Opis przypadku *Case report*

Temporary colostomy as a treatment of colonic torsion in dogs

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Summary

Volvulus of the colon can occur spontaneously as a result of intestinal atony, chronic inflammation, neoplastic, parasitic invasion, and the presence of foreign bodies. If colonic torsion is confirmed, the only treatment option is exploratory surgery. After laparotomy and decompression of the distended large bowel, the twisted portion of the colon is evaluated for vitality and evidence of necrosis. The standard treatment in the case of intestinal necrosis is resection of the affected portion of the gut and anastomosis. The primary benefit is avoidance of stoma, but many complications related to unsuccessful anastomosis are possible.

Keywords: colonic torsion, temporary colostomy, dog

Volvulus of the colon can occur spontaneously as a result of intestinal atony, chronic inflammation, neoplastic, parasitic invasion, and presence of foreign bodies (2, 3, 8, 9). Anatomically, a dog's large bowel consists of the cecum, ascending colon, transverse colon, descending colon, and rectum. The cecum, shaped like a letter "S" is blind ended, and it is located on the right side of the root of mesentery. The ascending colon is connected to the ilium via the ilio-colic junction, and to the cecum via the ceco-colic junction. The short, ascending colon turns from the right side to the left, merging into the transverse colon and then via the splenic bend into the descending colon, which in a dog can be 10 to 16 cm long. It begins on the left side and runs posterior towards the pelvic inlet (5). The colon is supplied with arterial blood from the ilio-colic artery, a branch of the anterior mesenteric artery, and the posterior mesenteric artery (5). The nerve vagus and branches of the pelvic nerve provide innervations. Diagnosis and differentiation of colonic disorders is based on the history, physical examination, and additional laboratory tests. History usually includes symptoms like: dyschezia, straining, defecating small amounts of stool at a time, mixed with blood and mucous (8-10). It can also include vomiting, anorexia, abdominal pain, fever due to necrosis, which can lead to perforation and generalized septicaemia (8-10).

Abdominal and rectal palpation help to evaluate the integrity of the rectal mucosa, part of pelvis and pelvic canal, detect possible strictures and the presence of pain. Laboratory tests, including complete blood count with differential, and chemistry screen adds more information about the patient's clinical status and possible complications. Continuing colonic torsion will result in increased alkaline phosphatase (AP), creatinine kinase (CK), lactodechydrogenase (LDH), and gamma-glutamyl transpeptydase (GGPT) (5). The survey, and contrast radiographs of the abdomen and pelvis, may help to rule out the presence of foreign bodies, impacted faecal material, or intussusception. Ultrasound examination will assist in ruling out intestinal obstruction due to the presence of tumors, or large fecal masses, and assist in fine needle aspiration or percutaneous biopsy to collect material for further testing. Colonoscopy can be used to rule out tumors, erosions or foreign bodies, and confirm colonic torsion (5, 8-10).

If colonic torsion is confirmed, the only treatment option is exploratory surgery. After laparotomy, and decompression of the distended large bowel, the

twisted portion of the colon is evaluated for vitality, and evidence of necrosis. If recognized, subtotal or total colectomy is performed. After resection of the ischemic segment, anastomosis is completed using either "end to end", "side to side", or "end to side" technique. Direct end-to-end anastomosis is not always indicated in the case of colonic torsion in dog, and an alternative two-step operation to form a temporary colostomy with the delayed end-to-end anastomosis should be considered. In human medicine, this is called the Hartman's procedure, described by the author in 1923 (12). Colostomy is a surgical procedure in which stoma is formed by pulling the healthy end of the colon through the anterior abdominal wall and suturing it into place. This opening allows for elimination of stool and intestinal gas. It can be temporary and reversible, or irreversible. Placement of the stoma can occur at any location along the ascending, transverse, and descending section of the colon. Sigmoidostomy is usually done in Hartman's operation. Stoma can be classified based on:

– criterion of time (temporary or permanent),
– involved colonic segment
– type of stoma (based on the amount of surface exit: loop colostomy, end colostomy, double barrel colostomy) (1, 11).

The most common type of colostomy is the end colostomy, used when the necrotic part of the colon has been removed, and the remaining part is not yet ready to be connected. Stoma can be located in the midline, left abdominal region (APR), or in the any suitable part of the abdomen, as described by Hartman's technique (2, 4). It should always follow rules of "good stoma", published in 1967 by Turnbull and Weakley:

– correctly located stoma should not be close to hip (iliac crest), and thick skin folds in obese animals. It can be also formed in place of the umbilicus, after it has been removed;
– should have properly dissected (formed) canal for the stoma within abdominal musculature;
– should have minimal tension in the site of connection between skin and the colon;
– should have fixation of omentum to the abdominal wall;
– eversion of colonic mucosa and suturing it to the skin;
– good blood circulation to the surgical site (11).

Complications can occur even in properly created stoma. They can be local or systemic.

Local complications can be divided into:

a) early surgical:
• swelling due to too narrow intramuscular channel
• ischemia due to excessive tension of the blood supplying omentum
• fistula or leak at muco-cutaneous junction
• necrosis
• infection

b) late surgical:
• hernia

c) dermatologic:
• dermatitis due to the leak of intestinal content
• bacterial or fungal infection.

The systemic complications are mainly metabolic.

Preoperative Procedure. Colonic torsion and resulting intestinal obstruction requires emergency surgery. However, if allowed by the clinical condition of the patient, to reduce the risk of pre-operative and postoperative complications preparatory procedures should be implemented. Food should be withheld for 24 hours before surgery, but access to water should be available all the time.

Administration of laxatives and enemas is contraindicated. After colon surgery the risk of infection is high, so it is recommended to use systemic antibiotics at least 24 hrs before. The most commonly used are: second-generation cephalosporins, i.e. cefmetazole (15 mg/kg i.v. q. 8-12 hrs), cefoxitintyn (30-40 mg/kg i.v. q. 6 hrs), also metronidazole (10 mg/kg i.v.). Also as vagolitic to prevent bradycardia during manipulation within the gut: atropine (0.02-0.04 mg/kg s.c. or i.v.); moreover, to maintain hydration and to prevent excessive fluid loss due to exposed intestines crystalloid fluid therapy (40-60 ml/body weight i.v.) should be initiated.

End colostomy procedure. The dog is placed in dorsal recumbence. A routine ventral midline celiotomy is performed. Decompression of the twisted large bowel, identification and resection of the ischemic segment of the colon is performed. The proximal end of the colon is closed temporarily with a 2-0 non-absorbable monofilament suture and purse-string suture pattern: the dissection of the canal in the skin and abdominal musculature, dragging the proximal end of colon to the surface, and attaching it to the skin with a single interrupted pattern. The mucosal layer of the colon is sutured to abdominal muscles with

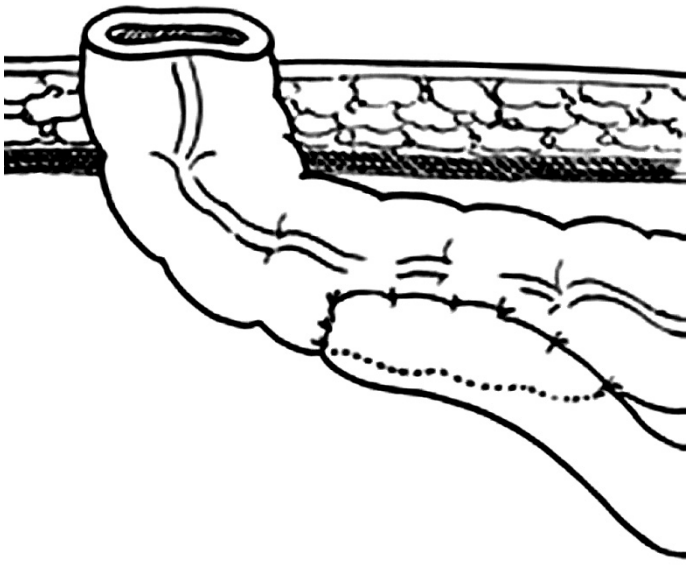

Fig. 1. Exteriorization of proximal fragments of the colon with lateral attaching to the distal fragment of the colon

monophilament absorbable suture material and two layers of the colon wall are sutured to the skin using the same suture material.

The next step is connecting the remaining distal part of the descending colon (or proximal rectum) (Fig. 1), with the proximal end of the colon, proximal to the colostomy site to return the contiguity of the intestinal tract. The original contiguity of the colon is restored after the period of 3-6 months. This experimental technique is similar to the one described in humans and adapted to the anatomical structures of the dog by the authors.

Clinical case

Signalment: German shepherd, 17-months-old, male, not neutered, bilateral cryptorchid. The owner reported that the dog did not defecate for a couple of days and yelped during straining, but did not produce any stool. In addition, the dog was depressed, lethargic, had a decreased appetite, and was retching several times during the day. The owner stated that several days ago he had fed the dog pork bones. The initial physical examination revealed a rectal temperature of 39.8°C. Rectal palpation revealed the presence of hard fecal masses. Ventro-dorsal and right-lateral abdominal radiographs showed a distended colon filled with a large amount of fecal material and gas.

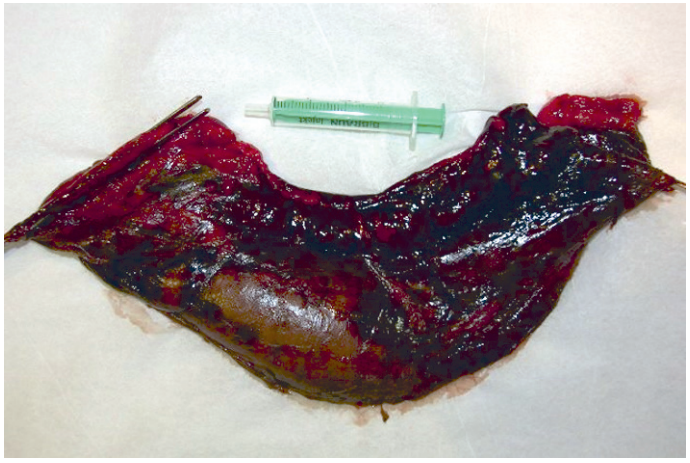

Fig. 2. Removed fragment of the colon

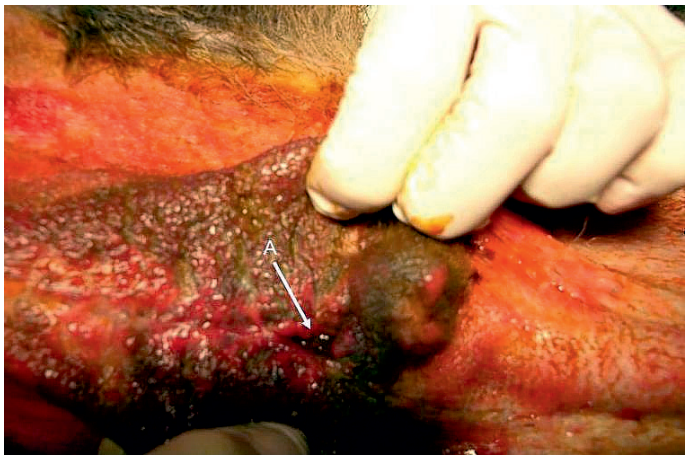

Fig. 3. Stoma (A) 3 months after surgery: note the dermatologic changes in this area

Complete Blood Count (CBC) and differential revealed all values within reference ranges. Serum chemistry showed: Amylase – 328.79 U/L, ALT – 207.95 U/L, AST – 214.73 U/L, AP – 113.73 U/L, LDH – 2018 U/L, BG – 98.0 mg/dl, BUN – 17.73 mg/dl, and creatinine – 0.69 mg/dl. The provisional diagnosis indicated large bowel obstruction. Initial treatment consisted of intravenous administration of 500 ml of lactated Ringer's solution, Rapidexon (dexamethasone) at 0.1 ml/kg i.v. Linco-spectin (licomycin-spectinomycin) 1 ml/5 kg s.c. Combivit 8 ml/24 hrs and an enema of water emulsion with paraffin warmed to 38.0 degree Celsius. After the first 12 hrs of treatment the patient's condition had not improved, the body temperature increased to 42°C and the dog had symptoms of acute peritonitis. The decision for exploratory laparotomy was made. The dog was premedicated with Atropine sulphate i.v. Buprenorphine i.v. and induced with a combination of xylazine and ketamine (i.m). The patient was intubated and anesthesia was maintained with Halothane. Exploratory surgery revealed peritonitis, torsion of the colon, and evidence of necrosis. Resection of approx. 20 cm of the compromised portion of the colon and proximal rectum was performed, and due to the questionable vitality of the involved omentum and its blood supply, and on account of it a high chance of dehiscence, it was decided to perform end colostomy.

The stoma was dissected according to the "rule of good stoma" on the linea alba, just proximal to the penis. The exposed colon was attached to the skin using 3-0 Monosoft suture in a simple interrupted pattern, and the proximal end of the rectum was attached to the colon with end-to-side anastomosis using Catgut Plain normal 4-0 in simple interrupted suture pattern. This made it possible to leave an intact distal rectum, and rectal opening.

The abdominal wall was closed using Polysorb 1-0 and mattress suture pattern, with a seton drain left for 4 days to collect fluid from the peritoneal cavity. Subcutaneous tissue was closed using Catgut Plain Normal 2-0, in simple continuous pattern, and the skin was closed with Monosof 0-0 and mattress suture pattern. The plan was to leave the stoma for 3 months, then close it, and reverse the temporary connection of the rectum and colon with a primary end-to--end anastomosis (5).

At the end of the surgical procedure the dog was administered metronidazole 15 mg/kg i.v., compound electrolyte solution 500 ml with Duphalyte up to 50 ml/5 kg of body weight, Lincoseptin SS 1 ml prep/5 kg bw. The dog was placed at nil per os orders per 7 days. The patient was monitored for the next 10 days, until sutures' removal.

The repeated CBC and chemistry screen seven days after surgery showed all values within the reference range.

Three months after surgery the dog had undergone reversal procedure, the stoma was closed and distal end of the colon was primarily connected with proximal rectum with end-to-end anastomosis.

The abdominal wall was closed in the same manner as described above. The dog was administered i.v. infusion of metronidazole 15 mg/kg, compound electrolyte solution 500 ml with Duphalyte 50 ml/5 kg bw. Lincospectin SS 1 ml/5 kg bw. for 7 days. Skin sutures were removed after 10 days. Food was withdrawn for 7 days.

Discussion

Treatment of colonic torsion has two objectives: removal of intestinal obstruction (volvulus) and treatment of complications related to segmental, large bowel necrosis and peritonitis. The question is, if the surgery should be limited only to the removal of obstruction or to the excision of necrotic portion of the colon with end-to-end anastomosis. In the case of ascending and transverse colon, both methods can be successfully employed. The same treatment of the descending portion of the colon is controversial, and the technique with temporary colostomy can be an alternative with a smaller risk of leak and dehiscence after direct end-to-end anastomosis.

The described above two-step solution extends the treatment period, may lead to serious post-operative complications, and requires extensive and prolonged post-operative care. Undoubtedly, full comprehension of the surgical procedure and cooperation of the owner is necessary for a successful outcome.

The standard treatment in the case of intestinal necrosis is a resection of the affected portion of the gut and anastomosis. The primary benefit is avoidance of stoma, but numerous complications related to unsuccessful anastomosis are possible (6, 7).

In the above-described case because of colonic torsion and necrosis a large part of the descending colon required resection. The direct end-to-end anastomosis in this case carried a higher risk of post-operative complications and, based on Hartmann's procedure, temporary colostomy and future reversal appeared to be the treatment of choice (12).

The optimal time for the reversal of the temporary stoma and restoration of continuity of the large intestine is not precisely defined. It depends on the patient's individual healing and rate of regaining strength by connected portion of colon and rectum. On average, it takes longer than in the small intestine, partially due to the much higher pressure exerted by moving fecal masses, causing tearing, leakage and possible dehiscence. The highest risk of dehiscence is during the first 72-96 hrs after surgery because disintegration of the collagen fibers exceeds the synthesis, and presence of peritonitis slows down the entire healing process. Delaying the initial anastomosis gives the remaining portion of the distal colon and rectum time for strengthening and healing. Additionally, the chance of dehiscence may be decreased by using staplers instead of suture material. In general, in the two-stage surgery the most complex is the anastomosis to re-create contiguity of the colon and rectum. To easier identify the proximal end of the rectum, one can apply long and unabsorbable sutures (12). The atrophy of the rectal mucosa reverses as soon as the contiguity of the colon and rectum is re-established. In veterinary literature there are only a few described cases of colostomy in dogs. Most of the authors stress the necessity of following rules of "good stoma" (11), and describe post-operative complications related to formation of fistulas, peristomal dermatitis, peritonitis, and general septicaemia, leading to major organ failure. In the above-described case side effects were limited to dermatitis and mild atrophy of the rectal stump, which returned to normal soon after surgical reversal of colostomy.

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