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Title	Intravaginal hematoma with hematometra causing severe anemia in a pet rabbit (Oryctolagus cuniculus)
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Citation	Japanese Journal of Veterinary Research, 69(1), 67-72
Issue Date	2021-02
DOI	https://doi.org/10.14943/jjvr.69.1.67
Doc URL	https://hdl.handle.net/2115/80622
Type	departmental bulletin paper
File Information	JJVR69-1_67-72_AtsukoKojimoto.pdf

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

Japanese Journal of Veterinary Research 69(1): 67-72, 2021

JJVR

SHORT COMMUNICATION Clinical Case Report

Intravaginal hematoma with hematometra causing severe anemia in a pet rabbit (*Oryctolagus cuniculus*)

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Received for publication, June 8, 2020; accepted, November 4, 2020

Abstract

A 23-month-old female dwarf-mixed rabbit was admitted after a large amount of blood was found in its cage. The rabbit had severe anemia (hematocrit 10%); abdominal ultrasonography revealed fluid accumulation, primarily in the proximal vagina. After blood transfusion, an exploratory laparotomy revealed a dilated vagina with an enlarged uterus; ovariohysterectomy with partial vaginectomy was performed. The anemia improved the next day (hematocrit 19%) and the rabbit recovered. Grossly, a large blood clot was present in the proximal vagina with a small amount of blood in the uterus. Histological examination revealed a varicosity in the proximal vagina and uterine endometrial hyperplasia. This case suggests that intravaginal hematoma with severe anemia may occur in rabbits, for which prompt surgery may be required.

Key Words: intravaginal hematoma, rabbit, surgery

Vaginal hematoma is an uncommon puerperal disease, with potentially serious consequences in humans[10,22)]. Genital tract varicosities, enlarged and tortuous veins, are a rare risk factor for the hematoma formation[22)]; vaginal varicosities are extremely rare but may occur in pregnant women[17)] and patients with portal hypertension[3)]. Although few reports have described vaginal hematomas in veterinary medicine, continuous vaginal bleeding has been sporadically reported in mares with vaginal varicosities[4,21)] and in a dog with vaginal vascular ectasia[5)].

In rabbits, uterine lesions containing varicosities or vascular ectasia have been reported as endometrial venous aneurysms[1,2,12)]. Although surgical resection of varicosities/vascular ectasia have been successfully performed in horses and a dog[6,21)], few accounts describing treatment in rabbits have been reported[11)]. Recently, the first case of vaginal varicosities (venous aneurysms) was reported, but its clinical course was not described[2)].

Uterine endometrial hyperplasia (UEH) and varicosities in rabbits often cause intrauterine hemorrhage, with clinical signs of hematuria or vaginal hemorrhagic discharge[1,12,13,15)]. The

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doi: 10.14943/jjvr.69.1.67

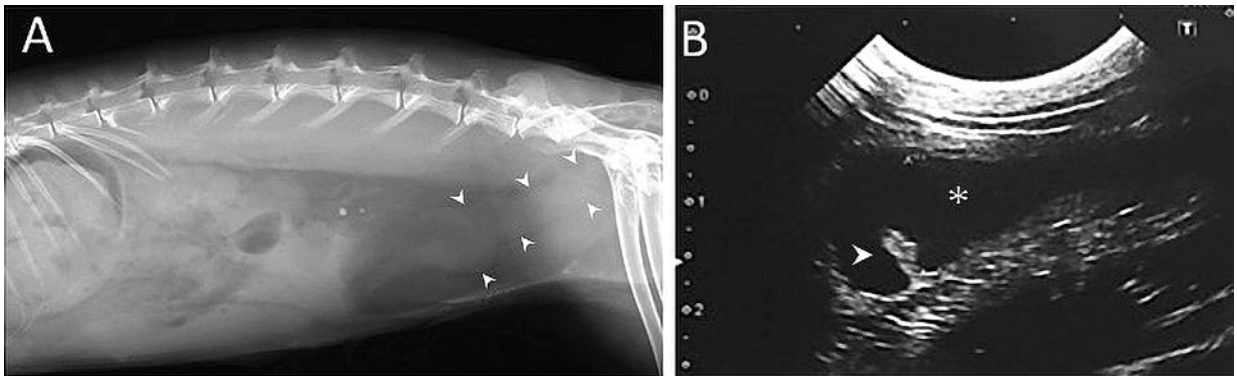


Fig. 1. (A) Lateral abdominal radiography of an adult female pet rabbit (*Oryctolagus cuniculus*) exhibiting severe anemia revealed cylindrical soft tissue masses (arrowheads) occupying the caudal abdomen.
(B) Ultrasonography of the caudal abdomen of an adult female pet rabbit exhibiting severe anemia. The proximal vagina is dilated with fluid accumulation (asterisk) and a polypoid lesion (arrowhead) of the mucosa is observed.

rabbit possesses no uterine body but has a long vagina extending to the attachment of the right and left uterine horns at the level of the cranial border of the bladder; the vagina distends and fills with urine during micturition[7]. Therefore, blood can accumulate in the uterus and the long proximal vagina anatomically. However, to our knowledge, no such cases have been reported. Here, we describe the surgical treatment of a rabbit with a massive vaginal hematoma and mild hematometra causing severe anemia, with histologically mild UEH and a vaginal varicosity.

A 23-month-old female dwarf-mixed rabbit, weighing 1.6 kg, presented with the owner's complaint of a large amount of blood in the cage the previous night. The rabbit was depressed with decreased appetite and activity. Physical examination revealed pale mucous membranes, hypothermia (rectal temperature 36.9°C, normal range:38.5–40.0°C) and weakened femoral pulses. A complete blood count revealed severe anemia (hematocrit 10% [normal range 33%–50%], reduced hemoglobin 3.4 g/dl [normal range 10–17.4 g/dl]) and increased polychromatic erythrocytes indicating a regenerative response. Radiography revealed a cylindrical soft tissue mass occupying the caudal abdomen (Fig. 1A); abdominal ultrasonography revealed a dilated genital tract with fluid retention, mainly in the proximal vagina (Fig. 1B). No other abnormal findings were discovered through diagnostic imaging including thoracic radiography. Based on these findings, anemia caused by uterine bleeding was diagnosed. Considering the patient's status and the possibility that persistent bleeding could be fatal, a blood transfusion, followed by fluid infusion, was performed to stabilize the patient, then emergency surgery was performed.

A total of 10 ml of blood, collected from another rabbit kept in the same house (1-year-old, female, weighing 1.9 kg), was transfused after confirming the compatibility (i.e., no agglutination) in both major and minor cross-matching tests. Anesthesia was induced with propofol (intravenously, to effect) and maintained with isoflurane and oxygen using a laryngeal mask airway device (V-gel® Rabbit, R2, Docsinnovent Ltd., London, UK). During exploratory laparotomy, a moderately enlarged right uterine horn and a markedly dilated vagina were noted; ovariohysterectomy plus partial vaginectomy were performed. Intraoperative bleeding was minimal and vital parameters were within normal limits during the surgery. The rabbit recovered uneventfully, and the hematocrit increased to 19% the next day and to 40% at 14 days postoperatively; the rabbit was clinically normal at a visit 6 months later.

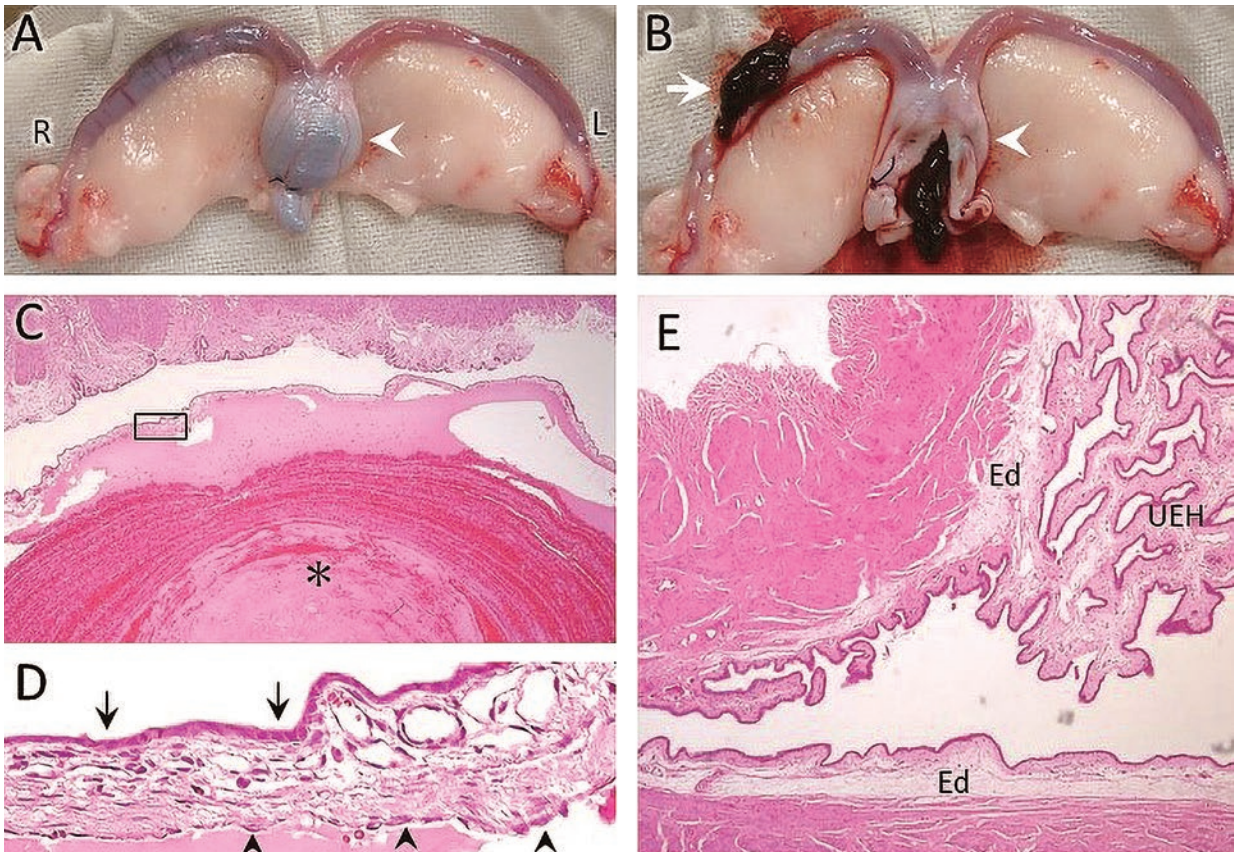


Fig. 2. Gross appearance and histology of the removed organs after ovariohysterectomy and partial vaginectomy in a rabbit with severe anemia.
(A) Moderate dilatation of the right (R) uterine horn and marked dilatation of the proximal vagina (arrowhead). (B) Incisions of the right uterine horn (arrow) and proximal vagina (arrowhead) revealed hematomas.
(C) Histological features of the polypoid lesion in the vagina (H&E staining, × 40). Markedly dilated vein containing a hematoma (asterisk) is present.
(D) Higher magnification of box in Fig. 2C (× 400). Under the mucosal epithelium (arrows), the dilated vein lined by endothelial cells (arrowheads) are observed.
(E) Histological features of the right uterine horn (H&E staining, × 40). Diffuse edematous change (Ed) in the submucosa and mild uterine endometrial hyperplasia (UEH) are observed.

Gross examination of the resected organs revealed that the markedly dilated vagina (27 mm in diameter) and the moderately dilated right uterus (8 mm in diameter) (Fig. 2A), which contained blood clots in their lumens (Fig. 2B). No remarkable changes were observed in the mucosal surface of the uterus and vagina, except for one dark red polypoid lesion, 4.5 mm in diameter, within the vaginal mucosa. Histologically, the polypoid lesion was a markedly delated, mucosal vein that contained hematoma within its lumen (Fig. 2C, D), which is consistent with the reported features of varicosities[1,2,11]. No other changes were observed in the vaginal mucosa; partial UEH was observed in the right uterine horn with mild edematous changes throughout the submucosa (Fig. 2E). The inflammatory response was minimal with a minor submucosal infiltration of heterophils. Further histological examination of multiple samples from the vagina and uterine horns was performed but additional significant findings were not obtained. There were no abnormal findings in either ovary; follicles were found in both ovaries, but no corpora lutea were

identified.

This is the first report of intravaginal hematoma in a rabbit treated with surgery. In the anemic rabbit reported here, marked fluid-accumulation was evident in the proximal vagina, rather than the uterus, with abdominal imaging. In past reports, mucometra, hydrometra, and pyometra were included in the disease lists of the dilated genital tract with fluid accumulation in the rabbit, but intravaginal hematoma has not been described. The present case suggests that rabbits can develop an intravaginal hematoma potentially leading fatal anemia and that prompt surgery may be required.

The potentially fatal sequelae (severe anemia) of vaginal hematoma formation are reported in humans[10], but the disease manifestations differ from those in rabbits. Vaginal hematomas in humans are most commonly paravaginal hematomas compressing the vaginal cavity[10], which are caused by the disruption of major blood vessels around the vagina through delivery, incision/puncture, or suture[10,19,22]. The rabbit described here had blood accumulation in the vaginal canal, located in the abdominal cavity, that is, an intravaginal hematoma.

To our knowledge, hematometra has been reported only in dogs in the veterinary literature. Severe anemia caused by hematometra has been reported in three dogs (hematocrit 12%–17%)[6,8,18]; all three dogs exhibited UEH with pyometra[8,18] or polyps[6], but the cause of the bleeding was unknown. Uterine disease occurs frequently in rabbits[3], with adenocarcinoma and UEH being the most common[2,9,13,15,20]. Hematometra, as well as intravaginal hematoma, were not described in previous reviews of uterine diseases (836 cases)[2,9,13,15,20] or a pathological review of the vagina (858 cases)[2]. However, one study indicated that severe anemia (hematocrit < 20%) associated with uterine bleeding was observed in 9% (10/116) of UEH cases[15]. Intrauterine pooling of blood and severe anemia has been reported in cases of uterine torsion[14] and uterine varicosities[1,2]. In a pathological review of 378 cases (necropsy 229, biopsy 149) of uterine disease in rabbits, varicosities were found in 19 cases (5%); 15 had hemorrhage from ruptured varicosities[2]. Therefore, diseases that are associated with hematometra may not be rare in rabbits.

Intrauterine hemorrhage in rabbits has been suggested to be caused by UEH or extensive vascular changes in the uterus due to pseudopregnancy[1] or the rupture of endometrial varicosities[1,2]. Varicosities, reported as venous aneurysms in rabbits, typically exhibit multiple mucosal polyp-like lesions and are characterized by endothelium-lined hematomas histologically[1,2]. Varicosities in the vaginal wall have been also reported in one rabbit[2]. In humans, vaginal varicosities are formed by compression of the inferior vena cava and diminished pelvic venous return caused by pregnancy or portal hypertension secondary to liver cirrhosis[17], whereas in rabbits, uterine varicosities have been suggested to be caused by congenital anomalies or UEH[1,2]. In fact, the rupture of endometrial varicosities is typically observed in relatively young rabbits (13–72 months old, median 32 months)[2], as in our case (23 months old). Ectatic vessels, even small lesions, can cause massive bleeding[5]. In the present case, UEH and vaginal varicosity might have contributed to the bleeding, but it is unclear whether the vaginal hematoma was caused by uterine or vaginal bleeding.

Fluid accumulation[7,12] or polypoid lesions[12] in the uterus can be detected with abdominal ultrasonography in rabbits; our case suggests that ultrasonography can also help detect these lesions in the proximal vagina. The differential diagnoses for intrauterine fluid accumulation may include pyometra, mucometra, hydrometra, and hematometra. In a recent study of uterine disease in rabbits, the incidence of hydro/mucometra was low (8%), and the incidence of pyometra (1.9%) was less than that of varicosities (5%)[2]. In another study[9], hydro/mucometra or pyometra accounted for 8/50 (16%) of the cases, but no vaginal discharge was observed in these cases. Thus, in rabbits with vaginal hemorrhagic

discharge and fluid accumulation in the uterus or vagina, hematometra and/or intravaginal hematoma should be included in the list of differential diagnoses.

Ovariohysterectomy (OVH) is the treatment of choice for uterine disorders[7,13]; partial vaginectomy is not generally recommended because of its association with various complications[7]. In cases of intravaginal hematoma, OVH plus partial vaginectomy may be appropriate given the possibility of intravaginal causative lesions including varicosities[2]. Severe intrauterine hemorrhage can be fatal[7,14], but perioperative blood transfusion (12–20 ml) and OVH were reported in 4 rabbits with severe anemia (hematocrit 14%–19%) and resulted in clinical resolution in three rabbits[14]. The authors of that report[14] recommend prompt OVH with preoperative blood transfusion for anorexic rabbits with severe anemia. In surgical patients, it is generally recommended to maintain a hematocrit of at least 21%–25% and a hemoglobin concentration of at least 7 g/dl[16] and to perform a blood transfusion if the hemoglobin level is less than 6 g/dL[11]. Our case exhibited severe anemia (hematocrit 10%, hemoglobin 3.4 g/dl) and anorexia; we performed a whole blood transfusion and emergency surgery. Considering the small donor size and simple surgical procedure, we collected 10 ml of blood and transfused it to reduce perioperative risks associated with hypoxemia in the peripheral tissues[16]. The efficacy of such small volume of transfusions is unknown, but the transfused volume (6.3 ml/kg) was within the range of that empirically used in cats (5–20 ml/kg)[16] and intraoperative vital signs were stable in our case. The rapid improvement of anemia may be due to a preoperative erythropoietic regeneration.

The clinical course of this report suggests that massive intravaginal hematoma with hematometra, possibly leading to severe anemia, may occur in rabbits and that OVH plus partial vaginectomy may be a choice of treatment for this condition. Mild UEH and a vaginal varicosity were observed histologically but the main cause of the bleeding could not be determined.

Acknowledgements

We thank Amanda Guthrie, DVM, from Edanz Group (https://en-author-services.edanzgroup.com/) for proofreading this manuscript.

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