

FELINE MEGACOLON: THE HARD FACTS

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Introduction

Constipation is defined as the infrequent or difficult evacuation of stool. It is a common problem in cats, may be acute or chronic and does not inherently imply a loss of colonic function. Often the underlying cause is dehydration and is readily managed by supportive hydration, by oral, nutritional or parenteral means. When a cat has intractable constipation that is unresponsive to therapy or cure, this is referred to as obstipation. Obstipation implies permanent loss of function. When obstipation results in dilatation of the colon or hypertrophy of the colon, then the condition is described as megacolon.

Dilated megacolon is the end-stage condition of idiopathic colonic dysfunction. The resulting disease has diffuse colonic dilatation and hypomotility. Hypertrophic megacolon is a result of pelvic fracture malunion and stenosis of the pelvic canal or another obstructive mechanism including neoplasm, polyp, or foreign body. Colonic impaction is the accumulation of hardened feces in the pelvic colon and is the consequence of constipation, obstipation or megacolon. It does not, in itself, imply loss of function or reversibility of the problem. This distinction is critical in considering treatment plans as well as prognosis.

In humans, there are two recognized forms of megacolon:

1. Congenital aganglionic megacolon (Hirschsprung's Disease): During embryologic development, it is normal for the neural crest cells, which develop into the enteric neuronal plexus (Meissner's submucosal and Auerbach's myenteric) network. Congenital aganglionic megacolon is a disease in which the migration of neural crest cells arrests before reaching the anus resulting in a segment of the distal bowel lacking enteric neuronal coordination. This results in functional obstruction and colonic dilatation proximal to the affected segment. Distension of the colon may reach a diameter of 15-20 cm. As the colon distends, there is hypertrophy of the wall; eventually, if the distension outstrips the hypertrophy, thinning occurs which may result in rupture. Impacted feces may also, at any stage of the disease, cause mucosal inflammation and shallow ulceration.
2. Acquired megacolon is a condition of any age and may be from
 - a. Chagas' disease, a trypanosomal infection
 - b. Obstruction by neoplasm or inflammatory stricture
 - c. Toxic megacolon from ulcerative colitis or Crohn's disease involving the colon
 - d. Functional psychosomatic illness.

In Chagas' disease, trypanosomes destroy the enteric plexus; in the other three conditions, there is no deficiency of mural ganglia.

In cats with megacolon, there is little evidence to show any deficiency in enteric neuronal network as histologic studies fail to show significant abnormalities in density or morphology of ganglia. An extrinsic neural defect involving the parasympathetic or sympathetic nerves is unlikely, as one would expect concurrent problems with the lower urinary tract. Dr. Robert Washabau and his cohorts have worked extensively on feline megacolon and have studies to support that the underlying problem is characterized by abnormalities in smooth muscle function.

Signalment

Constipation, obstipation and megacolon may be seen in cats of any age, breed and gender, however middle aged (mean 5.8 years), male (70%) domestic short-haired (46%) cats appear to be more at risk.

History

Cats are presented because of a client's observation of reduced, absent or painful, elimination of hard stool. Cats may pass stool outside the box as well as in it, may posture and attempt to defecate for prolonged periods or may return to the box to try repeatedly to pass stool, unsuccessfully. There may be mucous or blood passed associated with irritative effects of impacted stool, and even, intermittently, diarrhea. Vomition is frequently associated with straining. Inappetance, weight loss, lethargy and dehydration become features of this condition if unresolved. Dilated megacolon is preceded by repeated episodes of recurrent constipation and obstipation. In the cat with hypertrophic megacolon, there may be a known history of trauma resulting in pelvic fracture.

Physical Examination

Impaction and enlargement of the colon is the underlying finding in all cases of megacolon. It may be difficult to differentiate this abnormality from neoplasia, so radiographs will be required. Cats with dysautonomia will have signs referable to other autonomic defects, such as urinary incontinence, regurgitation, mydriasis, prolapse of the nictating membrane and bradycardia. Digital rectal examination under sedation or anaesthesia should be performed in all cats to rule-out pelvic fracture, malunion, rectal diverticulum, perineal hernia, anorectal stricture, foreign body, neoplasia or polyps. A neurological examination should be performed to detect any neurological causes of constipation, including pelvic nerve trauma, spinal cord injury, or sacral spinal cord deformities of Manx cats.

Differential Diagnosis of Constipation in the Cat:

[From Washabau RJ, Hasler AH. Constipation, Obstipation and Megacolon. In: August JR (ed), Consultations in Feline Internal Medicine 3, Philadelphia, WB Saunders Co, 1997, p106.]

Neuromuscular Dysfunction:

- Spinal cord disease - lumbosacral disease, cauda equine syndrome, sacral spinal cord deformities of the Manx cat
- Hypogastric or pelvic nerve disorders - traumatic injury, malignancy, dysautonomia
- Submucosal or myenteric plexus neuropathy - dysautonomia, aging
- Colonic smooth muscle - idiopathic megacolon, aging

Mechanical Obstruction:

- Intraluminal- foreign material (bones, plant material, hair), neoplasia, rectal diverticulum, perineal hernia, anorectal strictures
- Intramural – neoplasia
- Extramural – pelvic fractures, neoplasia, prostatic disease

Inflammation

- Perianal fistula, proctitis, anal sac abscess, anorectal foreign bodies, perianal bite wounds

Metabolic and Endocrine

- Metabolic – dehydration, hypokalemia, hypercalcemia
- Endocrine – hypothyroidism, obesity, nutritional secondary hyperparathyroidism

Pharmacologic

- Opioid agonists, cholinergic antagonists, diuretics, barium sulfate, phenothiazines

Environmental and Behavioral

- Soiled litter box, inactivity, hospitalization, change in environment

Etiology

Studies by Washabau, et al have shown that in naturally occurring cases of feline megacolon, sections of longitudinal and circular smooth muscle of all parts of the colon show abnormalities of function when submitted, in vitro, to isometric stress measurements. These tests further showed that the smooth muscle was less responsive to neurotransmitters (acetylcholine, substance P and cholecystokinin), membrane depolarization using potassium chloride and electrical field stimulation when compared to colonic segments from healthy controls. The conclusion drawn by these workers was that the disorder involves abnormal intracellular activation of smooth muscle myofilaments. Histologic evaluation of these tissues fails to show abnormalities.

Diagnostics

Serum biochemistries and a complete blood count characteristically are normal, however, these should be performed in order to detect those cats with electrolyte abnormalities (hypokalemia, hypercalcemia, dehydration). A baseline serum T4 should be checked in obstipated kittens suspected of being hypothyroid.

Abdominal radiography should be performed to characterize the mass and verify that it is, indeed, colonic impaction. Radiographs will also help to identify predisposing factors such as pelvic fracture, extra-

luminal mass, foreign body, and spinal cord abnormalities. Colonic impaction does not, in itself, imply irreversible, medically irresolvable, megacolon.

Barium enemas, or colonoscopy and ultrasound may be additional tools required to help define the problem. CSF evaluation is required in cats with neurological involvement.

Therapeutics

There are five components to medically managing the megacolon patient.

- 1) Achieve and maintain optimal hydration
- 2) Remove impacted feces
- 3) Dietary fiber
- 4) Laxative therapy
- 5) Colonic prokinetic agents

1) As long as cellular dehydration is present, the need will exist to resorb water from renal and gastrointestinal systems. Thus, systemic hydration must be addressed. This may be achieved through parenteral fluid therapy, including regular subcutaneous fluids in the home, feeding canned foods, adding water or broth to the food, feeding meat broths, or the use of running water fountains in the home. Addition of fiber to the diet should be avoided until the patient is adequately hydrated.

2) Removal of impacted feces is required to reduce the toxic and inflammatory stress on the bowel wall. Pediatric rectal suppositories may be used to help with mild constipation. They include dioctyl sodium sulfosuccinate (DSS, Colace™), glycerin or bisacodyl (Dulcolax™).

Enemas are another way to soften hardened stool. Solutions that may be used include warm tap water, DSS (5-10 ml/cat), mineral oil (5-10 ml/cat) or lactulose (5-10 ml/cat). Enemas should be administered slowly through a well-lubricated 10-12 French rubber catheter. Mineral oil and DSS should not be given together as the DSS promotes mucosal absorption of the mineral oil. Sodium phosphate containing enemas (e.g., Fleet™) are contraindicated because they predispose to life-threatening electrolyte imbalances (hypernatremia, hyperphosphatemia and hypocalcemia) in cats. Hexachlorophene containing soaps should be avoided in enemas because of potential neurotoxicity. Finally, enemas given too rapidly may cause vomiting, pose a risk for colonic perforation and may be passed too rapidly for the fecal mass to be softened by them.

Manual extraction may be required in recalcitrant cases. Infusion of water into the colon, manual massage and reduction of the mass by abdominal palpation and gentle use of sponge forceps to break down the fecal mass may be helpful. Caution must be used to reduce the risk of perforation. Anytime a cat is anesthetized for manipulations of the colon, an endotracheal tube should be in place, in case the cat vomits.

3) Dietary fiber acts as a bulk-forming laxative. The benefits of insoluble (poorly fermentable) fiber, such as from wheat bran, cereal grains and psyllium, are to improve or normalize colonic motility by distending the colonic lumen, they increase colonic water content, they dilute luminal toxins (such as bile acids, ammonia and ingested toxins) and they increase the rate of passage of ingested materials thereby reducing the exposure of the colonocyte to toxins, while increasing the frequency of defecation. Suggested doses are: psyllium (Metamucil™, 1-4 tsp mixed with food PO q12-24h), canned pumpkin (1-4 tbs mixed with food PO q24h), coarse wheat bran (1-2 tbs mixed with food PO q24h).

Soluble (highly fermentable) fibers (oat bran, pectin, beet pulp, vegetable gums) are readily digested by bacteria and provide large quantities of short chain fatty acids, which are beneficial in many ways for colonic health, but they are not suitable as laxatives, because they have little ability to increase fecal bulk or dilute luminal toxins.

4) Besides bulk forming, laxatives may be categorized as emollient, lubricant, hyperosmotic and stimulant, based on their method of action. Emollient laxatives are anionic detergents that increase the miscibility of water and lipid in ingesta, enhancing lipid absorption and impairing water absorption. DSS

(Colace™, 50 mg PO q24h) and dioctyl calcium sulfosuccinate (Surfax™, 50 mg PO q12-24h) are examples of emollient laxatives that have been used in cats.

Lubricant laxatives impede water absorption as well as enabling easier passage of stool. Mineral oil (10-25 ml PO q24h) or petrolatum (hairball remedies, 1-5 ml PO q24h) are best suited to mild cases of constipation. Additionally, mineral oil is better administered by enema rather than orally, because of the risk of aspiration pneumonia. Used chronically, lubricant laxatives may interfere with the absorption of fat-soluble vitamins.

Hyperosmotic laxatives stimulate colonic fluid secretion and propulsive motility. While there are three types (poorly absorbed polysaccharides [lactulose, lactose], magnesium salts [magnesium citrate, magnesium sulfate, magnesium hydroxide] and polyethylene glycols [GoLYTELY™, Colyte™]), lactulose (0.5 ml/kg PO q8-12h, prn) is the safest and most consistently effective agent in this group. Kristalose is a product consisting of lactulose crystals for reconstitution that cats may accept more readily sprinkled on their food or suspended in water. The magnesium salts are contraindicated in cats with renal insufficiency. Miralax, polyethylene glycol (PG3350) may be used in cats at a dose of 1/8 - 1/4 tsp twice daily in food; polyethylene glycols are contraindicated with functional or mechanical bowel obstruction.

The stimulant laxatives enhance propulsive motility by a variety of actions. One example, which has been used in cats, is bisacodyl (Dulcolax™, 5 mg PO q24h), which acts by stimulating nitric oxide-mediated epithelial cell secretion and myenteric neuronal depolarization. Long-term use may result in myenteric neuron damage.

5) Colonic prokinetic agents are a relatively new class of drug, which have the ability to stimulate motility from the esophagus aborally. Older motility agents have been unsuccessful, either because of significant side-effects (bethanechol) or the inability to enhance motility in the distal gastrointestinal tract (metaclopramide, domperidone). Cisapride (Propulsid™, Prepulsid™) belongs to the new group of benzamide prokinetic drugs and has been shown, anecdotally, to be beneficial in cases of mild to moderate constipation. Cats with longstanding obstipation or megacolon are not likely to be helped much by cisapride. Published dose recommendations are 2.5 mg PO q8-12h; this author routinely uses 5 mg/cat PO q8-12h without noted side-effects. Signs of acute toxicosis in dogs include diarrhea, dyspnea, ptosis, tremors, loss of righting reflex, hypotonia, catalepsy and convulsions.

Cisapride has been withdrawn from the pharmaceuticals market because of cardiac toxicity in a small, select group of human patients. Veterinarians may request cisapride from compounding pharmacists. Washabau et al, have shown that nizatidine and ranitidine, stimulate colonic smooth muscle, *in vitro*. They appear to work by inhibition of acetylcholinesterase. Suggested doses to be given in conjunction with cisapride are ranitidine (Zantac™, 1-2 mg/kg PO q12h) or nizatidine (Axid™, 2.5-5.0 mg/kg PO q12h). Other H2 receptor antagonists, cimetidine and famotidine are not effective. Erythromycin and motilin, effective in canine intestinal motility, are not effective in the feline colon.

Newer promotility drugs have not yet received wide use. Some suggested doses and comments by Dr. Washabau follow: "Cats treated with prucalopride at a dose of 0.64 mg/kg experience increased defecation within the first hour of administration. Fecal consistency is not altered by prucalopride at this dosage. The therapeutically effective dose for tegaserod in cats is 0.1-0.3 mg/kg PO BID. Misoprostol was recently shown to stimulate feline colonic smooth muscle contraction *in vitro*."

Surgery

Cats with chronic obstipation or megacolon should be considered as candidates for colectomy. Chronic fecal impaction results in mucosal ulceration and inflammation and risk of perforation. Surgery should be done before bowel wall and patient health are compromised and debilitated. At the time of resection, small intestinal biopsies are advised, as concurrent, underlying disease (e.g. lymphosarcoma, feline infectious peritonitis) may be identified. Post-operatively, diarrhea may be present for 4-6 weeks. As anal tone isn't compromised, this does not result in house soiling. The prognosis is good for recovery. (Vet Clin North Am Small Anim Pract. July 2002;32(4):901-15)

Comparison of biofragmentable anastomosis ring and sutured anastomoses for subtotal colectomy in cats with idiopathic megacolon

Ryan S, Seim III H, MacPhail C, et al. *Vet Surg.* December 2006;35(8):740-8.

Abstract

OBJECTIVE: To report use of a biofragmentable anastomosis ring (BAR) device in cats with idiopathic megacolon (FIM) and compare outcome after subtotal colectomy with sutured colocolic anastomosis. **STUDY DESIGN:** Retrospective study. **ANIMALS:** Nineteen cats with megacolon. **METHODS:** Medical records (January 1990-January 2004) of cats treated surgically for idiopathic megacolon with sutured (SUT) or BAR anastomosis were retrieved and reviewed. Operative, short- and long-term complications, and survival times were recorded and Kaplan-Meier survival analysis used to assess outcome. **RESULTS:** There were 11 SUT and 8 BAR cats. One BAR cat had anastomotic dehiscence 36 hours after surgery. Mild serosal tearing during BAR insertion in 6 cats was corrected by suture reinforcement. One SUT cat developed anastomotic stricture at 32 days. Short-term complication rates at 3 and 7 days were 18% and 45% in the SUT group and 25% and 87.5% in the BAR group, respectively ($P=.058$). Two SUT cats had persistent loose stool consistency and were euthanized 254 and 1661 days after surgery. One BAR cat had recurrence of constipation which was managed medically. Long-term complication rates were not significantly different between SUT and BAR ($P=.61$). The 1 and 4-year survival rates were 90% for SUT and 100% for BAR ($P=.29$). **CONCLUSIONS:** No difference was detected for short and long-term complication rates and survival times between SUT and BAR groups. **CLINICAL RELEVANCE:** The BAR device can be used for colocolic anastomosis in cats with idiopathic megacolon. Serosal tearing during BAR insertion was a common intraoperative complication. Regardless of anastomotic technique, survival outcome after colonic resection is excellent for cats with FIM.

If the megacolon is of the hypertrophic type, then pelvic osteotomy is required in addition to the colectomy. Should the megacolon be less than 6 months duration subsequent to the pelvic fracture, then the pelvic osteotomy may be all that is required. Options for pelvic widening include revision of the pelvic fractures by osteotomy of impinging bone, corrective osteotomy and stabilization, or pelvic symphyseal distraction osteotomy. Pelvic symphyseal distraction osteotomy is a successful and safe method for widening the pelvic canal to relieve obstipation. (*Compend Contin Educ Pract Vet.* September 2005;27(9):662-670)