Persistent vaginal hemorrhage caused by vaginal vascular ectasia in a dog

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Case Description—A 6-year-old 36.5-kg (80.3-lb) spayed female Labrador Retriever was evaluated because of an 11-month history of vaginal bleeding. Previous radiographic, endoscopic, and surgical interventions had failed to detect an underlying cause for the bleeding. The dog was examined on an emergency basis because of severe anemia after the bleeding increased in severity.

Clinical Findings—Bleeding was severe, and results of vaginoscopy and radiography (after administration of a contrast agent) did not confirm the cause of the hemorrhage. An exploratory episiotomy revealed multiple bleeding vascular abnormalities within the vaginal mucosa cranial to the external urethral orifice, which were suggestive of vascular ectasia.

Treatment and Outcome—A total vaginectomy was performed via a ventral midline incision and a pubic symphysiotomy. Macroscopic and microscopic examination of excised vaginal tissues confirmed changes compatible with vascular ectasia. The dog made an uneventful recovery with no further vulval bleeding until 19 months after surgery, at which time vulval bleeding recurred. Further investigation and treatment were declined by the owner.

Clinical Relevance—Vascular ectasia may be a cause of chronic vaginal hemorrhage and life-threatening anemia in dogs. In the dog of this report, the diagnosis was made on the basis of direct observation during exploratory episiotomy and histopathologic findings. To manage the condition, total vaginectomy was performed; however, despite radical surgery, bleeding recurred. (J Am Vet Med Assoc 2008;233:945–949)

A 6.3-year-old 36.5-kg (80.3-lb) spayed female Labrador Retriever was reevaluated at the Queen Mother Hospital for Small Animals, The Royal Veterinary College, University of London because of an 11-month history of persistent vaginal bleeding.

The dog had first been referred to the hospital 6.5 months previously for investigation of vaginal bleeding, which was evident as continual blood spotting. The dog had been neutered at 6 months of age, before its first estrus, and there had been no detectable vaginal bleeding until 5 months prior to referral. An exploratory celiotomy had been performed by the referring veterinarian 5 weeks prior to referral; at that time, resected tissue from the left ovarian pedicle was examined histologically and was reported to be scar tissue. No gross abnormalities were evident during the exploratory surgery.

At the first referral evaluation, physical examination, including digital vaginal and rectal examinations, revealed no abnormalities other than a blood-stained discharge from the vagina. Results of hematologic and serum biochemical analyses, including APTT and PT assessments, were within reference limits. Urine collected via cystocentesis was analyzed; microscopically, hematuria was detected, but bacterial culture yielded no growth after incubation for 48 hours. Ultrasonographic imaging of the abdomen performed at that time revealed evidence of adhesions between the cervical stump and bladder neck and retained uterine tissue; in the region of the left ovarian pedicle, an area that was hypoechoic, compared with surrounding tissue, was detected. A vaginal smear was prepared for cytologic examination. The quality of the preparation was reported as excellent, and individualized polygonal to columnar cells with only mild variation in cell and nuclear size were present on a background of blood. The columnar cells each had a basal round to oval nucleus that was reminiscent of cuboidal to columnar epithelial cells (possibly intestinal or uterine). The cells were quite homogeneous, and it was suggested that they might be indicative of a hyperplastic, metaplastic, or possibly benign neoplastic process.

Findings of abdominal radiography were unremarkable. The dog was anesthetized, and retrograde vagino-urethrocytography was performed. The procedure revealed a stricture in the cranial portion of the cervix.
vagina and some irregular filling defects in the caudal portion of the vagina (Figure 1). By use of a flexible endoscope, vaginoscopy revealed blood-stained discharge in the vagina, but a specific bleeding lesion was not identified. Because the reason for the bleeding was unclear and its point of origin was uncertain and because it was possible that the source of bleeding could be at a site cranial to the region that could be examined endoscopically, exploratory abdominal surgery was advised.

During exploratory celiotomy, a ligature that had been recently placed around the left ovarian pedicle was located. The cervical stump adherent to the bladder was not inflamed or swollen, and the stricture detected radiographically was not palpable. A short length of uterine mass was evident at the right ovarian pedicle. The 2 ovarian pedicles, remaining uterine body, and cervix were excised. Histologic examination of these tissues revealed changes compatible with recent surgery. There was no evidence of retained ovarian tissue, estrogenic influence on the excised endometrium, or neoplasia.

The dog continued to have notable vaginal bleeding, although clinicians at the Queen Mother Hospital were not informed until 6.5 months later when the degree of bleeding was reported to have recently increased. Further evaluation of the dog was advised. Several days later, the dog was brought to the Emergency and Critical Care Service at the hospital. At this time, vaginal bleeding had been occurring for a period of 11 months, but the frequency and volume of bleeding had increased, and the dog was passing clots of blood. The dog was reported to be dull and lethargic, but no hematuria or dysuria had been detected. Analysis of a blood sample collected from the dog at the referring veterinary practice on the day prior to reevaluation revealed an Hct of 14%, hypoproteinemia, low hemoglobin concentration, and neutrophilia with left shift.

On clinical examination, the dog was quiet but alert and responsive. The dog was panting and had tachycardia (heart rate, 160 beats/min), pale mucous membranes, and weak peripheral pulses. Rectal temperature was 39.3°C (102.7°F), and there was fresh blood dripping from the vulva. Results of a digital vaginal examination were suggestive of a mass cranial to the urethral orifice. The dog was admitted to the intensive care unit. At admission, PCV was 16% (reference range, 37% to 55%), plasma total solids concentration was 44 g/L (reference range, 54 to 82 g/L), and whole blood lactate concentration was 2.5 mmol/L (reference range, 0.6 to 2.5 mmol/L). Subsequently, hematologic findings included regenerative but severe anemia (Hct, 15.8% [reference range, 37% to 55%]; RBC count, 1.89 X 10¹² cells/L [reference range, 5.5 X 10¹² cells/L to 8.5 X 10¹² cells/L]; hemoglobin concentration, 4.60 g/dL [reference range, 12 to 18 g/dL]; mean corpuscular volume, 83.8 fl [reference range, 60 to 77 fl]; and mean corpuscular hemoglobin concentration, 28.8 g/dL [reference range, 31 to 37 g/dL]). Examination of the blood smear revealed some anisocytosis and moderate polychromasia of RBCs and 24 nucleated RBCs/100 WBCs. Many of the RBCs were hypochromic with an abnormally large central clear zone. The WBC count was within reference range. Serum biochemical analyses revealed several abnormalities: total protein concentration was 42.4 g/L (reference range, 49 to 71 g/L), albumin concentration was 25.3 g/L (reference range, 28 to 39 g/L), globulin concentration was 17.1 g/L (reference range, 21 to 41 g/L), chloride concentration was 117.1 mmol/L (reference range, 107 to 115 mmol/L), cholesterol concentration was 2.8 mmol/L (reference range, 3.3 to 8.9 mmol/L), and alkaline phosphatase activity was 9 U/L (reference range, 19 to 285 U/L). Other variables were within reference limits. Prothrombin time and APTT were within reference limits, as was the buccal mucosal bleeding time. Findings of abdominal ultrasonography were unremarkable. A urine sample was collected via cystocentesis; no abnormalities were detected via urinalysis, and bacterial culture yielded no growth. The dog received a transfusion of 1 unit of packed RBCs.

The following day, the dog was anesthetized. Radiographic views of the caudal portion of the abdomen were obtained; no abnormalities were evident. Retrograde vagino-urethrocystography was performed, and findings confirmed that the stricture in the cranial region of the vagina was still present and largely unchanged (Figure 2). There was an irregular circumferential filling defect in the caudal aspect of the vagina just cranial to the external urethral orifice, which was a clear progression from the small filling defect detected via retrograde vagino-urethrocystography 6.5 months previously.

During the same anesthetic episode, vaginoscopy (by use of a flexible endoscope and rigid anoscope) was attempted. Unfortunately, both procedures were unrewarding because of severe bleeding. A tampon was placed to control vaginal bleeding, and consent was obtained from the owner for exploratory surgery.

An episiotomy was performed to allow exploration of the vagina. The urethra was catheterized with a 12-F Foley catheter that was subsequently connected to a closed collection system. In the caudal portion of the vagina just cranial to the urethral orifice (corresponding to the abnormal area identified radiographically),
multiple raised bleeding lesions resembling blood blisters were detected. During observation, these raised bleeding lesions became filled with blood, bled, and clotted spontaneously; bleeding recommenced if a clot was dislodged. It was considered that treatment via a vaginal approach would exacerbate the hemorrhage; thus, the episiotomy was closed, and the vagina was packed with sterile swabs. A ventral midline caudal celiotomy was extended by pubic symphysiotomy to allow access for total vaginectomy. A total vaginectomy was performed by dissecting the vagina from its urethral and rectal fascial attachments in a cranial to caudal direction. Monopolar diathermy was used for hemostasis. During surgery, a vascular malformation within the dorsal wall of the vagina was identified (Figure 3). At the level of the vaginovestibular junction, the vagina was excised and the remaining ends of the vestibule were oversewn with 3-0 polyglactin 910 suture. The pubic symphysiotomy was repaired by use of standard wire cerclage placed via the obturator foraminae, and routine closure was performed. The entire excised vagina was submitted for histologic examination.

The dog made an uneventful recovery from anesthesia and surgery and was urinating and defecating normally prior to discharge. No further vaginal bleeding occurred. The dog was administered carprofen \( (1.6 \text{ mg/kg (0.73 mg/lb)}, \text{ PO, q 12 h for 4 days)} \) and cephalaxin \( (16.4 \text{ mg/kg (7.5 mg/lb)}, \text{ PO, q 12 h for 5 days)} \). Ferrous sulfate \( (5.5 \text{ mg/kg (2.5 mg/lb)}, \text{ PO, q 24 h)} \) was prescribed for 28 days. Eight weeks of lead restriction was advised to allow healing of the pubic symphysiotomy.

Macroscopic examination of the excised and sectioned vagina revealed a well-defined area of hyperemic mucosa that was circumferential in the caudal aspect of the vagina with a dorsocranial extension. There were multiple single to confluent irregularly raised reddened areas within the mucosa of the caudal portion of the vagina, which corresponded to the bleeding lesions observed during episiotomy (Figure 4). The excised vagina was fixed in neutral-buffered 10% formalin. For histologic examination, multiple biopsy specimens from the vaginal lesions were processed by routine methods, sectioned, and stained with H&E stain. Microscopic examination revealed the presence of numerous, often dilated (ectatic), thin-walled vascular spaces located within the lamina propria mucosa-submucosa and that extended multifocally within the tunica muscularis (Figure 5). Vascular spaces were lined by a single layer of attenuated endothelial cells, contained intraluminal RBCs, and often raised the mucosa. Some dilated vascular spaces were plugged by thrombi composed of fibrin and entrapped blood cells. In addition, some vascular spaces opened into the vaginal lumen with intraluminal discharge of blood and fibrin. The lamina propria mucosa-submucosa was edematous and had multifocal mild infiltration with lymphocytes, plasma cells, and rare neutrophils. The surface epithelium was segmentally replaced by a band-like accumulation of fibrin, nuclear debris, and neutrophils.

The microscopic diagnosis was vascular dilation and ectasia with luminal thrombosis within the lamina propria-submucosa and tunica muscularis of the vagina. The vascular lesions were most consistent with the presence of dilated and ectatic veins (varicose veins with thrombosis).

Long-term follow-up information was solicited by telephone from the owner and referring veterinarian.
The dog had been apparently normal for 19 months following surgery, when bleeding from the vulva was again evident. The owner decided against additional procedures. Twenty-one months after surgery, the owner reported that the dog was well but had vulval bleeding on a daily basis. Further evaluation was offered but was declined.

**Discussion**

The authors believe that this is the first report of vascular ectasia of the vagina in a dog. Similar lesions in the
vagina and uterus of horses as a cause of vaginal hemorrhage and in the endometrium of rabbits (endometrial venous aneurysms) have been described. A congenital vascular malformation resulting in recurrent vaginal hemorrhage in a 5-year-old girl has been reported. In women, vaginal varicose veins in patients with liver cirrhosis have been described and cervical varices as an unusual etiology for third-trimester bleeding have been reported.

In the veterinary medical literature, there are reports of 4 dogs with vascular ectasia. All of those dogs had bleeding from the affected sites. In 3 dogs, the lesions were located in the gastrointestinal tract; the cecum or colon was affected in 2 dogs, and lesions were located in the rectum and anus of the third dog. For all 3 dogs, clinical diagnosis was not straightforward and a definitive diagnosis was made on the basis of histologic findings following surgical resection of affected tissues. Preoperative investigations that were considered most useful in localization of the site of blood loss were endoscopy and, for 1 dog, scintigraphy. Two were considered most useful in localization of the site of resection of affected tissues. Preoperative investigations that were considered most useful in localization of the site of blood loss were endoscopy and, for 1 dog, scintigraphy. Two were considered most useful in localization of the site of resection of affected tissues. Preoperative investigations that were considered most useful in localization of the site of resection of affected tissues. Preoperative investigations that were considered most useful in localization of the site of resection of affected tissues.

Histologic features of vascular ectasia are consistent in the veterinary and human medical literature. Lesions are described as dilated and thrombotic, blood-filled channels, most with only a single layer of endothelial cells. In chronic lesions with ulceration of the mucosa, the thin-walled vessels become susceptible to trauma and rhexis. Loss of superficial epithelium might be related to compression by dilated vessels, which causes necrosis, or may be secondary to vascular thrombosis and ischemia.

In horses and dogs, lesions of vascular ectasia have been treated by ligation or coagulation of individual varicose veins, local submucosal resection, or radical excision. Local resection was not believed to be a safe approach in the dog of this report. In humans with benign gynecologic vascular malformations, vascular embolization is a primary treatment of choice; cesarean delivery with gravid hysterectomy has been performed in a woman with third-trimester hemorrhage from massive cervical varices.

In the dog of this report, vaginal vascular ectasia was the cause of vaginal hemorrhage and life-threatening anemia. It is uncertain whether the vascular changes were congenital or acquired. Total vaginectomy was performed without complication and was curative in the short term; although the dog developed recurrent vulval bleeding, it is unknown whether that was related to recurrent or progressive lesions. Vascular vaginal ectasia should be considered as a rare but possible cause of vaginal hemorrhage in female dogs.

References