Acta Veterinaria-Beograd 2026, 76 (2), 313-320
UDK: 636.7.09:618.15-006.36
DOI: 10.2478/acve-2026-0022

Case report

VAGINAL ANGIOLEIOMYOMA IN A DOG: A FIRST CASE REPORT

Woo Jun KIM[1], Hoon JI[3], Tae-Un KIM[1], Jae-Hyuk YIM[1], Su-Min BAEK[1,2], Jin-Kyu PARK[1,2*]

[1]Kyungpook National University, College of Veterinary Medicine, Department of Veterinary Pathology, Daegu, Republic of Korea; [2]Institute for Veterinary Biomedical Science, Kyungpook National University, Daegu, Republic of Korea; [3]Hoon's Animal Clinic, Busan, Republic of Korea.

(Received 13 March, Accepted 15 May 2026)

Vaginal tumors are relatively uncommon in dogs and are predominantly benign mesenchymal neoplasms, such as leiomyomas and fibromas. Among perivascular wall tumors, angioleiomyoma is a rare benign neoplasm characterized by well-differentiated smooth muscle bundles interspersed with numerous blood vessels. While typically arising from the dermis or subcutis, a genital origin is exceptionally rare in veterinary medicine. A 15-year-old intact female Maltese dog presented with a pedunculated vaginal mass. The mass was surgically excised along with a concurrent ovariohysterectomy. Histologically, the mass demonstrated a proliferation of neoplastic smooth muscle cells appearing to arise from the blood vessel walls and expanding into the adjacent stroma. The neoplastic cells were fusiform with cigar-shaped nuclei and lacked atypia or mitotic figures. Immunohistochemically, the neoplastic bundles were diffusely positive for vimentin and alpha-smooth muscle actin, and multifocally positive for desmin, while negative for von Willebrand factor. Based on these findings, the mass was diagnosed as a vaginal angioleiomyoma. Clinically, the rich vascular network of this tumor may necessitate thorough hemostasis during surgery. Furthermore, the successful management with OHE suggests a potential hormonal influence on its pathogenesis. To the best of the authors' knowledge, this represents the first report of vaginal angioleiomyoma in a dog, providing valuable diagnostic insights into the morphological diversity of canine perivascular wall tumors.

Keywords: Angioleiomyoma, dog, perivascular wall tumor, vagina

*Corresponding author: e-mail: jinkyu820@knu.ac.kr

INTRODUCTION

Vaginal or vulval tumors are relatively uncommon neoplasms in veterinary medicine, accounting for approximately 2.4% of all canine tumors [1,2]. The majority of these cases are benign, such as leiomyomas, fibromas, and polyps, and are predominantly observed in intact female dogs [2]. Among the less common mesenchymal neoplasms, canine perivascular wall tumors (PWTs) are rare, benign mesenchymal tumors derived from vascular mural cells [3,4]. This group of tumors encompasses several types, including hemangiopericytoma, angiomyofibroblastoma, myopericytoma, angiofibroma and angioleiomyoma [3]. Specifically, angioleiomyoma is characterized by well-differentiated smooth muscle bundles interspersed with numerous blood vessels [3-6]. In both human and veterinary medicine, angioleiomyoma typically originates from the dermis or subcutis of the limbs, head, and trunk [3,4,6]. In contrast, genital origin is exceptionally rare, while occasional cases have been reported in the ovaries or uterus rather than the lower genital tract [7-10]. In this report, we described a vaginal angioleiomyoma in an intact female dog.

CASE PRESENTATION

A 15-year-old intact female Maltese dog was admitted to a local animal hospital for examination of a vaginal mass and multiple mammary nodules. The patient was experiencing vaginal prolapse and persistent urinary incontinence. The vaginal mass was protruding into the vaginal orifice, exposing its terminal portion. Upon gentle manipulation, the entire mass was exteriorized. The mass was elastic to dense and homogeneously reddish, indicating severe congestion (Figure 1A). The lesion was pedunculated, measuring 4 × 2 cm. No hemorrhage or ulceration was observed. The mass was surgically excised.

The vaginal mass was collected in 10% neutral buffered formalin for fixation and referred to the Department of Veterinary Pathology, Kyungpook National University. The fixed tissues were routinely processed and sectioned. Hematoxylin & eosin (H&E) staining was performed for histological evaluation. Immunohistochemistry (IHC) was performed with the following antibodies: vimentin (mouse monoclonal, 1:200, MA5-11883; Invitrogen), desmin (mouse monoclonal, 1:200, sc-23779; Santa Cruz Biotechnology), von Willebrand factor (VWF) (rabbit polyclonal, Ready to use, GA527; Dako), and alpha-smooth muscle actin (α-SMA) (mouse monoclonal, 1:2000, M0851; Dako). The avidin-biotin complex method and 3,3'-diaminobenzidine (DAB) (Vector laboratories) chromogen were used for IHC detection. Slides were counterstained with 10% hematoxylin.

After fixation, the cut surface of the mass exhibited a heterogeneous whitish to blackish color (Figure 1B). Prominent cord-like structures were observed, indicating development of blood vessels. The blood vessels were sectioned longitudinally and transversely.

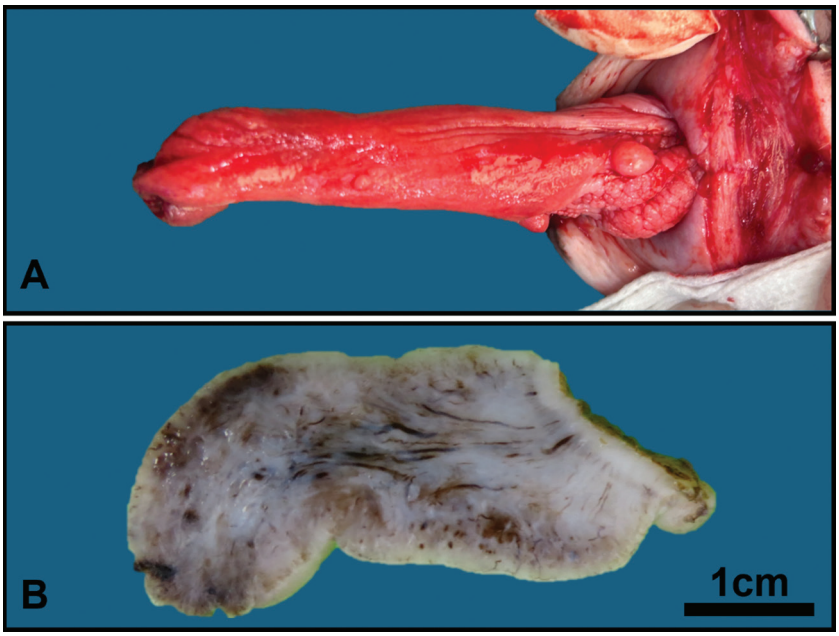

Figure 1. Vaginal mass in a dog. **(A)** The 4 x 2 cm vaginal mass was protruding into the vaginal orifice, showing severe congestion. **(B)** After fixation, the vaginal mass exhibited heterogeneously whitish to blackish cut surface with cord-like structures.

Microscopically, the vaginal mass demonstrated the proliferation of well-differentiated smooth muscle cells with marked vascularization (Figure 2A, 2B). Especially, venous or capillary type vessels were frequently observed. The blood vessels were dilated, congested, and focal hemorrhage was also observed. The neoplastic smooth muscle cells were fusiform with elongated cigar-shaped nuclei and abundant eosinophilic cytoplasm and formed interlacing bundles or small fascicles around blood vessels (Figure. 2A, 2B). Interestingly, the neoplastic smooth muscles cells appeared to arise from the blood vessel walls and expanded into adjacent stroma. In terms of differentiation, the neoplastic smooth muscle cells exhibited no atypia, no mitotic figures, mildly distinct nucleoli and vesicular nuclei. No lymphatic invasion or metastasis was observed. In IHC, neoplastic smooth muscle bundles were diffusely positive for vimentin, α-SMA and multifocally positive for desmin (Figure 2C, 2D). Blood vessels also showed α-SMA positivity. The neoplastic cells were negative for VWF, whereas the vascular endothelium showed strong immunoreactivity, thereby excluding endothelial neoplasms.

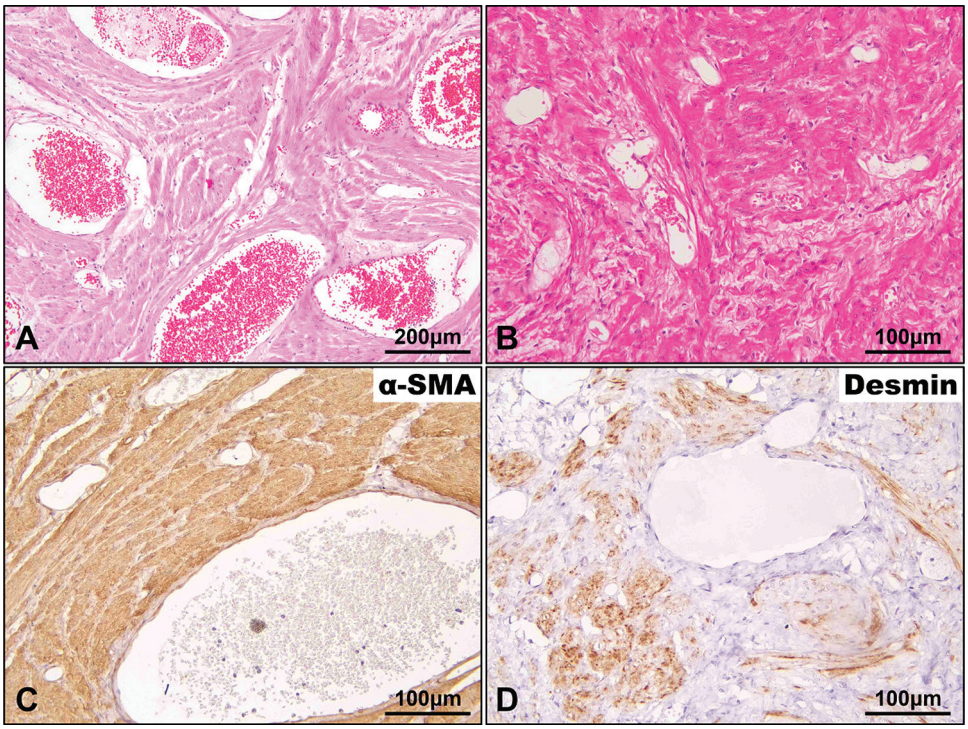

Figure 2. Representative images of microscopic findings. **(A)** Neoplastic smooth muscle cells appearing to arise from blood vessel walls exhibit perivascular growth pattern. These neoplastic smooth muscle cells form interlacing bundles. Numerous dilated and congested blood vessels are also observed. Hematoxylin & eosin (H&E) stain. Bar=200 µm. **(B)** In another area, small fascicles of neoplastic smooth muscle cells are observed. These neoplastic cells are characterized by fusiform cytoplasm with elongated cigar-shaped nuclei. H&E stain. Bar=100 µm. **(C)** The neoplastic smooth muscle cells show strong and diffuse immunoreactivity for alpha smooth muscle actin. Immunoperoxidase stain, DAB chromogen, 10% hematoxylin counterstain. Bar=100 µm. **(D)** The neoplastic smooth muscle cells show multifocal immunoreactivity for desmin. Immunoperoxidase stain, DAB chromogen, 10% hematoxylin counterstain. Bar=100 µm.

DISCUSSION

Histopathological examination revealed a proliferation of neoplastic smooth muscle cells appearing to arise from blood vessel walls, interspersed with numerous vascular structures (Figure 2A, 2B). Thus, the differential diagnosis included various PWTs exhibiting smooth muscle differentiation, as well as other common vaginal masses such as leiomyomas and polyps [2]. Within the PWT spectrum, angioleiomyoma, myopericytoma, angiomyofibroblastoma, and hemangiopericytoma often share α-SMA and desmin immunoreactivity. However, these neoplasms are distinguished by their distinct growth patterns. Angioleiomyoma is characterized by smooth muscle bundles arranged around blood vessels, while myopericytoma shows a concentric arrangement around small blood vessels [11]. Angiomyofibroblastoma is identified by

its alternating cellularity and cord-like structures around capillary-like blood vessels [12]. Hemangiopericytoma displays a characteristic "fingerprint" pattern with a variable α-SMA and desmin expression [13]. Leiomyoma is a common benign tumor in the vagina of female dogs and develops well-differentiated smooth muscle bundles [2,14]. Vaginal polyps are common non-neoplastic lesions characterized by a variably edematous, loose to dense, collagenous stroma containing spindle shaped and stellate cells [2,15].

In the present case, the absence of concentric or fingerprint patterns around central vessels allowed for exclusion of myopericytoma and hemangiopericytoma [11,13]. Furthermore, the lesion lacked the cord-like or nested structures and the epithelioid/plasmacytoid morphology characteristic of angiomyofibroblastoma [12]. Despite the observed smooth muscle differentiation, the presence of numerous blood vessels and neoplastic smooth muscle cells appearing to be derived from the blood vessel walls ruled out leiomyoma or vaginal polyps [14,15]. Given these features, the vaginal mass was diagnosed as angioleiomyoma.

Several studies have suggested that mild trauma, venous stasis, and hormonal changes may contribute to the development of angioleiomyoma [16,17]. Supporting the role of hormonal influence, these tumors exhibit a higher prevalence in females [4,5], and some cases have demonstrated immunoreactivity for estrogen or progesterone receptors [8,16]. Similarly, many vaginal neoplasms are affected by sexual hormones, thus ovariohysterectomy (OHE) combined with surgical excision is often recommended to prevent recurrence [2,14,16]. In the present case, the vaginal mass was treated by surgical resection along with OHE, and no recurrence has been observed during the 2-year follow-up period. Although IHC for hormone receptors or serum hormone assays were not performed in this study, further investigations are warranted to validate the hormonal pathogenesis of canine angioleiomyomas.

In human cases, angioleiomyoma may cause severe pain, which is thought to result from smooth muscle contraction leading to local ischemia [4,5]. In the present case, while localized pain was not evident, the patient presented with vaginal prolapse and persistent urinary incontinence, likely due to the mechanical effect and size of the pedunculated mass. A critical clinical consideration for angioleiomyomas is their abundant vascular architecture. Given the prominent vascular networks observed histologically, careful management of hemostasis may be essential to prevent significant hemorrhage during surgical excision. In fact, some human patients who were treated with surgical excision for genital angioleiomyoma received blood transfusions due to massive intraoperative bleeding [16]. Therefore, clinicians should consider angioleiomyoma as a differential diagnosis when evaluating vulvovaginal masses.

Although a limited number of canine angioleiomyomas have been reported in other locations, to the best of the authors' knowledge, this is the first description of vaginal angioleiomyoma in veterinary literature. Although macroscopic or radiological examinations can assist in the diagnosis of angioleiomyoma, definitive diagnosis

requires careful histological and immunohistochemical evaluation [4]. Consequently, the detailed histopathological descriptions in this report offer valuable diagnostic insights, expanding the current understanding of the anatomical distribution and morphological diversity of PWTs in dogs.

Acknowledgement

This work was supported by National Research Foundation of Korea (NRF) grants funded by the Korea Government, the Ministry of Science and ICT (grant number RS-2024-00408854).

Author's contributions

WJK was involved in data collection, data interpretation, and wrote the manuscript. HJ was involved in data collection. TUK, JHY, SMB were involved in data interpretation. JKP supervised the whole progress within data collection, data analysis and interpretation, reviewed and revised the manuscript, and is responsible for the integrity of the work as whole. All authors read and approved the final manuscript.

Declaration of competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Statement of Informed Consent

The owner understood procedure and agreed that results related to investigation or treatment of their companion animals, could be published in Scientific Journal Acta Veterinaria-Beograd.

ORCID iDs

Woo Jun Kim https://orcid.org/0009-0007-8975-8561
Tae-Un Kim https://orcid.org/0000-0002-0830-0126
Jae-Hyuk Yim https://orcid.org/0009-0006-4249-1452
Su-Min Baek https://orcid.org/0000-0002-7222-6186
Jin-Kyu Park https://orcid.org/0000-0003-4876-1055

REFERENCES

1. Brodey RS, Roszel JF: Neoplasms of the canine uterus, vagina, and vulva: a clinicopathologic survey of 90 cases. J Am Vet Med Assoc 1967, 1294-1307.
2. Thacher C, Bradley RL: Vulvar and vaginal tumors in the dog: a retrospective study. J Am Vet Med Assoc 1983, 183:690-692.
3. Avallone G, Helmbold P, Caniatti M, Stefanello D, Nayak RC, Roccabianca P: The spectrum of canine cutaneous perivascular wall tumors: morphologic, phenotypic and clinical characterization. Vet Pathol 2007, 44:607–620.

4. Bernard M, Le Nail LR, de Pinieux G, Samargandi R: Angioleiomyoma: an update with a 142-Case series. Life 2024, 14:338.
5. Hachisuga T, Hashimoto H, Enjoji M. Angioleiomyoma: A clinicopathologic reappraisal of 562 cases. Cancer 1984, 54:126–130.
6. Liu SM, Mikaelian I: Cutaneous smooth muscle tumors in the dog and cat Vet Pathol 2003, 40:685-692.
7. Gupta M, Suryawanshi M, Kumar R, Peedicayil A: Angioleiomyoma of uterus: a clinicopathologic study of 6 cases. Int J Surg Pathol 2018, 26:18–23.
8. Bouraoui S, El Hadj OEA, Rekik W, Goutallier-Ben Fadhel C, Kébir FZ, Lahmar A Gara F, Mzabi-Regaya S: First case of angioleiomyoma originating from the ovary of an adult woman. Gynecol Obstet Invest 2010, 70:8–12.
9. Valentine MJ, Beierschmitt A, DeLay J, Callanan, JJ: Uterine angioleiomyoma in an African green monkey (Chlorocebus aethiops sabaeus).J Med Primatol 2017, 46:9-12.
10. Jakab C, Rusvai M, Biró N, Szabó, Z., Gálfi P, Kulka J: Claudin-5-positive angioleiomyoma in the uterus of a degu (Octodon degus). Acta Vet Hung 2010, 58:331-340.
11. Mentzel T, Dei Tos AP, Sapi Z, Kutzner H: Myopericytoma of skin and soft tissues: clinicopathologic and immunohistochemical study of 54 cases. Am J Surg Pathol 2006, 30:104–113.
12. Laskin WB, Fetsch JF, Tavassoli FA: Angiomyofibroblastoma of the female genital tract: analysis of 17 cases including a lipomatous variant. Hum Pathol 1997, 28:1046–1055.
13. Mazzei M, Millanta F, Citi S, Lorenzi D, Poli A: Haemangiopericytoma: histological spectrum, immunohistochemical characterization and prognosis. Vet Dermatol 2002, 13:15–21.
14. Agnew DW, Maclachlan NJ: Tumors of the Genital Systems. In: Tumors in Domestic Animals. 5th Edit. Ames: John Wiley and Sons; 2016, 689–722.
15. Brown PJ, Evans HK, Deen S, Whitbread TJ: Fibroepithelial polyps of the vagina in bitches: a histological and immunohistochemical study. J Comp Pathol 2012, 147:181–185.
16. He S, Jiang J: Clinical characteristics and treatment outcomes of angioleiomyoma of the female genital tract: a retrospective cohort study. BMC Women's Health 2024, 24:479.
17. Ramesh P, Annapureddy SR, Khan F, Sutaria PD: Angioleiomyoma: a clinical, pathological and radiological review. Int J Clin Pract 2004, 58:587–591.

VAGINALNI ANGIOLEJOMIOM KOD PSA: PRVI PRIKAZ SLUČAJA

Woo Jun KIM, Hoon JI, Tae-Un KIM, Jae-Hyuk YIM,
Su-Min BAEK, Jin-Kyu PARK

Vaginalni tumori su relativno retki kod pasa i pretežno su benigne mezenhimalne neoplazme, kao što su lejomiomi i fibromi. Među tumorima perivaskularnog zida, angiolejomiom je retka benigna neoplazma koju karakterišu dobro diferentovani snopovi glatkih mišića ispresecani brojnim krvnim sudovima. Iako tipično nastaju iz dermisa ili subkutisa, genitalno poreklo je izuzetno retko u veterinarskoj medicini. Petnaestogodišnja nesterilisana ženka maltezera dovedena je sa pedunkuliranom vaginalnom

masom. Masa je hirurški odstranjena uz istovremeno uklanjanje jajnika iz ovariohisterektomije. Histološki, masa je pokazala proliferaciju neoplastičnih ćelija glatkih mišića koje izgledaju kao da nastaju iz zidova krvnih sudova i šire se u susednu stromu. Neoplastične ćelije su bile vretenastog oblika sa štapićastim jedrima i nisu pokazale atipiju ili mitotske figure. Imunohistohemijski, neoplastični snopovi su bili difuzno pozitivni na vimentin i alfa-aktin glatkih mišića, i multifokalno pozitivni na desmin, dok su negativni na fon Vilebrandov faktor. Na osnovu ovih nalaza, masa je dijagnostikovana kao vaginalni angiolejomiomom. Klinički, bogata vaskularna mreža ovog tumora može zahtevati temeljnu hemostazu tokom operacije. Štaviše, uspešno lečenje sa OHE sugeriše potencijalni hormonski uticaj na njegovu patogenezu. Koliko je autorima poznato, ovo predstavlja prvi izveštaj o vaginalnom angiolejomiomu kod psa, pružajući vredne dijagnostičke uvide u morfološku raznolikost tumora perivaskularnog zida pasa.