Case Report Rapport de cas

Usefulness of magnifying endoscopy with narrow-band imaging for diagnosing primary vascular ectasia in a dog

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Abstract — A 2-year-old spayed female crossbred dog was presented for profuse, acute, and chronic vaginal hemorrhage. Coagulation disorders were excluded. Conventional diagnostic imaging failed to precisely identify the source of bleeding. After whole-blood transfusion, magnifying endoscopy with narrow-band imaging allowed the visualization of unique vascular patterns within the vaginal wall. Presumptive diagnosis of vaginal vascular ectasia was made and confirmed by histopathological examination. Surgical management with subtotal vaginectomy cured the dog.

Key clinical message:
Vascular ectasia is rarely reported in veterinary medicine and is challenging to diagnose. This is apparently the first report of the usefulness of magnifying endoscopy with narrow-band imaging as a diagnostic tool for vascular ectasia in a dog.

Résumé — Apport de la fonction imagerie à bande étroite en endoscopie pour la détection d'une ectasie vasculaire primaire chez un chien. Une chienne femelle stérilisée de race croisée a été présentée pour récidive aiguë et profuse de saignements vaginaux perdurant de façon intermittente depuis l'adoption. Le bilan de coagulation ne présentait pas d'anomalie et les examens d'imagerie conventionnels n'ont pas permis d'identifier avec certitude l'origine de l'hémorragie. Après transfusion, la réalisation d'une endoscopie utilisant un processus informatique de chromoscopie virtuelle par bandes spectrales étroites a permis la visualisation d'un réseau vasculaire anormal sur la paroi vaginale. La présomption d'ectasie vasculaire vaginal a été confirmée par examen histologique. La résolution complète des saignements a été constatée après réalisation d'une vaginectomie subtotale.

Message clinique clé :
Les ectasies vasculaires (angiodysplasie) sont peu souvent rapportées en médecine vétérinaire et leur diagnostic est difficile à établir. Ce cas relate pour la première fois l'intérêt de la chromoscopie virtuelle par bandes spectrales étroites en endoscopie vétérinaire dans la prise en charge diagnostique d'une ectasie vasculaire vaginale chez un chien.

(Traduit par les auteurs)

Can Vet J 2022;63:511–514

Case description

A 2-year-old spayed female crossbred dog weighing 26 kg was presented to the National Veterinary School of Toulouse for recurrent vaginal bleeding since adoption at 2 mo of age. On 2 previous occasions, the dog was presented to the referring veterinarian for the same complaint. The first presentation was self-limiting and Von Willebrand's factor activity was determined to be within normal limits [150%; reference range (RR): 70 to 180%]. At 6 mo of age, the dog experienced a second episode and was ovariectomized. No abnormality or source of bleeding was identified during the laparotomy. Bleeding persisted post-operatively before spontaneous resolution within the next 3 wk. The dog was presented 1.5 y later, at the Veterinary Teaching Hospital of the National Veterinary School of Toulouse, with a 15-day history of continuous hemorrhagic vaginal discharge associated with severe lethargy. No other source of bleeding was reported by the owner.

At presentation, continuous dripping of frank blood and, intermittently, large blood clots from the vagina were observed. Physical examination revealed pale mucous membranes, and

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a heart rate of 180 beats/min associated with left systolic apical IV/VI heart murmur. Rectal palpation was unremarkable and on digital vaginal examination, there was fresh blood dripping from the vulva without evidence of a foreign body or palpable mass. Systolic blood pressure (oscillometric Doppler method) was 145 mmHg.

A complete blood (cell) count (CBC), revealed severe microcytic, borderline hypochromic regenerative anemia [hematocrit: 0.09 L/L (RR: 0.37 to 0.55 L/L), reticulocyte count: 278.9 × 10^9/L (RR: 19.4 to 150.1 × 10^9/L), MCV: 42.7 fL (RR: 60 to 71 fL); MCHC: 22.2 g/dL (RR: 21.9 to 26.3)], a leukocytosis characterized by a moderate mature neutrophilia [25 430 leukocytes/μL (RR: 5600 to 20 400), 22 450 neutrophils/μL (RR: 2900 to 13 600); 1370 lymphocytes/μL (RR: 1100 to 5300), 1590 monocytes/μL (RR: 0400 to 1600)], and thrombocytosis [platelets: 600 000/μL (RR: 108 000 to 562 000)]. Coagulation panel was unremarkable [partial prothrombin time: 9 s (RR: 7.3 to 9.9), activated partial thromboplastin time: 12.7 s (RR: 12.9 to 16.9), fibrinogen: 2.03 g/L (RR: 1.3 to 4.7), antithrombin III: 181% (RR: 102 to 191), and fibrinogen degradation products < 5 mg/L (RR: 0 to 5)]. Buccal mucosal bleeding time was within normal limits (173 s; RR: 210 s). Biochemistry panel and electrolytes assessment revealed hypoproteinemia [total proteins: 38.7 g/L (RR: 48 to 66 g/L), albumin: 19.0 g/L (RR: 23 to 39 g/L), globulin 19.7 g/L (RR: 22.0 to 31.1), and A/G: 0.96 (RR: 0.80 to 2.2)]. Total iron concentration was low [total iron: 1.4 μmol/L (RR: 5 to 32 μmol/L)], suggestive of iron deficiency and further supporting the primary assessment of blood losses as the origin of the hematological and biochemical abnormalities. After blood typing [dog erythrocyte antigen (DEA) 1.1 negative], 500 mL of compatible fresh whole blood (DEA 1.1-) were administered, resulting in hemodynamic stabilization with a follow-up hematocrit of 0.16 L/L. Additional therapy included intravenous fluid therapy using 0.9% sodium chloride, 2 mL/kg per hour and intramuscular iron supplementation (Fer Dextran 150 mg).

Abdominal ultrasound examination revealed a homogeneous mass (1.7 × 0.9 mm) surrounded by anechoic fluid within the uterine stump. Both uterine horns were filled with hypoechoic fluid. The remainder of the ultrasonography was unremarkable. To further characterize the mass and plan for potential surgery, pre- and post-contrast (I.V. iohexol) computed tomography (CT) images of the abdomen were obtained. The dog was routinely anesthetized for a CT scan and an indwelling urinary catheter was placed. Abdominal CT revealed a large, soft tissue mass without contrast-enhancement. Results were mostly consistent with a hematoma. Retrograde vagino-urethrocystography using flexible endoscope (Video-bronchoscope BF-P190; Olympus France S.A.S, Rungis, France) and white light imaging (Evis Exera III Video xenon light source CLV-190; Olympus) under saline irrigation was then performed. Examination of the vaginal vestibule revealed mild bloody discharge without identification of an underlying causative lesion.

On conventional vaginoscopy, there was a diffuse ill-defined hyperemic area on the dorsal aspect of the proximal vagina and a large blood clot filled the vagina (Figure 1). Magnifying endoscopy with narrow-band imaging (NBI) using the NBI

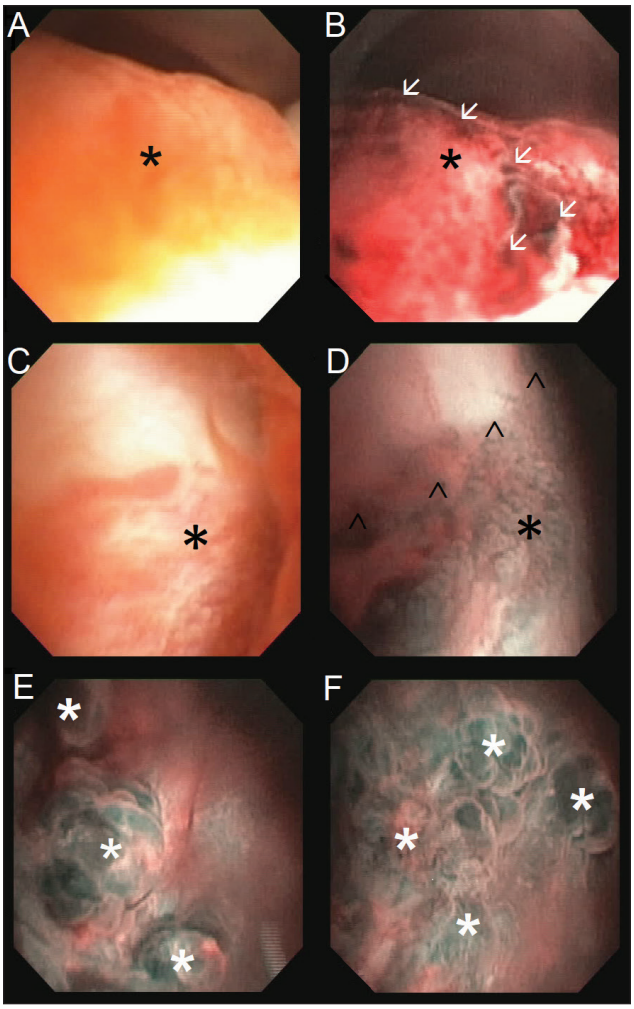

Figure 1. Images from the vaginoscopic examination presented either without (A and C) or with (B, D, E, and F) narrow-band imaging (NBI). A and B – Dorsal aspect of the vaginal wall with an irregular and thickened appearance (asterisks). Enhancement of the abnormal vascularization pattern (B; short arrows) with NBI. C and D – Right lateral wall of the vagina without (C) or with (D) NBI. Note the vascular pattern enhancement with NBI, the irregular and hyperhemic mucosa (asterisks) and the magnification of the boundary between regions of normal and aberrant vascularization pattern with NBI (arrowheads). E and F – Visualization of numerous dilated ectatic vascular tufts enhanced by NBI (asterisks).

function of the video xenon light source enabled visualization of multiple bundles of tortuous, dilated vessels, present diffusely on half the length of the dorsal aspect of the vagina. Some clusters of punctiform vascular ectactic lesions consistent with varicosis proliferations were visualized (Figure 1). Urethrocystoscopy was unremarkable. A presumptive diagnosis of congenital vaginal vascular ectasia (VE) was made from the gross morphologic abnormalities observed during endoscopy. The diffuse distribution and the number of vascular lesions made laser coagulation or electrocautery an inappropriate method of treatment. Therefore, consent was obtained from owners for a subtotal vaginectomy.

With the patient positioned in dorsal recumbency and urethral catheterization with a Foley catheter, the surgical procedure was divided into 2 steps. A total hysterectomy under celiotomy,

which was performed using a coagulation and mechanical transection forceps (Enseal; Ethicon) with ligation of the uterine vein and artery [absorbable suture (Vicryl; Ethicon)], was completed after which a subtotal vaginectomy was done. After a ventral midline incision was made in the pelvic area, the adductor and gracilis muscles were elevated from the ventral aspect of the pubis and ischium and the pelvic symphysis was exposed. Bilateral pubic and ilial osteotomies were performed. The vagina was dissected caudally until reaching the vestibule and was then excised. The vaginal stump was sutured with absorbable suture (PDS II; Ethicon). The symphysiotomy was then reduced and abdominal wall, subcutaneous tissue and skin were sutured. A urinary catheter was kept in place for 48 h to prevent any urination efforts that could cause discomfort and interfere with healing of the symphysiotomy.

Histopathologic evaluation of the vagina revealed variably dilated, and ectatic venous vessels within the submucosa, with occasional cystic dilations. Affected vessels were variably blood-filled. The muscularis layer displayed a mild perivascular neutrophilic infiltrate. No pathogens or neoplastic cells were identified. Results of the histopathological analysis supported the endoscopic diagnosis of primary vaginal VE.

The dog recovered uneventfully from anesthesia and surgery. Hematocrit, total proteins, and albumin concentrations progressively increased before discharge (0.30 L/L; 66.9 and 30.3 g/L, respectively). Analgesia was progressively tapered. The dog was able to urinate and defecate normally before discharge 5 d after surgery. The dog was re-evaluated after 2 mo and was doing well. A CBC was unremarkable [hematocrit: 0.42 L/L (RR: 0.37 to 0.55 L/L), reticulocyte count: 30.9 $\times$ 10^9/L (RR: 19.4 to 150.1 $\times$ 10^9/L)]. Total iron [17.7 μmoL/L (RR: 5 to 32)], total protein [66.5 g/L (48 to 66)], and albumin [33.6 g/L (RR: 23 to 39)] concentrations were within the reference ranges. No vaginal bleeding had occurred since discharge from the hospital at the time of writing, 6 mo after the surgery.

Discussion

Vascular ectasia, also referred to as angiodysplasia, has been described as originating from the digestive tract (1–6) and urinary bladder (7,8) in dogs. It has also been described as originating from the reproductive tract in other species (9–12). In all cases, bleeding from the affected sites was the primary clinical complaint. Angiodysplasia involving the colon is the most frequent form in human medicine (55 to 80% of cases) (13,14). Vaginal VE, leading to life-threatening anemia is a rare condition that has only been described once in the dog (7). To the authors' knowledge, this is the first report of vaginal VE diagnosed by magnifying endoscopy with NBI.

The exact etiology of VE is currently unknown in veterinary species and humans. Theories include weakness of the venous valves and/or walls, arteriovenous communications, reduced venous outflow with increased venous pressure or arterial flow (15). None of these has been conclusively proven, but in humans with varicose veins of the legs, the elastic properties of the veins' walls, the increased arterial flow, and oxidative stress are major putative factors (16). The underlying cause for the dog presented here could not be identified. Given the age of the dog and the chronic history of clinical signs, this was most likely a congenital VE.

As lesions are described as being distributed upon the mucosal and not serosal surface, explorative laparotomy usually fails to identify lesions of either colonic (2,3) or vaginal (7) VE, as in the present case. Therefore, endoscopic evaluation has a central role for diagnosis of VE. In humans, it has been proven to be an effective method in detecting angiodysplastic lesions (17,18), with an estimated sensitivity of 80% (19). The typical endoscopic characteristics of colonic angiodysplasia are flat or slightly raised, red, round, scalloped, or fern-like in shape mucosal blood vessels (17). However, repeated examinations may be necessary depending on the location and extent of lesions. A previous report of vaginal VE highlighted the difficulties of identifying angiodysplastic lesions despite multiple endoscopic evaluations (7). Conventional endoscopy has some limitations in diagnosing angiodysplasia; indeed, over-distension of the evaluated organs, presence of anemia, and possibly hypotension and/or the need for anesthesia can be associated with blanching and thinning of vessels. Vascular ectasia, therefore, is likely underdiagnosed in veterinary medicine and might be more frequent than suspected as some publications reported clinical cases that could be evocative of bladder and/or urethral angiodysplasia (20).

In the present case, magnifying endoscopy with NBI facilitated identification of vascular lesions. This is, to the authors' knowledge, the first report of such a diagnostic approach in a canine patient with VE. The use of NBI has only been reported in dogs to evaluate perfusion of intestinal mucosal in case of chronic enteropathies (21). Narrow-band imaging has gained increasing attention over the past 2 decades in human medicine (22–24). Rather than using conventional white light, 2 narrow band filters of blue and green are used. These filters have a bandwidth of 30 nm with central wavelengths of 415 and 540 nm, respectively, which are maximally absorbed by hemoglobin. The blue light at 415 nm enhances visualization of superficial mucosal vascular patterns, whereas the green light at 540 nm enhances submucosal intraepithelial papillary capillary loops (25). The interest of the NBI technique resides in the improvement of tissue contrast; under conventional white light, vasculature appear red on a background of pink mucosa, whereas under NBI, they appear dark green/black on the background of a pale white mucosa (22,25). As such, this tool is increasingly used in human medicine to improve early detection of neoplastic lesions (22,26). One limitation of NBI as a diagnostic tool is that intramucosal hemorrhage can hinder evaluation of the mucosal vascularization pattern (23), as the wavelength of the blue light is mostly absorbed by hemoglobin (25). However, despite active bleeding, the use of NBI in the present case was a useful method for the diagnosis of VE and prevented the dog from having multiple endoscopic examinations.

Treatments described for dogs with VE include surgical resection (1–4,7,8), hormone therapy with estrogen and progesterone (6) and endoscopic-assisted argon plasma coagulation (APC) (5). The latter technique is the preferred method for treatment of colonic VE in human patients, with long-term resolution in 85% (27). The only dog treated with APC for

colonic VE required 4 endoscopic-assisted APC treatments, which finally resulted in long-term resolution of gastrointestinal hemorrhage (5). Medical management with estrogen and progesterone was reported as a viable alternative to surgery in 2 dogs with colonic VE, resulting in resolution of hemorrhage/clinical signs within 6 and 8 wk after initiation of treatment, respectively (6). The exact mechanism by which hormone therapy decreases the occurrence of bleeding is unknown. Conflicting results in human medicine with either a beneficial effect to prevent recurrence of bleeding in patients with colonic VE (28,29) or no superiority of hormonal therapy over placebo (30,31). Surgical management with subtotal vaginectomy was chosen in the present case mainly because conservative management with either hormone therapy or APC was not considered a safe option, given the life-threatening anemia and the extensive lesion. Prognosis may be good after appropriate treatment (2–4,8), and no relapse has been observed after 8 mo in the dog described here. However, recurrence may still occur as in the case reported with vaginal VE that experienced occasional vulvar bleedings after vaginectomy (7). In addition, long-term resolution likely depends on the possibility of complete resection or treating the lesions and on location and extent of the lesions (1,5).

In conclusion, this is the first report that describes the use of magnifying endoscopy with NBI for diagnosing vaginal VE in a dog with life-threatening anemia secondary to chronic, intermittent vaginal hemorrhage. This technique allowed a definitive diagnosis to be made using a single endoscopic procedure. Further evaluation of this technique in a larger group of dogs with VE at various locations is, however, needed to determine its diagnostic utility. CVJ

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