In a Tight Spot!

Rectal Stricture in the Canine Patient

Olivia G Mann

Mississippi State University College of Veterinary Medicine

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CPC Advisors:

Jason Syrcle, DVM, DACVS-SA

Jon Blakely, DVM

Introduction:

Rectal stricture, also known as rectoanal stricture, is a thickening of the rectal wall, causing narrowing of the rectum. This condition is uncommon in dogs, but when it does occur it is usually the result of trauma, inflammatory disease, or neoplasia.[5, 10] Traumatic causes of rectal stricture include surgical intervention, foreign body penetration, repeated enema administration, or radiation therapy.[5] Inflammatory causes of rectal strictures include colitis and perianal fistulae.[7] The most common neoplastic disease affecting the rectum is benign adenomatous polyps, but malignant neoplasia can also occur, the most common of which is adenocarcinoma, which has been associated with rectal strictures.[5] Generally, dogs who present with rectal stricture are middle-aged to older, with a median age of seven years at time of diagnosis for dogs with non-neoplastic causes of rectal stricture.[7] The clinical picture of rectal stricture includes tenesmus, diarrhea, obstipation, and occasionally, ribbon-like stools. On physical examination, the stricture can almost always be palpated on digital rectal palpation, and on abdominal palpation one may detect an enlarged colon with impacted feces.[10]

To diagnose rectal stricture, history and physical examination are sufficient in most dogs, and priority turns to determining whether the cause of rectal stricture is benign or neoplastic. Bloodwork such as complete blood count and serum chemistry are usually clinically unremarkable. Diagnostic imaging, such as radiography and ultrasound, is a useful tool for visualizing other possible causes of obstipation, and can also assist in finding masses. However, the only method that can definitively diagnose whether the cause of a stricture is benign or malignant is biopsy and histopathology, which can be obtained via colonoscopy, transanal

incisional biopsy, or direct excisional biopsy while undergoing surgical removal of the stricture.[10]

Treatment of rectal strictures is focused on alleviating or removing the stricture and treating the inciting cause of the stricture. Depending on the severity of the stricture, bougienage, balloon dilatation, or surgical techniques may be used. Bougienage or balloon dilatation are generally preferred to surgical removal for non-neoplastic causes of stricture, as these methods are associated with fewer complications and can achieve the same desired results of alleviation of clinical signs.[4,10] Surgery of a rectal stricture involves resection and anastomosis of the affected rectum. Surgical techniques used to achieve this include rectal pull-through and ischiopubic osteotomy.[1] Depending on the etiology of rectal stricture, prognosis is guarded to fair, with benign causes carrying a better prognosis than neoplastic. Approximately 50% of rectal neoplasms are malignant and for these cases prognosis is poor. No matter the cause of stricture, there is unfortunately a high rate of recurrence.[5, 10] The purpose of this case report is to describe the surgical management of one case of benign rectal stricture in an eleven-year-old mixed breed canine.

Case Report:

Lucy is an 11-year-old female spayed Labrador retriever mix who presented to her primary veterinarian on February 8, 2018, for severe obstipation. At that visit she was diagnosed with an impaction and severe mucohemorrhagic colitis. After treatment with intravenous fluids and antibiotics, she did well and was sent home. However, approximately one month later, Lucy returned for another episode of severe obstipation. A digital rectal exam was performed and a stricture was found approximately four inches into the rectum. Three enemas and an attempt at manual evacuation of stool were unsuccessful, and on March 15th she was referred to MSU-

CVM surgery department. Diagnostics were performed including bloodwork, radiographs, ultrasound, fine needle aspirate of caudal mesenteric lymph nodes, and colonoscopy with biopsies. Her bloodwork was clinically unremarkable, while thoracic radiographs revealed a lung nodule; abdominal radiographs and ultrasound revealed a thickened colon and several small nodules within the spleen, and the fine needle aspirates were non-diagnostic. Colonoscopy revealed that the rectal stricture was ten centimeters from the anus and was three centimeters thick, with 80% occlusion of the colonic lumen. The colonic biopsies revealed mild chronic colitis and fibrosis. Lucy was prescribed lactulose to soften her stools and made an appointment with MSU-CVM Internal Medicine.

On April 2nd, Lucy presented to the Internal Medicine department. She was bright, alert, and responsive, and her vital signs were within normal limits with a temperature of 101.7 F, a heart rate of 88 beats per minute, and a panting respiratory rate. Her mucous membranes were pink and moist with adequate perfusion. Multiple masses of varying size and consistency were palpated on her head and abdomen. Her lungs sounded clear with no crackles or wheezes ausculted, and her heart had a normal rate and rhythm with no murmurs or arrhythmias ausculted. Abdominal palpation revealed no abnormalities, and her palpable lymph nodes were within normal limits. Her rectal stricture was easily palpated on digital rectal exam and was noted to be the same size as previously described. All other exam parameters were within normal limits. Bloodwork performed that day (Complete blood count and serum chemistry) were clinically unremarkable. Abdominal CT performed revealed the previously described lung nodule to be located in the left cranial lung lobe, and thickening of the caudal one-half to one-third of the colon was noted. Three enemas were given, but Lucy still did not defecate. After consulting with Internal Medicine, the owner elected surgery to remove the rectal stricture as

well as the nodule on the left cranial lung lobe, and Lucy was transferred to MSU CVM Surgery service on April 5th.

When Lucy presented to MSU CVM Surgery Department, she was bright, alert, and responsive. Her vitals were still within normal limits and no changes were noted compared to her previous physical exam. No further diagnostics were performed before her surgery, and on April 5th, Lucy underwent the following surgical procedures under general anesthesia: a thoracoscopic-assisted partial lung lobectomy, in which the affected area of the left cranial lung lobe was removed; a splenectomy, due to the nodular nature of the spleen when an abdominal exploratory was performed; and a bilateral ischiopubic ostetotomy, in which the pubis is cut and drilled on both sides and temporarily moved to provide exposure of the affected rectum, which underwent a resection and anastomosis. The affected portion of the rectum did not appear overtly ischemic, nodular, or necrotic, and the stricture necessitated palpation by an assistant to determine where to resect and anastomose. The affected portion of the rectum was then excised using a #15 scalpel blade. During the excision, a Poole suction tip was used to suction fecal material as it appeared. The caudal rectal incision was made obliquely and spatulated to deal with luminal disparity. The rectum was then closed using 3-0 PDS in a simple interrupted pattern. The ischiopubic flap was replaced, and cerclage wires were used to secure the flap back to the pelvis. After the anastomosis was performed, a urinary catheter was placed, as well as a Mila chest tube to obtain negative pressure. Organ samples that were collected and sent for histopathology included the spleen, the affected portion of left cranial lung lobe containing the nodule, the rectal stricture, a section of omentum, and a rectal lymph node that was located near the stricture. The abdomen was thoroughly lavaged before closure of the surgical site, and Telfa bandages were placed over the incision. Lucy recovered uneventfully in ICU and received LRS

fluids at a rate of 2.5 mL/kg/hr (56 mL/hr), a fentanyl CRI at a rate of 3 mcg/kg/hour, and a lidocaine 2% CRI at a rate of 50 mcg/kg/minute. Other medications for pain and recovery included Baytril IV (20 mg/kg every 24 hours), Carprofen (2.2 mg/kg PO every 12 hours), and lactulose (0.5 mg/kg PO every 8 hours), the latter serving to loosen her stools.

Lucy continued to recover well while in ICU—her chest tube was pulled on April 6th, approximately 8 hours after her surgery, and though her urinary catheter fell out the same day the chest tube was pulled, she urinated normally when outside. Her fentanyl and lidocaine were also discontinued that day, and she was switched to Tylenol 4 (2 mg/kg PO every 8 hours). She remained on the carprofen, the Baytril, and lactulose, and maropitant was given (1 mg/kg IV every 24 hours) to attempt to reduce any nausea so she might eat, as her appetite had been poor the first 24 hours after surgery. Her incision site was iced for 5-10 minutes every 6 hours while in ICU, and on April 7th, she walked outside with assistance and effort, though her hind limbs were weak with a wide-based stance due to surgical manipulation in that area. Her bandages were changed as needed. On April 8th, she was able to walk outside without a sling for assistance, and her wide-based stance continued to improve, as did her appetite. The lactulose administration was effective at loosening her stool, and she had bouts of diarrhea both in her cage as well as outside. Each time she defecated, her perineal region was gently washed and dried to avoid ascending urinary tract infection and fecal staining.

On April 9th, Lucy was discharged from ICU and transferred to the surgery wards. In addition, her biopsy and histopathology report came back that same day revealing the following: rectal mural intermuscular fibrosis, reactive rectal lymph node, omental organizing foreign body granulomas, pulmonary adenoma of the left cranial lung lobe, and splenic nodular lymphoid hyperplasia. These results revealed that the rectal stricture was inflammatory rather than

neoplastic in cause, and that the tumor of the lung lobe was benign and that removal was likely curative. From the 9th until discharge from MSU-CVM on the 12th, Lucy continued to have loose stool, and her lactulose administration was eventually discontinued. Her perineal region became red and irritated due to frequent defecation, and desitin diaper rash cream was applied as needed and as tolerated. Her appetite and ambulation continued to improve, and her incision site was heat-packed for 5-10 minutes every 6 hours while in the surgery wards. Lucy was hospitalized for a total of 12 days at MSU-CVM, and when she was discharged she was sent home with Baytril, Tylenol 4, and Carprofen at the doses mentioned above, as well as omeprazole (1 mg/kg PO every 24 hours).

On April 13th, contact with Lucy's owner was made and when asked about her condition, he stated that after having a few days of diarrhea, Lucy went in the opposite direction and became constipated. He took her to their primary veterinarian, where an enema was successfully performed. On the 26th, the primary veterinarian was contacted, and she reported that Lucy was being given lactulose and her stools were watery again, but if they were not watery, Lucy would get constipated again. Lucy was otherwise bright and alert with a good appetite and normal ambulation at that time. On October 2, 2018, Lucy's owner was contacted, and the owner said Lucy was doing well at home, had a good appetite, and had normal bowel movements with no straining. Lucy has recovered fully and is now enjoying life at home on her farm with her owners, and she was not on any medication at the time of contact with the owner.

Discussion:

Acquired rectal strictures in dogs do not appear to have a breed or sex predilection with a variety of breeds and both sexes having shown to be affected, but as previously discussed, older

dogs more commonly present with this condition.[4,7] Several etiologies are causative of rectal stricture, and can be divided into two categories: benign or neoplastic. Since Lucy's rectal stricture was of a benign cause, this paper will focus on the benign category. Benign causes of rectal stricture include trauma via foreign body penetration or surgery, repeated enemas, an ischemic event of the blood supply to the rectum, or inflammatory disease such as bacterial colitis or inflammatory bowel disease.[5, 7, 10]

Foreign bodies, surgical manipulation, repeated enemas, and inflammatory disease such as colitis or proctitis can cause segmental rectal stricture via the introduction and persistence of inflammatory infiltrates, which then can lead to ischemia. In addition to causing a wound in and mechanical obstruction of the rectum, foreign bodies also inhibit wound healing by causing intense inflammatory reactions at the site of the object.[2, 6] In a case report of rectal stricture in pigs, inflammatory colitis and proctitis caused by *Salmonella typhimurium* infection was shown to result in ulceration of the middle third of the rectum, and histologically, invasion of mononuclear leukocytes and endothelial hypertrophy were both present.[8] This then led to ischemic proctitis in the pigs as scar tissue formed to replace the dead tissue, and caused segmental constriction of the affected portion. Though no studies in dogs have been performed at the time of writing, the same process may be presumed to occur in dogs with chronic colitis or infection with bacteria such as *Salmonella* species. Injuries to the rectum heal more slowly than in other areas of the gastrointestinal tract due to decreased arterial inflow, lack of collateral circulation, and incapability of producing adequate neovascularization in the face of injury. Indeed, the cranial rectal artery, a branch of the caudal mesenteric artery, supplies the vast majority of blood to the rectum.[3] These characteristics also make the rectum more prone to lasting ischemic injury. An acute occlusive event due to inflammation or an arterial embolism to

the cranial rectal artery may thus cause infarction of the area of the intrapelvic rectum. Severe damage to the rectal tissue due to ischemia causes ingrowth of fibroblasts and collagen myofibroblasts. Constriction of the myofibroblasts result in a circumferential, segmental rectal stricture.

Clinical signs of non-neoplastic rectal stricture are nearly always exclusive to the stricture itself, and systemic signs are rare. The most common presenting complaints include tenesmus, diarrhea or constipation, and/or ribbon-like stools. If concurrent inflammatory disease is present, the dog may also have hematochezia or melena.[7, 10] Mechanical disruption to the rectum, such as an ingested foreign body, tends to cause a more acute clinical presentation, i.e. within one to three weeks; whereas in other cases of benign rectal stricture, the clinical signs develop gradually as the stricture slowly develops.[7]

Rectal strictures can nearly always be diagnosed via digital rectal palpation on routine physical examination.[5] In one study, rectal strictures could be palpated in all nineteen dogs that were included in the study.[7] Thus, in most dogs, history and physical exam is generally sufficient to diagnose this condition. The question then becomes whether the stricture is of malignant or benign origin. Other tests are useful in ruling out other differentials, but none are specific for diagnosing rectal stricture.

Bloodwork analysis such as complete blood count and serum chemistry are generally clinically unremarkable unless a concurrent comorbidity is present, such as inflammatory bowel disease. Contrast radiography is generally not necessary for diagnosis but can be helpful in determining the true extent of the stricture.[5, 10] Other imaging modalities such as computed tomography (CT) can also be employed for this purpose. However, as previously stated, the only way to definitively diagnose if the stricture is malignant versus benign is via biopsy and

histopathology of the affected portion. This can be obtained by flexible endoscopy, rigid proctoscopy, or during surgery to remove the affected rectum.[10]

Several options are available for treatment of a rectal stricture, including balloon dilatation with concurrent triamcinolone administration, digital bougienage, or surgical removal. Currently, the former two are recommended over the latter due to the ability to resolve the stricture with fewer risks and adverse effects involved than surgical correction; for example, dehiscence or infection.[10] However, it must be noted that in all cases of rectal stricture repair, risk of restructure is inherent due to the nature of colonic tissue, and this risk must be communicated with the owner before initiating treatment.[5]

Balloon dilatation with endoscopic guidance can be employed to dilate the stricture site, and has been shown to alleviate clinical signs in dogs with benign rectal strictures.[7] Usually, intralesional triamcinolone is also added to the protocol to reduce inflammation and risk of re-stricture. This treatment method has been previously employed successfully in esophageal stricture of dogs and cats, and the protocol for treating rectal strictures is almost identical. In the 2007 Webb research study, balloons between the sizes of 18 and 35 millimeters were used, based on the size and weight of the dog being treated. Of the sixteen dogs treated, ten (62%) only required one dilatation procedure. One dog had visual evidence of mucosal tearing after balloon dilatation procedure, but no other complications were noted in any of the other dogs receiving this treatment, and in the same percentage of dogs (62%), there was complete resolution of clinical signs related to the rectal stricture when followed up. These results are encouraging for continued use of this protocol to treat inflammatory, benign rectal strictures. Incidentally, balloon dilatation is also the most common method of treating humans with colonic strictures due to Crohn's disease.[4]

Digital bougienage is a newer treatment option that can be used for mild benign inflammatory rectal strictures. A study published in 2017 described its use, which is primarily restricted to rectal strictures caused by inflammatory processes such as inflammatory bowel disease.[4] After colonoscopy to identify site of the stricture, digital bougienage was performed with one finger, which was lubricated with local anesthetic gel. Once inserted, circular motions to break down the stricture were performed at the same pressure throughout. This protocol was repeated every two to five days until clinical signs related to the stricture were completely resolved. As with balloon dilatation, all clinical signs related to stricture were eliminated for patients whose follow-ups were available. Unlike the balloon dilatation study, none of the animals experienced complications related to the procedure. In addition, this procedure is relatively quick, simple, and requires no special equipment. This study had a small sample size composed of only nine cases, but its results are promising and this method should be considered for mild benign strictures.

Several surgical treatment options are available, including rectal pull-through, dorsal rectal approach, or ventral rectal approach. Lucy underwent a ventral rectal approach; hence, that approach will be the focus of discussion concerning surgical treatment. Lucy underwent a bilateral ischiopubic osteotomy, in which, after a ventral midline celiotomy incision is made and the adductor muscles and internal obturator nerves are carefully dissected away, the pubis and caudal ischia are cut on both sides and temporarily placed aside to make a window through which the affected rectum is available for further inspection and manipulation.[1] After the site of stricture is identified, abdominal organs are packed off and the borders of the lesion are determined. A minimum of 2 centimeters cranial and caudal to the lesion's borders is recommended to ensure complete removal of the stricture.[1] Bowel contents are gently milked

away from the stricture to minimize risk of fecal spillage, and Carmalt forceps are placed at the borders of the section to be removed, whereas Doyen forceps are gently placed on colonic and rectal tissue that will remain. After gentle transection of the affected rectum, the severed ends are gently cleansed and an end-to-end anastomosis is performed via simple interrupted sutures through all layers of the rectum. The Doyen forceps are removed and the site is examined for any leakage before the ischiopubic section is reattached to the pelvis and realigned via orthopedic wire. The abdomen is then thoroughly lavaged before closure of the surgical site is performed. Potential complications of surgery include peritonitis, fecal incontinence, dehiscence, re-stricture, and infection of the ischiopubic flap.[1] The highest risk for dehiscence occurs approximately three to five days after surgery because at this time in the healing process, collagen lysis exceeds collagen synthesis, and the tissues are relatively friable in this period. However, with the ventral rectal approach, recovery is generally relatively uneventful despite the extent of the procedure. In one 2008 study involving seven animals that underwent the procedure, all seven were able to ambulate normally within three days of the operation.[9] Of course, patients that undergo this procedure must be closely monitored for stool production and ambulation, as well as post-operative pain.

Supportive therapy should not be forgotten or dismissed and should include lactulose administration for stool softening as well as a high-quality, low-residue and highly-digestible diet to encourage passage of soft stool that is not irritating to the colonic and rectal walls.

Conclusion:

This case report describes the diagnostic approaches and surgical correction of rectal stricture in a canine patient, which can easily be diagnosed with history and physical

examination, highlighting the importance of rectal exam in every patient. There is very little literature regarding the pathophysiology of benign rectal stricture, but many treatment modalities exist. Surgical therapy has relatively few complications post-operatively, though when they occur they can be severe. These complications include dehiscence of the anastomosis site and septic peritonitis. In addition, in all cases of rectal stricture, re-stricture is an inherent risk no matter which treatment modality is elected.

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