In(tussus)ception

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Introduction

An intussusception is characterized by an invagination of one section of the gastrointestinal tract into the adjoining section[2]. The proximal portion of the gut, known as the intussusceptum, telescopes in on the more distal portion of the gut, known as the intussuscipiens[2,5]. This telescoping of the gut is due to a difference in gut motility between the two sections[7]. The condition is not itself a disease, but rather a sequela of an ongoing gastrointestinal disease process. Many intussusceptions are acute in nature, though some can occur chronically or intermittently. The case outlined below is an instance of a chronic intussusception.

Case History and Presentation

Gigi is a 2-year-old, spayed female, Jack Russell terrier mix that was presented to the Mississippi State University College of Veterinary Medicine Small Animal Surgery service on April 18, 2018, for treatment of gastrointestinal intussusception. Gigi first began having signs of gastrointestinal upset in December of 2017, when she began having a decreased appetite and had two episodes of vomiting under her owners' bed. Over the next few weeks, Gigi began to lose weight, would often shake or tremble, and was passing malformed, often bloody stools. She presented to her local veterinarian in January 2018, who radiographed her abdomen, but did not diagnose anything conclusive. Gigi's clinical signs continued to worsen until April 2018, when her local veterinarian diagnosed an intussusception on abdominal ultrasound. On April 17, 2018, the local veterinarian performed an exploratory laparotomy, but upon seeing the extent of the intussusception, she deemed it more than they could handle and referred it to the surgeons at MSU CVM, with morphine and gabapentin for pain control.

On presentation to MSU CVM, Gigi was bright, alert, and responsive. She weighed 13.4 kg and had a thin body condition score of 3/9. Her temperature was 102.2 F, pulse was 160 beats per minute, and respiratory rate was 24 breaths per minute, all within normal limits. Loose feces with frank blood was seen upon rectal palpation. Her physical exam was unremarkable, though her abdomen was only gently palpated due to her fresh incision.

Pathophysiology

Intussusceptions can occur due to a variety of causes, and are not a primary disease, but rather are sequelae of ongoing gastrointestinal disease processes[2,17]. Intussusceptions occur when there is hyperperistaltism, or increased motility, in a segment of intestine. When there is enough of a difference in motility between one segment of intestine and the adjoining segment (such as occurs with diarrhea), the faster-moving segment (the intussusceptum) telescopes into the slower adjoining segment (the intussuscipiens), forming the intussusception[9,16]. Intussusceptions can occur in animals of all ages, but most commonly, patients are young animals (less than 1 year of age in 75% of cases)[2,17]. These young animals often have a history of intestinal parasitism or viral enteritis[9,16,17]. Older patients with intussusceptions may have an intestinal foreign body, gastrointestinal neoplasia, or inflammatory bowel disease[11,18,19]. Idiopathic intussusceptions have also been documented. The most common clinical signs associated with intussusception are vomiting and diarrhea[16,17].

The intussusception leads to either partial or complete obstruction of the lumen of the involved bowel[9]. Intussusceptions may occur anywhere throughout the gastrointestinal tract, though the ileocolic junction is the most common site of occurrence[2,4]. Early in the course of the intussusception, strangulation of the vessels in the intussusceptum leads to congestion and swelling of the involved tissues, further entrapping the bowel[2,9,12]. This congestion and

obstruction leads to the distension of the portion of bowel proximal to the intussusception[3,5]. The intussusception can quickly become life-threatening if enough local ischemia and necrosis occurs, leading to perforation, peritonitis, sepsis, and death[12,17]. The severity of the condition depends on the amount of vascular compromise and luminal obstruction[12,18]. As the intussusception becomes more chronic, fibrous adhesions will begin to form between the intussusceptum and intussuscipiens, making reduction of the intussusception increasingly difficult[21,17]. In some of these cases, the intestinal wall will slough and luminal patency will return[17].

Diagnostic Approach/Considerations

Diagnosing an intussusception can be most easily achieved through ultrasound, though some may be diagnosed radiographically[6,13]. On ultrasound, the affected intestinal segment will have a characteristic “bullseye” appearance as the intussusception is viewed in cross section and both the intussuseptum and intussuscipiens are viewed[6,13]. The use of color doppler ultrasonography can not only be useful in diagnosing intestinal intussusception, but also in determining the extent of mesenteric vessel strangulation[15]. Radiographically, most intussusceptions appear as a tissue-dense mass inside a dilated loop of bowel[5]. If the intestinal mucosa has become folded and edematous, there may be a characteristic “coiled spring” appearance of the intussusceptum within the gas dilated intussuscipiens[5]. Because Gigi’s intussusception had already been directly visualized by her veterinarian during the initial surgery, no diagnostic imaging was performed prior to her surgery at MSU-CVM.

Other useful diagnostics include a complete blood count (CBC), serum chemistry, and urinalysis. On CBC, patients with an intussusception may have anemia, leukopenia, leukocytosis, lymphocytosis, and hemoconcentration[17]. The serum chemistry will typically show azotemia,

increased blood urea nitrogen, hypoalbuminemia, hypocalcemia, hyperproteinemia, hyponatremia, hypochloremia, and hypokalemia[17]. A urinalysis of these patients typically reveals an increased urine specific gravity[17]. Many patients with intussusceptions will present with some level of dehydration due to diarrhea, vomiting, and other ongoing losses[3].

Treatment and Management

Treatment of an intussusception will ultimately depend on the primary cause of gastrointestinal upset that led to the intussusception in the first place[2,18]. Without treating the primary cause, intussusception may recur[18]. Some minor intussusceptions may spontaneously reduce, however, in most cases, surgical intervention and manual reduction or resection is required[14,17]. An exploratory laparotomy reveals the intussusception, to which gentle traction may be applied to try to reduce it[18]. Traction should immediately be halted if the serosa begins to rip, otherwise there is increased risk for spillage of intestinal luminal contents and resulting peritonitis[18]. If the entrapped bowel is viable, an enteroplication procedure may be performed to prevent recurrence of the intussusception[1,5,10,18]. In an enteroplication, adjacent sections of intestine are sutured together, serosa-to-serosa, creating gentle undulations that prevent obstruction, and sutures are placed at intervals such that bowel entrapment cannot occur[1,5,10,8].

If the section of bowel is non-reduceable or is no longer viable, a resection and anastomosis procedure will need to be performed[5,8]. In this procedure, the affected section of bowel is isolated with clamps or forceps, then resected and removed[5]. The two ends of viable intestine are then anastomosed, which can be achieved through suture, intestinal staples, or a combination thereof[5,20]. The mesenteric rent between the sections of bowel will also be sutured together and the newly adjoined sections will be leak-tested for assessment of proper closure[5,20]. Once the intussusception has been resolved, the intestines should always be thoroughly checked

for foreign bodies, neoplasia, or other insults that may have led to the initial alteration of gastrointestinal (GI) motility[18]. The resected intestinal tissue should always be submitted for biopsy, as the histological results can help diagnose the underlying cause of the intussusception[7]. Post-operative management of these surgeries should consider pain control and gastroprotectants, as well as fluid therapy and activity restriction[17]. As mentioned earlier, treatment of the underlying primary disease process is necessary for full recovery and prevention of future intussusceptions[18].

As with all surgical procedures, there are several complications that could occur. Hemorrhage from improperly ligated vessels or from the incision site are always possible[17]. If the ends of the anastomosed intestinal segments are not appropriately apposed, leakage of intestinal contents into the abdominal cavity could occur[20]. If there is such a leakage into the abdomen, the bacteria normally contained within the intestine would then proliferate and lead to a widespread peritonitis. Peritonitis leads to sepsis, which in most cases quickly leads to death[1,4]. Even if the intestine retains its integrity, there is no guarantee that proper motility will return to the segments, and there is a possibility for chronic diarrhea and abnormal stools for the duration of the animal's life[4,12]. The intestinal intussusception could also recur, especially if the underlying cause is not successfully treated[1].

Case Outcome

On April 18, 2017 Gigi underwent a laparotomy with the intent of performing a resection and anastomosis of the affected area of bowel if the intussusception could not be manually reduced. Upon entering the abdomen, an approximately 7-inch jejunocolic intussusception was visualized. The intussusceptum was comprised of the distal 1/3 of the jejunum and the entire ileum cranial to the cecum, and the intussuscipiens consisted of the cecum and ascending colon.

An attempt at manual reduction of the intussusception was made, however, there were multiple fibrous adhesions between the intussusceptum and intussuscipiens and reduction was halted when an approximately 3-inch rent formed in the middle of the intussusception. The surgeon then elected to perform a resection and anastomosis procedure, resecting at either end of the lesion and anastomosing the healthy intestinal ends using endo-GIA stapling along the anti-mesenteric border of the two pieces. The newly joined gut was leak tested and the abdomen was closed using a 3-layer closure.

Gigi was managed post-operatively in the ICU. She remained on intravenous Lactated Ringers Solution for one day post-op. She was given a dose of Drontal Plus for small dogs to take care of any intestinal parasites she may have been harboring. Gigi's pain was managed with methadone (0.2mg/kg IV q6h) for two days post-op and Tylenol 3 (2 mg/kg PO q8h) for 12 days post-op. To prevent ulceration and aid in GI motility and healing, Gigi was placed on omeprazole, 1 mg/kg PO q24h for 12 days post-op. Maropitant, an anti-emetic, was administered at 1 mg/kg IV or SC q24h for 6 days post-op. Gigi also began receiving probiotics with her food to encourage the return of healthy gut flora. Gigi was sent home with instructions for incisional care, activity restriction, careful monitoring, and continuation of her medications and probiotic supplements.

The jejunocolic intussusception removed from Gigi's abdomen was submitted for biopsy. On histopathology, there was marked thickening of the serosal and mesenteric surfaces with tortuous, hyperplastic blood vessels. The lamina propria was also thickened and the intestinal crypts were hyperplastic. There was minimal content present within the lumen, but it did contain sloughed cellular material and rod-shaped bacteria. The contents of the colon were thick, pasty, and dark red made up of proteinaceous material and rod-shaped bacteria. The pathologist noted

that the tissues were “remarkably healthy, considering,” and that “significant mesenteric fibrosis was evident, making reduction unlikely.”

Gigi had an uncomplicated recovery from her abdominal surgery. She experienced some residual diarrhea as her intestinal mucosa was healing, and her body adjusted to her shortened bowels. She quickly regained a normal appetite and was able to go home on April 23,2018. Gigi’s stools have since become a normal consistency and she is back to her normal happy self with no signs of recurrence of intussusception or peritonitis.

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