or gastroenteritis was considered to be the most likely predisposing factor for the intestinal intussusception. The most common type of intussusception was found to be the ileocolic. Of the 21 dogs that underwent surgical resection and anastomosis of the intestine, 18 dogs recovered completely and three died due to complications. The high survival rate was due to the effective pre-operative, surgical and post-operative therapy.

Introduction

Intussusception is a type of intestinal obstruction that is created by the forceful invagination of one part of the intestine into the lumen of an adjacent segment and affects mainly young animals (Orsher and Rosin, 1993; Guilford and Strombeck, 1996). The exact pathophysiology of the intussusception still remains unclear. It may begin as a result of a local intestinal incongruency in homogeneity (induration, flaccidity or sudden anatomic change in diameter) or a mechanical linkage of non-adjacent intestinal segments, which leads to a kink or a fold in the bowel wall (Lewis and Ellison, 1987; Guilford and Strombeck, 1996). Intussusception has been reported to occur as a sequela to a number of conditions such as intestinal parasitism, linear foreign bodies, non-specific gastroenteritis, viral-induced enteritis (parvovirus, distemper), leptospirosis, intraluminal masses and prior abdominal surgery (Wilson and Burt, 1974; Weaver, 1977; Lewis and Ellison, 1987; Oakes et al., 1994; Guilford and Strombeck, 1996). However, others consider that most intussusceptions that occur in young animals are idiopathic (Wilson and Burt, 1974; Ellison, 1986; Lewis and Ellison, 1987). Treatment of intussusception in dogs is by laparotomy and manual reduction or resection and anastomosis of the affected intestinal segment. Intussusception associated with systemic disease (e.g. acute viral enteritis or gastroenteritis) has an increased morbidity and mortality (Ellison, 1986).

In the present study, an attempt has been made to demonstrate that acute enteritis or gastroenteritis is the most likely predisposing factor for the intestinal intussusception in young dogs.

Materials and Methods

The criteria for the inclusion of an animal in this study were the presence of clinical signs compatible with acute enteritis or gastroenteritis of at least 4 days duration. A total of 220 young dogs (age range, 2 to 12 months old) that fulfilled the above criteria were admitted to the Department of Clinical Studies, Faculty of Veterinary Medicine, Aristotle University of Thessaloniki, Greece, between January 1995 and June 1999. The dogs were unvaccinated or incompletely vaccinated against distemper, infectious hepatitis, leptospirosis, canine parvovirus and coronavirus. On admission a physical examination followed by haematology (packed cell volume, as well as white blood cell and platelet count), biochemical screening (serum alanine aminotransferase, alkaline phosphatase, lipase activities and blood urea nitrogen, potassium and albumin concentration), urinalysis and a faecal examination were carried out in every case, before any kind of treatment was instituted. A direct faecal examination and fresh saline preparations were used for the detection of parasitic ova and intestinal protozoa, respectively. An enzyme-linked immunosorbent assay test (CITE test: IDDEX Laboratories Inc, Westbrook, USA) was also used at the time of admission (which ranged between 1 and 5 days from the beginning of the symptoms) for detecting parvoviral antigen in stool samples taken directly from the rectum. Abdominal radiography (plain or contrast) and/or abdominal ultrasonography were performed on dogs that were suspected of having intestinal intussusception.

Results

All of the 220 animals presented with clinical signs of anorexia, weight loss, dehydration and diarrhoea. The diarrhoea was haemorrhagic in 100 (45.4%) dogs. Vomiting was presented in 180 (81.8%) dogs. Neither gastrointestinal parasites nor protozoa were found in any of the dogs studied. In 85 cases (38.6%) the cause of enteritis was considered to be parvoviral since canine parvoviral antigen (CPV-2) was detected. The causative agent of enteritis or gastroenteritis in the remaining 135 dogs could not be determined.

Intestinal intussusception was diagnosed in 29 dogs (13.18%). The breed distribution included 13 mixed-breeds, six German Shepherds, four German Shepherd crosses, two Rottweilers and from one each of Neapolitan Mastiff, American Pit Bull, Boxer and Doberman. Sixteen female and 13 male dogs were included with mean weight 11.2 kg (ranged from 3.5 to 27 kg). The mean age of the animals was 4.6 months, with a range of 1.5 to 12 months of age. Thirteen dogs were unvaccinated, whereas 11 were vaccinated against distemper, infectious hepatitis, leptospirosis and parvovirus, two against distemper, infectious hepatitis and leptospirosis, two against distemper and parvovirus and one against parvovirus only.

All the dogs with intussusception had a history of acute enteritis or gastroenteritis with a variable duration. Mean duration of clinical signs was 8.7 days and ranged from 1 to 20 days. Vomiting was recorded in 18 dogs and diarrhoea in all of them. Nine dogs with parvoviral enteritis had a history of haematochezia. Physical examination revealed abdominal distension in five dogs. On abdominal palpation a mass was noted in 26 dogs and abdominal pain was elicited in the remaining three dogs. Prolapse of the intussusceptum through the anus was revealed in four dogs.

Haematological and blood biochemical abnormalities included low packed cell volume (<32%) in eight dogs, leukocytosis (>18 000/mm³) in 11 dogs, low serum albumin concentration (<2 g/dl) in five dogs, low serum K⁺ concentration (<3 mEq/l) in three dogs and raised serum alkaline phosphatase activity (>120 U/l) in six dogs. The cause of enteritis was considered to be parvoviral in 10 of 29 (34%) dogs, since canine parvoviral antigen (CPV-2) was detected.

Abdominal radiography was performed in 29 dogs. Intestinal distension suggestive of obstruction was seen in 15 dogs and an abdominal mass suggestive of intussusception was seen in three dogs. Barium contrast studies were performed in three dogs and abdominal ultrasonography in 22 dogs to confirm the intussusception.

Four dogs died before any treatment was instituted. One of them was parvoviral positive. Another four dogs were euthanized upon owners' request. Two of these dogs had parvoviral enteritis. Necropsy that was performed in all these dogs revealed ileocolic intussusception.

Surgery was carried out in 21 dogs. Pre-operatively all dogs received Lactated Ringer's solution supplemented with KCl (20 mEq/l) and a combination of amoxicillin with amikacin,

cefamandole or cefuroxime intravenously. These animals underwent laparotomy and intestinal resection and end-to-end anastomosis. Intestinal anastomosis was performed by using 3/0 or 4/0 polydioxanone (PDS, Ethicon) or polyglactin 910 (Vicryl, Ethicon) in a simple interrupted appositional pattern. In one dog manual reduction of the intussusception was performed initially but due to the questionable viability of the reduced segment, resection was finally carried out. One dog had peritonitis due to perforation of the involved intestine and intestinal resection and anastomosis along with open peritoneal drainage were performed. The dog died on the fourth post-operative day. Intussusception was found to be ileocolic in 18 dogs, colocolic in one dog and ileoileal in two dogs. Post-operatively, all dogs continued to receive fluids, and intravenous antibiotics. Opioid analgesia (morphine or pethidine) was administered in all dogs. Food (a/d diet, Hills, Hatfield, UK; selected protein diet, Waltham, Mowbray, UK) and water was offered 24 h afterwards.

Intestinal multiple biopsies from the 29 dogs with intussusception (21 at the time of surgery and eight at the time of necropsy) and histopathology did not demonstrate any evidence of idiopathic inflammatory bowel disease.

Post-operatively, five dogs had diarrhoea and six dogs had faeces that were not well formed; these conditions ranged in duration from 1 to 4 days. One dog with parvoviral enteritis died due to dehiscence of the anastomosis and subsequent peritonitis. Another dog with parvoviral enteritis continued to have haemorrhagic diarrhoea for 7 days post-operatively and died. Necropsy revealed haemorrhagic enteritis. Mean hospitalization time post surgery for the remaining 18 dogs was 4.9 days (ranged from 2 to 5 days).

All the 18 dogs were re-examined every 10 days for 1 month. Follow-up was thereafter carried out by telephone communication with the owner or the referring veterinarian. Mean follow-up time was 26.5 months (ranged from 7 to 57 months). At the time of writing all dogs are doing well.

Discussion

All of the dogs with intussusception were young and this is in agreement with the findings of others (Wilson and Burt, 1974; Weaver, 1977; Oakes et al., 1994).

All intussusceptions included in this study were associated with acute enteritis or gastroenteritis and no other factors were found to be implicated. Acute enteritis or gastroenteritis seems to be the predominant predisposing factor for intussusception in this hospital, because the cases studied represent all of the intussusception cases admitted during the period 1995–99.

Parvoviral antigen was seen in 34% of the dogs with intussusception in this study, and other undetermined viral or bacterial agents, inflammation, hypermotility and metabolic derangements were the cause of enteritis or gastroenteritis in the remaining dogs. Acute enteritis or gastroenteritis predisposes to intussusception by inducing alterations in the intestinal motility. Intestinal hyper- or hypomotility is a feature of parvoviral enteritis (Dow, 1996; Guilford and Strombeck, 1996; Rewerts and Cohn, 2000). The present findings are in contrast with those of others where most intussusceptions were either idiopathic or associated with a low incidence of viral-induced enteritis (Wilson and Burt, 1974; Weaver, 1977; Oakes et al., 1994). The high incidence of intussusception-associated acute enteritis or gastroenteritis in this study may be attributed to the high incidence of viral or bacterial enteritis, inflammation and hypermotility in young dogs that were admitted to this hospital between 1995 and 1999.

Anorexia, vomiting and diarrhoea (bloody or not) were the predominant clinical signs of intussusception reported in this and in other studies (Wilson and Burt, 1974; Weaver, 1977; Oakes et al., 1994). The haemorrhagic diarrhoea in the dogs of this study might be due to parvoviral or other type of enteritis and/or intussusception. A palpable abdominal mass was recorded in the majority of the cases. Abdominal pain on palpation was considered not to be a consistent finding in intussusceptions (Wilson and Burt, 1974). Daily physical examination is a crucial part of the care for the dog with parvoviral enteritis because the clinical signs of intussusception may be mistaken for worsening parvoviral enteritis (Rewerts and Cohn, 2000).

Most intussusceptions (20 of 21) in this study were irreducible due to adhesion formation.

Intestinal resection and end-to-end anastomosis was finally performed for the correction of intussusception in all cases. None of the dogs were treated by manual reduction alone. This may be attributed to the chronicity of intussusceptions in this study, since mean duration of clinical signs was 8.7 days. Furthermore, intestinal plication to reduce the possibility of recurrence was not performed in any of the dogs in this study.

Most intussusceptions were ileocolic (89.7%) and this is in agreement with the reports of others (Wilson and Burt, 1974; Weaver, 1977; Oakes et al., 1994).

Recurrence of the intussusception following surgery is not uncommon and some authors reported recurrence rates between 20 and 27% (Weaver, 1977; Wolfe, 1977; Orsher and Rosin, 1993; Oakes et al., 1994). An increased tendency of recurrence was also reported for parvoviral enteritis-associated intussusceptions (Ellison, 1986). According to Wolfe (1977) and Guilford and Strombeck (1996) the recurrence rate is decreased if the intussusception is resected rather than reduced manually. In contrast Oakes et al. (1994) reported recurrence in five of 22 dogs that had their intussusceptions resected. Furthermore the recurrence rate of the intussusception may be increased if the predisposing factor is still present following surgical correction (Oakes et al., 1994; Guilford and Strombeck, 1996). In order to reduce the possibility of recurrence some authors advocate the use of enteroplication (Oakes et al., 1994; Wolfe, 1977). The present findings seem to support those of Wolfe (1977) and those of Guilford and Strombeck (1996). No recurrence has been reported in any of the 18 dogs that survived surgical resection of the intussusception, although the predisposing factor (acute enteritis or gastroenteritis) might have been present at the time of surgery. The use of opioids in the post-operative period in the present study may play a role in preventing the recurrence of intussusception, because these drugs increase non-propulsive gastrointestinal tone and prevent ileus during the early post-operative period (McAnulty et al., 1989). However, Oakes et al. (1994) found no effect of these drugs on the recurrence of intussusception.

According to Ellison (1986) intussusception associated with viral enteritis or gastroenteritis (parvovirus or distemper) has an increased morbidity and mortality and carries a guarded prognosis. Increased mortality in these cases may be due to fluid and electrolyte disturbances, and septicaemia. In the present study, only one of the 21 dogs that underwent surgery died, and this death was due to parvoviral infection. The high survival rate (85.7%) in this group may be also attributed to the aggressive pre-operative and post-operative fluid, electrolyte and antibiotic therapy.

Conclusively, in this study it was found that the acute enteritis or gastroenteritis was the only predisposing factor leading to intussusception in dogs. The most common type of intussusception was the ileocolic. Intestinal resection and anastomosis were performed in all of the dogs that underwent surgery. No further measures to prevent recurrence were taken and no post-operative recurrence was observed. The high survival rate that was achieved was due to the effective pre-operative, surgical and post-operative therapy that was implemented.

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