Jejunal Lesion Identified at a Previous Anastomosis Site in a Dog Using Capsule Endoscopy

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ABSTRACT

A 3 yr old spayed female French bulldog was evaluated for a progressive regenerative anemia of unknown origin that was unresponsive to empiric immunosuppressive and gastroprotective therapy. The patient had a history of previous resection and anastomosis of a small intestinal diverticulum ~2 yr prior to evaluation for her anemia. Capsule endoscopy revealed a focal abnormality in the distal jejunum at the site of a previous bowel resection and anastomosis. This lesion was suspected to be the cause of ongoing gastrointestinal bleeding and anemia. Exploratory laparotomy combined with endoscopy was performed to further investigate and localize the jejunal lesion. The lesion was resected, and a primary end-to-end jejunal anastomosis was performed. Histopathology of the specimen revealed jejunal suture granulomas with focal ulceration. The patient recovered well from surgery with significant improvement of the anemia and resolution of clinical signs at recheck examinations 1 and 2 wk postoperatively. Complete resolution of the anemia was noted at a 6 wk follow-up. The case report demonstrates how, in cases of unknown causes of anemia, capsule endoscopy is a noninvasive method of identifying the presence of gastrointestinal bleeding as a result of lesions that might otherwise not be detectable with abdominal ultrasound or conventional endoscopy. The report also documents a long-term complication to a resection and anastomosis surgery. (*J Am Anim Hosp Assoc* 2020; 56:30–33. DOI 10.5326/JAAHA-MS-6712)

Introduction

Capsule endoscopy has been approved for use in humans since 2000, with established usefulness in identifying small intestinal pathology and helping guide surgical recommendations.[1,2] One of the most common indications for capsule endoscopy in people is obscure gastrointestinal (GI) bleeding. In dogs, capsule endoscopy has been shown to be effective in identifying causes of bleeding, including erosions, ulcerations, or masses.[3,4] This case report exemplifies the value of capsule endoscopy in diagnosing a focal source of GI bleeding, specifically in a patient with progressive anemia of unknown origin. It also describes a unique scenario in which significant GI bleeding was occurring from a site where intestinal resection and anastomosis had been performed 2 yr prior.

Case Report

A 3 yr old spayed female French bulldog who weighed 9.5 kg was evaluated for regenerative anemia of unknown origin. She was initially presented on an emergency basis for anorexia and pale gums, with a recent history of treatment with cephalosporins for suspected pyoderma, but she was currently not being given any medications. Physical examination revealed light pink mucous membranes, mild tachypnea with clear lung sounds, and a normal heart rate (120–130 bpm). No melena or hematochezia was noted on rectal examination at that time. Abdominal radiographs showed suspected intestinal plication, however, a GI ultrasound revealed a normal GI tract and pancreas. Complete blood count (CBC) revealed a moderate macrocytic normochromic regenerative anemia (hematocrit [HCT] 22.9% [37.3–61.78%], mean cell volume 74.6 fL [61.6–73.5 fL], mean corpuscular

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CBC (complete blood count); GI (gastrointestinal); HCT (hematocrit); PCV (packed cell volume); PO (*per os*); TS (total solids)

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hemoglobin concentration 34.9 g/dL [32.0–37.9 g/dL], reticulocytes 315.6 K/uL [10.0–110.0 K/uL], packed cell volume [PCV] 27%, and total solids [TS] 4.2 g/dL) with a normal leukogram and platelet count. Serum biochemical analysis showed a hypoproteinemia (4.5 g/dL [5.5–7.6 g/dL]) with low normal albumin (2.5 g/dL [2.5–4.0 g/dL]) and globulin (2.0 g/dL [2.0–3.6 g/dL]). Saline agglutination was negative and a CBC with pathologist review confirmed a significantly regenerative anemia with moderate to marked polychromasia and a proportional number of metarubricytes. No spherocytes were noted. The patient was discharged on immunosuppressive therapy with prednisone (1 mg/kg *per os* [PO] *q* 12 hr) and cyclosporine (5 mg/kg PO *q* 12 hr) for treatment of possible immune-mediated hemolytic anemia. She re-presented later that evening for mild tachypnea. A recheck PCV was static (27%, TS 5.0 g/dL), and two-view thoracic radiographs were unremarkable.

Approximately 1 wk after initial evaluation, the patient was presented to the Internal Medicine Service at the VCA Animal Specialty and Emergency Center in Los Angeles for further evaluation. The owner reported that the patient had been doing well at home, aside from anticipated polyuria and polydipsia secondary to prednisone therapy. Her physical examination was unremarkable other than possible hematochezia noted on rectal. As the patient was doing well and the etiology of the anemia was still unclear (hemolysis versus hemorrhage), the recommendation was made to continue immunosuppressive therapy in addition to initiating treatment with famotidine (1 mg/kg PO *q* 24 hr) and metronidazole (13 mg/kg PO *q* 12 hr) for potential hematochezia.

At recheck examination 5 days later, the owner reported a decrease in appetite and subjectively paler gums. On physical examination, the patient had pale mucous membranes but an otherwise unremarkable exam. Recheck PCV revealed significant worsening of her anemia (PCV 18%, TS 4.5 g/dL). She was hospitalized for supportive care and received a transfusion of 1 U of packed red blood cells. In addition, a CBC with reticulocyte count, chemistry panel, and cobalamin were submitted to further evaluate potential causes of her anemia in addition to a Coomb's test and tick panel to look for evidence of immune-mediated disease. The CBC was consistent with a strongly regenerative normocytic hypochromic anemia and persistent hypoproteinemia. The tick panel and Coomb's test were negative, and cobalamin was normal (562 ng/L [284–836 ng/L]). A mild transfusion reaction (increased temperature and vomiting) occurred, and the patient was administered a dose of diphenhydramine. Abdominal ultrasound the following morning revealed possible gastritis, changes consistent with fluid overload (hepatic venous distension, mild peritoneal effusion), and mildly thickened gallbladder walls with a peripheral hypoechoic rim, which could be a result of fluid overload, although the changes have also been observed with hypersensitivity reactions.[5] At this time, after further review of her previous medical records, it was noted that during her spay, a jejunal mass (found to be a small intestinal diverticulum) was noted and removed with a resection and anastomosis, ~2 yr prior.

As a result of a lack of evidence of an immune-mediated process and a possible source of GI bleeding, further investigation using capsule endoscopy was recommended. The patient was fasted 24 hr prior to administration of the endoscopy capsule[a], based on manufacturer recommendations. A recheck ultrasound prior to capsule administration showed resolved gastric wall thickening and a normal GI tract. The hypoechoic rim around the gall bladder was persistent but subjectively improved. The patient was discharged the same day after capsule administration, as her PCV had remained stable and >30%. She was discharged on a reduced dose of prednisone (0.25 mg/kg PO *q* 24 hr) and doxycycline (5 mg/kg PO *q* 12 hr) while tick panels were pending as well as sucralfate (1 g slurry PO *q* 8 hr) and famotidine (0.5 mg/kg PO *q* 12 hr). Barium (3 mL PO *q* 12 hr) was later initiated for further gastroprotective therapy.

The capsule passed within 24 hr after administration without complication and was retrieved from the feces. The results were analyzed by a board-certified internist and showed a normal esophagus and esophageal transit time (9 s) and gastric transit time (39.7 min). Patchy irregular mucosa and several possible erosions were noted at the pyloroduodenal junction. Patchy irregularity of the mucosa was noted in the proximal duodenum along with several dilated lacteals in the duodenum and proximal jejunum. In a focal area of the distal third of the jejunum, there was retained dark brown fluid (**Figure 1B**) associated with mucosa that was irregular and thickened (Figure 1C). Immediately distal to that region, there was a linear irregularity, consistent with the appearance of a suture line, with areas in the center that looked mildly irregular and thickened (Figure 1A). The jejunum distal to this lesion was normal. The mucosa in the proximal colon appeared irregular or corrugated. Based on the relatively mild changes in the stomach and proximal small intestine, the focal jejunal abnormalities, suspected to be at the location of the patient's previous surgical site, were considered to be the likely source of patient's anemia.

On recheck examination, the patient had progressive, severe anemia, with a PCV of 15%. Given the focal lesion found on capsule endoscopy, the recommendation was made to pursue exploratory surgery combined with endoscopy. A second blood transfusion was administered preoperatively. An echocardiogram was also performed as a result of previous evidence of fluid overload on abdominal ultrasound, which revealed mild tricuspid regurgitation with mild biventricular dilation and mild to moderately decreased left ventricular

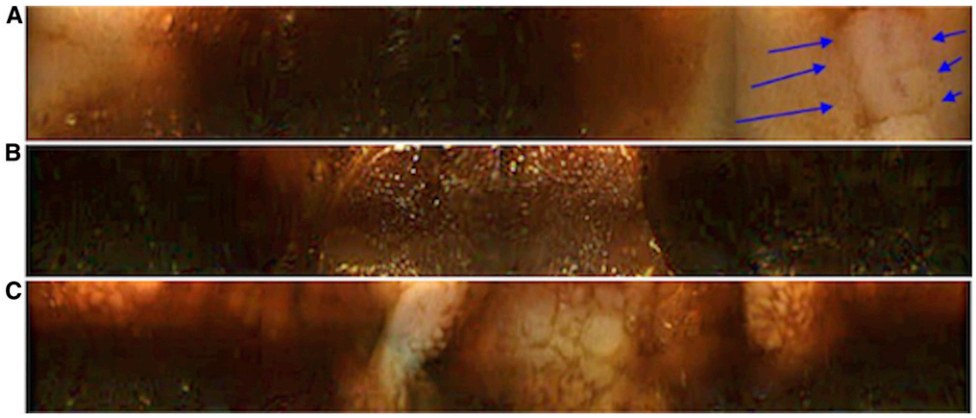

FIGURE 1 *(A) Suture line from previous resection and anastomosis; (B) retained fluid in jejunum; and (C) irregular and thickened jejunal mucosa.*

systolic function. It was unclear whether this dilation was secondary to disease, anemia, or secondary to fluid administration.

After placement under general anesthesia, conventional gastroduodendoscopy was performed which revealed small pinpoint petechiations near the pylorus and a slightly erythematous duodenum with few dilated lacteals. Pinch biopsies were obtained of the stomach and duodenum. The patient was then transferred to the surgery service for exploratory laparotomy. Intraoperatively, generalized gas distension of the intestines was noted. At the previous distal jejunal resection and anastomosis site, ~5–6 cm orad to the ileum, there was a mild circumferential narrowing of the intestinal lumen as a result of scar tissue formation along the previous surgical site. The luminal stenosis did not appear significant enough to cause a partial obstruction. A small omental adhesion was also identified on the antimesenteric aspect of the anastamosis site. An endoscope was introduced into the GI tract orally and manually guided to the area of anastamosis site. Areas of ulceration and erythema were noted within the mucosa at that location. As the intestines were beginning to show signs of vascular congestion as a result of the presence of the endoscope, it was removed. The remainder of the jejunum appeared normal as the endoscope was removed. The small and large intestines were visualized, and no other abnormalities were noted. The vascular congestion resolved upon removal of the endoscope. A resection and an end-to-end anastomosis of the affected segment of distal jejunum was performed including the area of scar formation and ~3 cm of healthy appearing jejunum on either side of the affected portion. The resected segment of intestine was opened and the mucosa evaluated, which showed a 5 mm linear mucosal erosion/ulceration in addition to other areas of mucosal erythema. There was evidence of brown liquid ingesta adhering to the mucosa in this region. This resected jejunum was submitted for histopathology along with the gastric and duodenal biopsies. The patient recovered well from surgery and was discharged 2 days later on tramadol (2.5 mg/kg PO *q* 8 hr), omeprazole (1 mg/kg PO *q* 12 hr), and famotidine (0.5 mg/kg PO *q* 12 hr).

Histopathology of the jejunal resection revealed focal jejunal ulceration with mild neutrophilic enteritis and early neovascularization and multiple serosal suture granulomas. There was minimal inflammation with the stomach and duodenum.

At following rechecks, 1 and 2 wk postoperatively, the patient had an improving normocytic normochromic regenerative anemia (HCT 34% [36–60%], MCV 79 fL [58–79 fL], mean corpuscular hemoglobin concentration 31 g/dL [30–38 g/dL], and reticulocytes 207 K/uL) and had returned to being clinically normal at home. On examination 6 wk postoperatively, a recheck CBC was completely within normal limits (HCT 39% [36-60]).

Discussion

The usefulness of capsule endoscopy in veterinary patients has only recently been investigated, but it is promising. This case report in particular serves to demonstrate the value of capsule endoscopy in diagnosing a focal source of GI bleeding within a canine patient after failure to identify a cause of progressive anemia by routine diagnostics and a lack of response to empirical treatment for immune-mediated hemolytic anemia.

Capsule endoscopy has the benefit of avoiding general anesthesia and allowing for visualization of parts of the small intestine beyond what is accessible with conventional endoscopy. Studies on anthelminthics have also found capsule endoscopy to produce high enough image quality such that it may be a useful means of quantifying worm burdens and thus an alternative to necropsy.[6,7] It has been shown to be safe, with the most common complication being failure of the capsule to pass into the duodenum before the capsule stops recording. In one study, this occurred in a minority of patients who later vomited up the capsule or had to have the capsule endoscopically removed. This complication did not appear to be associated with patient size.[3] In a second study, the capsules passed on their own within 27 hr.[6] Previous studies have also shown that the capsules remain the longest time within the pyloric region of the

stomach, and endoscopic placement within the duodenum can speed passage of the capsule.[8,9]

Recently presented abstracts have proposed capsule endoscopy as a safe and useful means of measuring GI transit time, identifying the presence and location of GI bleeding in addition to identifying other abnormalities in dogs with sonographically normal GI tracts, even those without overt signs of GI bleeding.[10, 11] In this patient, capsule endoscopy successfully identified a distal jejunal lesion, which went undetected with abdominal ultrasound and was beyond the reach of conventional endoscopy.

In this case, the patient was fasted for 24 hr, with oral medications being discontinued 12 hr prior to administration of the pill. The patient was allowed to eat 8 hr after administration. This proved to be an adequate length of fasting for visualization of the small intestine. Previous studies have shown 24–48 hr of fasting prior to capsule endoscopy and prolonged fasting and/or preparation with an osmotic laxative may improve visualization of the colon.[8] The cost to the client for capsule endoscopy was ~$900 (including the cost of the capsule and analysis), compared with ~$1700–2000 for standard endoscopy with biopsies at the same clinic.

This study also documents GI bleeding as a long-term complication of a previous intestinal resection and anastomosis surgery. There are several reports of foreign body obstructions in dogs as a complication of previous surgery; however, this report is the first to document anemia and ulceration as a complication, thought to be secondary to inflammation and suture granulomas.[12,13] In humans, anastomotic ulceration is reported to be a rare occurrence mostly seen in children who had bowel surgery in infancy and the mechanism is unknown. In one retrospective study, most of the anastomoses were located between the small intestine and colon, which is different than the present case.[14]

Overall, capsule endoscopy proved to be an appropriate diagnostic for identifying the source of the regenerative anemia in this patient. Part of this success is attributable to case selection. Based on this patient's history and clinical signs, there was possibility of a distal small intestinal lesion, which is why the recommendation was made to move forward with capsule endoscopy. Additionally, the client had reservations about pursuing an anesthetic procedure at the time. In hindsight, one other possible location of bleeding in this patient that was not evaluated was the urinary tract. A urinalysis, which had not been performed, would have been important as part of a minimum database and ruling out hematuria prior to pursuing more advanced diagnostics.

Conclusion

In cases of regenerative anemia in which it is unclear where a potential bleed could be occurring, capsule endoscopy is a noninvasive method that can be useful in guiding further diagnostics or treatment.

FOOTNOTES

[a] ALICAM; Infiniti Medical LLC, Menlo Park, California

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