

## **A case of pyometra with leiomyoma, paraovarian cyst and sutured vagina in a bitch**

**Murside Ayse Demirel<sup>1</sup>\*** and Duygu Baki Acar<sup>2</sup>

### ***Abstract***

The present case report describes a 6-year-old, mixed-breed bitch that was referred due to anorexia, polyuria, polydipsia, and lethargy for 2 weeks. The bitch had been spayed 4 years previously at a different clinic. Vaginal inspection by speculum and cytology was not possible because the vaginal canal had been closed surgically. Stump pyometra was suspected upon ultrasonographic and clinical examination. However, the whole uterus and ovaries were observed during surgery. Thus, the bitch had in fact not been spayed as noted anamnesis, but rather the vagina had been sutured to prevent copulation. Histopathological analysis of the uterus and ovaries revealed findings consistent with those for uterine leiomyoma, pyometra, and paraovarian cyst. Therefore, the bitch was diagnosed with pyometra with leiomyoma and a paraovarian cyst. Consequently, it is emphasized that vaginal suturing is an inappropriate and unacceptable method of contraception.

---

**Keywords:** leiomyoma, ovariohysterectomy, paraovarian cyst, pyometra, vagina

<sup>1</sup>*Laboratory Animal Breeding and Experimental Research Center, Faculty of Pharmacy, University of Gazi, 06330 Ankara, Turkey*

<sup>2</sup>*Department of Obstetrics and Gynaecology, Faculty of Veterinary Medicine, Afyon Kocatepe University, Afyonkarahisar, Turkey*

**\*Correspondence:** aysedemirel@gazi.edu.tr

## Introduction

Uterine tumors are rare in dogs, comprising less than 0.5% of reproductive tract tumors (Shammi et al., 2010), and usually occur in bitches over the age of 10-15 years (Smith, 2006). Leiomyoma is a smooth muscle cell tumor of the myometrium. It is the most common tumor of all canine uterine tumors, accounting for 85-90%. Leiomyomas are hormone-dependent and are frequently associated with ovarian follicular cysts or estrogen-secreting tumors, and often also with endometrial hyperplasia and/or mammary hyperplasia (Shammi et al., 2010; Millán et al., 2013). Uterine tumors such as leiomyoma may obstruct the cervix, causing pyometra (Nak et al., 2009), an infectious disorder of the uterus that varies clinically and pathologically in adult intact bitches during diestrus and can result in death (England, 2001; Johnston et al., 2001).

Ovariohysterectomy is a common surgical procedure for contraception in dogs. Therefore, the physical and behavioural signs of estrus are not manifested. Moreover, this method prevents diseases associated with the reproductive system such as pyometra, uterine or mammary tumor. However, some complications such as incomplete removal of the ovaries and uterus (ovarian remnant syndrome-stump pyometra), reaction to the surgical suture material, flank fistula and intra-abdominal adhesions may develop due to surgical misjudgment during ovariohysterectomy (England, 2001; Johnston et al., 2001; Demirel and Küplülu, 2010; Demirel and Baki Acar, 2012). The present study reports a case in which a surgical misjudgment instead of ovariohysterectomy, involving suturing of the vagina, led to pyometra with a leiomyoma-paraovarian cyst.

## Case Description

A 6-year-old, mixed-breed bitch was brought

to the clinic. Her owner reported that she manifested anorexia, polyuria, polydipsia, and lethargy of 2 weeks' duration, and that she had been spayed 4 years previously. Although the bitch had been administered systemic antibiotics at another clinic, the bitch had shown no improvement. While the spayed bitch exhibited signs of estrus, no vaginal bleeding was seen.

Clinical examination revealed that the bitch was weak and depressed, and had abdominal swelling. Viability parameters such as body temperature, heart rate and respiratory rate were increased (Table 1). On vulvovaginal examination, the vulva was oedematous but no vaginal discharge was present. Interestingly, vaginal inspection by speculum was not possible because the vaginal canal was closed; therefore, no vaginal smear could be taken for cytological analysis. Ultrasonographic examination (3.5-7 MHz multifrequency linear and sectorial probes, B-mode real-time ultrasonographic device, Esaote-FD-570, Florence, Italy) was performed. Transabdominal ultrasonography revealed a markedly enlarged uterus on the basis of the presence of anechoic structure; the size of the uterus could not be determined due to enlargement of the mass. Blood samples were collected for hematological (QBC-Vet Autoreader® hematology system, IDEXX Laboratories, Westbrook, MN) and biochemical (VetTest® Chemistry Analyzer, IDEXX) investigations. Alkaline phosphatase (ALP), blood urea nitrogen (BUN), creatinine levels, and neutrophil and leucocyte counts exceeded the reference levels (Table 1). According to the anamnesis, clinical and ultrasonographic findings, uterine stump pyometra was suspected. Surgical resection of the remnant tissues was recommended. Prior to surgery, a balanced electrolyte solution (20 mL/kg/h, intravenous, Isolyte® 500 ml solution, Eczacibasi-Baxter, İstanbul, Turkey) was administered and amoxicillin-clavulanic acid (8.75 mg/kg/day, i.m., Synulox®, Pfizer, Latina, Italy) therapy was started to improve the general condition of the bitch.

**Table 1** Values of pre- and post-surgical vital, haematological and blood biochemical parameters

Parameters	Pre-surgical	Post-surgical	Reference Range
Temperature (°C)	40.2	38.3	37.5-39.5
Heart rate (beat/minute)	124	102	90-110
Respiratory rate (beat/minute)	26	20	10-20
Leukocyte ( $10^9$ L)	24.5	11.9	6.0-16.9
Hematocrit (%)	40.2	44.7	37.0-55.0
Haemoglobin (g/dL)	10.4	14.2	12.0-18.0
Granulocyte ( $10^9$ L)	16.0	8.5	3.3-12.0
Neutrophil ( $10^9$ L)	14.8	5.4	2.8-10.5
Lymphocyte/monocyte ( $10^9$ L)	1.5	3	1.1-6.3
Eosinophil ( $10^9$ L)	3.0	3.1	0.5-1.5
Platelet ( $10^9$ L)	889	522	175-500
Alanine transaminase (IU/L)	12	14	10-100
Aspartate aminotransferase (IU/L)	58	22	0-50
Alkaline phosphatase (IU/L)	218	70	23-212
Creatinin (mg/dL)	2.0	0.9	0.5-1.8
Blood urea nitrogen (mg/dL)	32	16	7-27

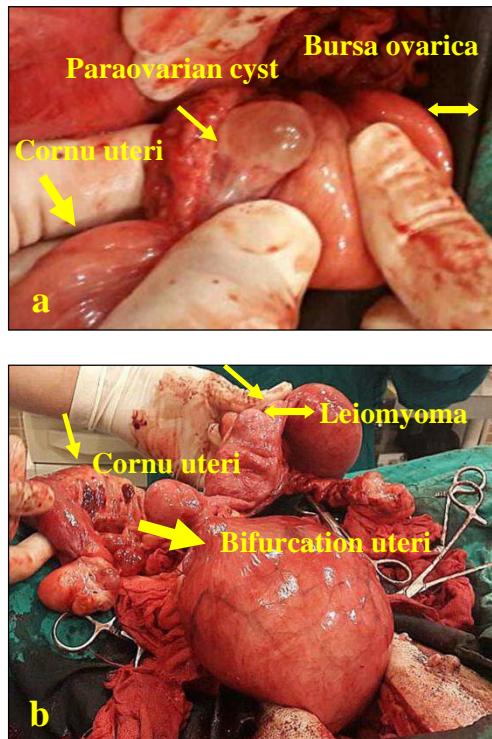
The presence of the whole uterus and ovaries was observed during surgery, indicating that the bitch had not been spayed as noted in anamnesis, but that the vagina had only been sutured to prevent copulation. Cystic structure was detected in the paraovarian area (Fig 1a). In addition, the uterine

content had been deposited in the region of the uterine bifurcation (Fig 1b), and hence, the uterine bifurcation could not be removed. An episiotomy was performed and the vaginal canal was opened. When the vaginal canal was well exposed, a portion of the content accumulating at the uterine bifurcation was drained.

After draining most of the accumulated content, the uterus and both ovaries were then carefully removed by ovariohysterectomy.

After removing the uterus and ovaries, the urinary bladder wall, which is in the vicinity of the uterus, was hyperaemic, swollen, and edematous. Urine samples from the bladder and pathologic content samples from the uterus were taken under sterile conditions for bacteriological examination, then antibiogram and *Escherichia coli* were isolated from

these samples. Based on the antibiogram, the isolates indicated sensitivity to amoxicillin and clavulanic acid, which continued for 10 days after the ovariohysterectomy. On the 10<sup>th</sup> postoperative day, the dog recovered without any complications. Furthermore, blood biochemical parameters and complete blood cell count were within normal limits. Besides, it was observed that the dog was healthy on close follow-up.



**Figure 1** (a) The appearance of a paraovarian cyst (thin arrows), cornu uteri (thick arrow) and bursa ovarica (two-headed arrow) (b) Removal of cornu uteri (thin arrows), bifurcation uteri (thick arrow) accumulated with pyometra content and leiomyoma (two-headed arrow)

The removed tissues were sent for histopathological evaluation. On macroscopic diagnosis, the uterine horns were 35 cm in length and 8 cm in diameter, and the uterine content sanguine-purulent. Two fibrous structures 6 × 5 × 4 cm in size were identified on the uterine horns. A simple cyst of 5 × 4 × 3 cm with 0.3-cm wall thickness was found in the paraovarian area. The uterine bifurcation was distended, measuring 21 × 16 cm. On microscopic evaluation of the ovarian tissue, the wall of the cyst showed fragments of smooth muscle cells along with congested blood vessels and chronic inflammatory cells. The cyst was lined by ciliated columnar cell. The structure was diagnosed as a mesonephric paraovarian cyst (Fig 2). The tumor cells resembled normal cells and formed bundles in different directions in the uterus; therefore, it was diagnosed as a leiomyoma (Fig 2). Presence of hemorrhagic areas was also observed in the endometrium. A number of areas were also found infiltrated by lymphocytes and neutrophils, indicating regional inflammation.

### Discussion

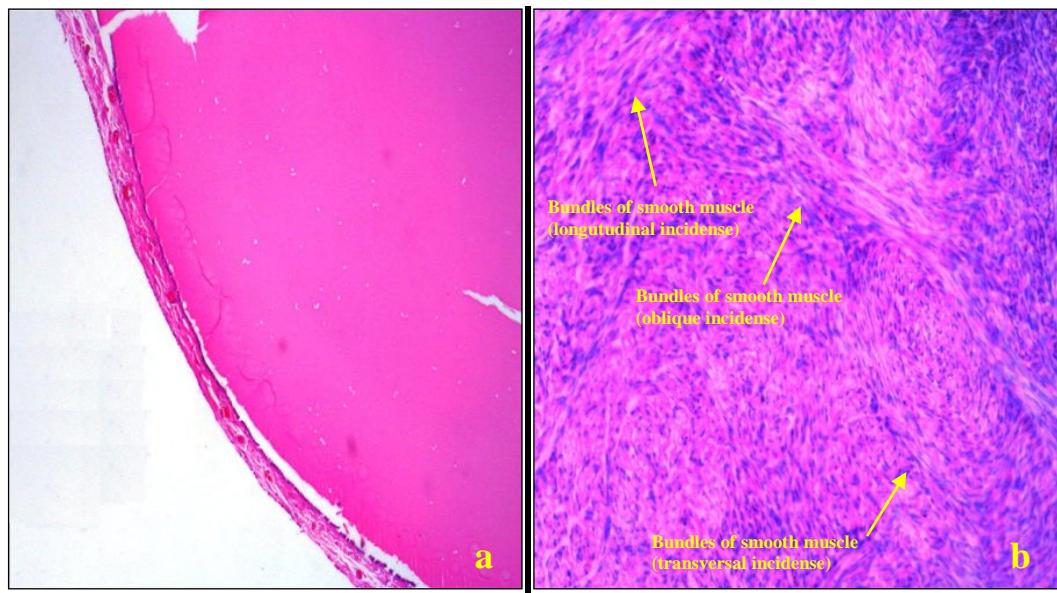
The removal of the ovaries by ovariohysterectomy is not only a method of contraception, but it is also used as a preventative technique to reduce the physical and behavioral signs

observed during the estrus period and to avoid venereal diseases such as transmissible venereal tumors. The physical inconveniences of estrus include bloody vaginal discharge and attraction for male dogs. Even though other surgical and nonsurgical methods of contraception are available, ovariohysterectomy is the most commonly used method (Root Kustriz, 2010). However, some complications may develop due to surgical factors when performing ovariohysterectomy (Musal and Tuna, 2005; Oliveira et al., 2012; Root Kustriz, 2010). These complications include incomplete removal of the ovaries and uterus (Sangster, 2005; Sontas et al., 2007; Demirel and Baki Acar, 2012; Oliveira et al., 2012), reactions to surgical suture material, flank fistulas (Gadelha et al., 2004), and intra-abdominal adhesions that affect the function of adjacent organs (Akinrinmade and Lawal, 2010). In less-preferred methods such as tubal ligation, the bitch continues to show signs of estrus, and may also copulate, although no conception occurs (Hagman et al., 2006). In the case described here, copulation had been prevented by suturing the vagina, and estrus signs had been observed without any proestrus bleeding. Secretion by the uterine glands continued due to progesterone activity during the diestrus period, but the secretion could not be discharged vaginally. It is likely that the elevated progesterone levels increased the sensitivity of the uterus to infection

through each estrus cycle of the bitch, and bacteria and their toxins enhanced the effect of the accumulation of exudate in the endometrial cavity. Hence, an inflammatory response developed, the endometrium thickened abnormally, and eventually pyometra occurred.

A similar situation can also be seen in segmental aplasia of the uterus and vagina. In bitches, the uterine and vaginal segments show developmental abnormalities ranging in severity from hypoplasia to complete agenesis; the severity of the defect influences reproductive function and clinical complications

(Romagnoli and Schlafer, 2006; McIntyre et al., 2010). The least severe form is the vagino-vestibular structure, in which secretion collection in the uterus and cranial vagina occurs. In the most severe form, the uterus may be partially or completely reduced to a stringy, fibrous structure. These extreme forms may co-occur with increased uterine size and signs of mucometra or pyometra. Fluid drainage from the uterus is completely obstructed in vaginal or cervical atresia and owner may complain that the bitch does not exhibit the expected estrus vulvar discharge (Oh et al., 2005; Colaço et al., 2012).



**Figure 2** Histopathological view of paraovarian cyst, H&E x4 (a) and leiomyoma-pyometra, H&E x10 (b)

It has been hypothesized that bacteria located in the endometrial cavity originate from the vaginal/intestinal flora (ascending) and/or from urinary tract infection (descending) (England, 2001; Hagman and Kühn, 2002; Chen et al., 2003; Gieg et al., 2006). Generally, gram-negative bacteria such as *E. coli*, *Klebsiella spp.* and *Pseudomonas spp.* are isolated from the uterine content, and endotoxemia is observed with pyometra (Hagman et al., 2006; Demirel and Küplülu, 2010). It is known that cystitis is commonly associated with canine pyometra, and *E. coli* isolated from the urinary bladder and those isolated from the uterus are similar. It has been suggested that the urinary tract may serve as a bacterial reservoir, and that bacteria ascend into the uterus during a susceptible stage of the estrous cycle (England, 2001; Gieg et al., 2006; Graves, 2006; Hagman and Kühn, 2002; Chen et al., 2003; Küplülu et al., 2009). In our case, the same bacterial species (*E. coli*) was also isolated from the uterine and urinary bladder contents. However, the origin of the bacteria in the uterus could not be determined whether it ascended or descended, due to the unknown history of the bitch.

Uterine neoplasms may be associated with reproductive disorders. Leiomyoma, which is rarely found in bitches, is frequently associated with ovarian follicular cysts, endometrial hyperplasia and mammary hyperplasia or neoplasia (Karagiannis et al., 2011; Tsioli et al., 2011). The tumor appears to be

ovarian-steroid dependent, as evidenced by its growth during the reproductive years (Bäcklin et al., 2003). Submucous leiomyomas that protrude into the uterine cavity or vagina are those which are most frequently infected. Moreover, it is considered that leiomyoma may cause pyometra by obstructing the cervix. Pedunculated submucous leiomyoma can become ulcerated and infected in the endometrial surface. When endometritis occurs, the leiomyoma may spread to the rest of the uterus. Consequently, parametritis, peritonitis and septicemia may develop. In addition, leiomyoma may cause pyometra by obstructing the cervix (Martens, 2003). Indeed, a uterine leiomyosarcoma coexisting with pyometra in a dog was reported in a previous study. The mechanical obstruction of the uterine lumen due to leiomyosarcoma primarily caused pyometra in that case report (Tsioli et al., 2011). In the present dog, the uterine leiomyoma, which was described as hormone-dependent tumor, was associated with cystic endometrial hyperplasia and paraovarian cyst, consistent with previous reports. However, in our case, the cause of the pyometra and the obstruction of the genital tract differed from that previously reported, in that it involved not only a leiomyoma, but also a vaginal obstruction that had been created surgically.

In conclusion, ovariohysterectomy is a method often used for contraception, but may cause complications such as stump pyometra, ovarian

remnant syndrome and tumoral masses. In the case described here, the pyometra content could not drain as the vaginal canal had been closed by suturing, and the clinical condition of the dog progressively deteriorated. This case demonstrates that suturing of the vagina is an inappropriate and unacceptable method of contraception and that pyometra requires early intervention due to its high mortality rate.

### Acknowledgments

The authors would like to thank Ugur Culha (Petcity Veterinary Clinic, Ankara, Turkey) for clinical assistance.

### References

Akinrinmade JF and Lawal AO 2010. Gross and histologic evaluation of abdominal adhesions associated with chromic catgut and polypropylene sutured enteropexies in dog. *Int J Morphol.* 28(4): 1221-1225.

Bäcklin B-M, Eriksson L, Olovsson M 2003. Histology of uterine leiomyoma and occurrence in relation to reproductive activity in the Baltic Grey Seal (*Halichoerus grypus*). *Vet Pathol.* 40: 175-180.

Chen YMM, Wright PJ, Lee CS, Browning GF 2003. Uropathogenic virulence factors in isolates of *Escherichia coli* from clinical cases of canine pyometra and feces of healthy bitches. *Vet Microbiol.* 94: 5769.

Colaço B, Dos Anjos Pires M, Payan-Carreira R 2012. Congenital aplasia of the uterine-vaginal segment in dogs. In: *A Bird's Eye View of Veterinary Medicine* CC Perez-Marin (ed) Croatia: InTech 165-178.

Demirel A, Küplülü Ş 2010. Investigation on the antiendotoxic effect of the combination of polymyxin E and ampicillin in dogs with endotoxic pyometra. *Kafkas Univ Vet Fak Derg.* 16: 313-318.

Demirel MA, Baki Acar D 2012. Ovarian remnant syndrome and uterine stump pyometra in three queens. *J Feline Med Surg.* 14: 913-918.

England G 2001. Infertility in the bitch and queen. In: *Veterinary Reproduction and Obstetrics* DE Noakes, TJ Parkinson, GCW England (ed) WB Saunders Harcourt Pub. Lim: 639-671.

Gadelha CRF, Ribeiro APC, Apparicio MF, Covizzi GJ, Vicente WRR 2004. Acquired vesicovaginal fistula secondary to ovariohysterectomy in a bitch: a case report. *Arq Bras Med Vet Zool.* 56: 183-186.

Gieg JA, Chew DJ, McLoughlin MA 2006. Disease of urinary bladder. In: *Saunders Manual of Small Animal Practice* (Third Edition) Chapter 79 Saunders-Elsevier: 895-914.

Graves TK 2006. Disease of the ovaries and uterus. In: *Saunders Manual of Small Animal Practice* (Third Edition) Chapter 90 Saunders-Elsevier: 982-991.

Hagman R and Kühn I 2002. *Escherichia coli* strains isolated from the uterus and urinary bladder of bitches suffering from pyometra: Comparison by restriction enzyme digestion and pulsed-field gel electrophoresis. *Vet Microbiol.* 84: 143-153.

Hagman R, Kindahl H, Fransson BA, Bergström A, Ström Holst B, Lagerstedt AS 2006. Differentiation between pyometra and cystic endometrial hyperplasia/mucometra in bitches by prostaglandin F2 $\alpha$  metabolite analysis. *Theriogenology.* 66: 198-206.

Johnston SD, Root Kustritz M, Olson PNS 2001. Disorders of the canine uterus and uterine tubes (oviducts). In: *Canine and Feline Theriogenology* K Ray, L Denise (ed) WB Saunders Company: 206-225.

Karagiannis GS, Pelekanis M, Loukopoulos P, Haris N, Ververidis HN, Kaldrymidou E 2011. Canine uterine leiomyoma with epithelial tissue foci, adenomyosis, and cystic endometrial hyperplasia. *Case Reports in Veterinary Medicine* Volume 2011, Article ID 901874, 4 pages. <http://dx.doi.org/10.1155/2011/901874>

Küplülü Ş, Vural MR, Demirel A, Polat M, Akçay A 2009. The comparative evaluation of serum biochemical, haematological, bacteriological and clinical findings of dead and recovered bitches with pyometra in the postoperative process. *Acta Vet-Beograd.* 59: 193-204.

Martens MG 2003. Pelvic inflammatory disease. In: *Te Linde's Operative Gynecology* 9th ed AJ Rock, WH (ed) Jones Philadelphia: Wiliams & Wilkins Lippincott 753-98.

McIntyre RL, Levy JK, Roberts JF, Reep RL 2010. Developmental uterine anomalies in cats and dogs undergoing elective ovariohysterectomy. *J Am Vet Med Assoc.* 237: 542-546.

Millán Y, Guil-Luna S, Reymundo C, Sánchez-Céspedes R and Martín de las Mulas J 2013. Sex steroid hormones and tumors in domestic animals. In: *Insights from Veterinary Medicine*. Chapter 7 ed Rita Payan-Carreira Intech: 191-214.

Musal B, Tuna B 2005. Surgical therapy of complicated uterine stump pyometra in five bitches: a case report. *Vet Med Czech.* 50: 558-562.

Nak D, Misirlioglu D, Nak Y, Alasonyalilar A 2009. Vaginal prolapse and pyometra associated with a leiomyoma in an Anatolian shepherd. *Aust Vet Practit.* 39: 27-30.

Oh KS, Son CH, Kim BS, Hwang SS, Kim YJ, Park SJ, Jeong JH, Jeong C, Park SH, Cho KO 2005. Segmental aplasia of uterine body in an adult mixed breed dog. *J Vet Diag Invest.* 17: 490-492.

Oliveira KS, Silva MAM, Brun MV, Pérez-Gutiérrez F, Toniollo H 2012. Ovarian remnant syndrome in small animals. *Semin Ciênc Agrár.* 33: 363-380.

Romagnoli S, Schlafer DH 2006. Disorders of sexual differentiation in puppies and kittens: a diagnostic and clinical approach. *Vet Clin North Am Small Anim Pract.* 36: 573-606.

Root Kustritz M 2010. What age is best for ovariohysterectomy of female dogs? In: *Clinical Canine and Feline Reproduction: Evidence-Based Answers* Wiley-Blackwell: 81-82.

Sangster C 2005. Ovarian remnant syndrome in a 5-year-old bitch. *Can Vet J.* 46: 62-64.

Shammi M, Simon MS, Raj MP, Sivashanker R, Kumar RS 2010. Surgical management of uterine leiomyoma in a bitch. *Tamilnadu J Veterinary & Animal Sciences* 6:181-182.

Smith F 2006. Canine pyometra. *Theriogenology* 66: 610-612.

Sontas BH, Gürbulak K, Ekici H 2007. Ovarian remnant syndrome in the bitch: a literature review. *Arch Med Vet* 39: 99-104.

Tsioli VG, Gouletsou PG, Loukopoulos P, Zavlaris M, Galatos AD 2011. Uterine leiomyosarcoma and pyometra in a dog. *J Small Anim Pract.* 52: 121-124.

## บทคัดย่อ

### ภาวะมดลูกอักเสบร่วมกับเนื้องอกกล้ามเนื้อเรียบและถุงน้ำข้างรังไข่ในแม่สุนัขที่ถูกเย็บปิดช่องคลอด

เมอร์ไซ เอส เดมิรล<sup>1\*</sup> และ ดูกู บาจู อาจัค<sup>2</sup>

สุนัขเพศเมีย พันธุ์ผสมอายุ 6 ปี มาเข้ารับการรักษาด้วยอาการ ซึม เปื้ออาหาร กระหายน้ำและปัสสาวะบ่อย นานประมาณ 2 สัปดาห์ ตามประวัติสุนัขได้รับการทำหมันมาเมื่อ 4 ปีก่อน ตรวจทางคิลินิกและอัลตร้าซาวน์พบช่องคลอดปิด วินิจฉัยเบื้องต้นส่งสัญญาณให้ มดลูกอักเสบ เมื่อผ่าเปิดช่องท้อง พบรดคลุกและรังไข่ ซึ่งแสดงถึงสุนัขไม่ได้รับการทำหมันตามประวัติข้างต้น แต่ได้รับการเย็บปิดช่องคลอดเพื่อป้องกันการผสมพันธุ์ สรุปการวินิจฉัยว่าสุนัขป่วยมีภาวะมดลูกอักเสบ ร่วมกับเนื้องอกกล้ามเนื้อเรียบและถุงน้ำข้างรังไข่ เนื่องจากการเย็บปิดช่องคลอดที่ไม่ถูกต้อง

**คำสำคัญ:** เนื้องอกกล้ามเนื้อเรียบ การตัดมดลูกและรังไข่ ถุงน้ำข้างรังไข่ มดลูกอักเสบ ช่องคลอด

<sup>1</sup>ห้องปฏิบัติการปรับปรุงพันธุ์สุนัข และศูนย์วิจัยทดลอง คณะเภสัชศาสตร์ มหาวิทยาลัยกาซี 06330 จังหวัดอังการา ประเทศไทย

<sup>2</sup>ภาควิชาสุติศาสตร์ คณะสัตวแพทยศาสตร์ มหาวิทยาลัยอฟยอนໂโคเคฟ จังหวัดอฟยอนカラไซชาร์ ประเทศไทย

\*ผู้รับผิดชอบบทความ E-mail: aysedemirel@gazi.edu.tr