

## DIAGNOSIS AND TREATMENT OF A CASE OF CANINE UTERINE ABSCESS

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### ABSTRACT

A 7-year-old female, Cocker Spaniel, began to suffer from anorexia and poor spirit 20 days before treatment. There was red fluid flowing out of the vagina. After self-feeding for 3 days, amoxicillin did not improve, and the affected animals were sensitive and uneasy. The general clinical examination, blood routine examination, biochemical blood indexes and B-type ultrasonic examination were used for the diagnosis and treatment to diagnose and treat the dog. The results showed that the dog was diagnosed as uterine abscess and the prognosis of the dog was good after ovariectomy, combined with postoperative monitoring and anti-inflammatory nursing.

**Keywords:** Dogs, Pyorrhoea of the uterus, Enucleation, Diagnosis, Treatment

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## 1. INTRODUCTION

Canine pyoderma refers to the accumulation of a large amount of pus in the uterine cavity of dogs, accompanied by endometrial hyperplasia and bacterial infection. Dogs with serious symptoms such as uremia, sepsis, and organ failure (Li 2008; Zhang et al. 2020). The disease is more common in female dogs over 6 years old, especially in old, non-fertile female dogs. Abortion, improper operation of the breeding process, and pseudopregnancy may cause uterine pus in female dogs (Chen 2013; Kumar and Saxena, 2018). According to the opening degree of the cervix of the sick dog, the canine uterine pyogenesis is clinically divided into open uterine pyogenesis and closed uterine pyogenesis (He and Ye 2009). The two types of uterine pus are clinically hidden. Physicians cannot find most of the affected dogs in time, so the treatment is delayed, resulting in the aggravation of the disease. The serious secondary infection will cause the death of the affected dogs. The author examined and diagnosed a case of an open canine uterine abscess. Now, this case's diagnosis and treatment process is introduced as follows for reference only.

## 2. MATERIALS AND METHODS

### 2.1. Case Information

One black female cocker spaniel, 7 years old, weighing 22.0kg, not sterilized, not delivered, fully immunized. On August 15, 2019, the dog owner was brought to the hospital and complained that she was in low spirits and had a poor appetite more than 20 days ago. Recently, she lost her appetite but accompanied by vomiting. There was red fluid flowing out of the vagina. She had fed amoxicillin himself three days before the hospital and didn't get better, so she was brought to the hospital.

### 2.2. Clinical examination

The body temperature of the affected dog was 40.2°C, the heart rate was 112 times/min, the respiratory rate was 35 times/min and the coat was rough and disordered. **Visual examination:** The abdominal circumference of the affected dog is slightly expanded, the oral mucosa is pale, the spirit is depressed, and the hair around the external reproductive organs is messy or even clustered. **Interrogation:** The affected dog has not given birth, becomes estrous before 1 month and then comes on; There was red liquid flowing out of the genitals. The owner suspected that the estrus was not over and didn't care, but the affected dog soon became mentally worse and lost appetite. Until three days ago, she lost her appetite, the amount of drinking water increased, and vomiting was occasionally seen. **Palpation:** Abdominal palpation of the affected dog was sensitive and showed obvious uneasiness. **Olfactory examination:** If the dog has bad breath, dip the vaginal secretion with a clean medical cotton swab and smell the rotten stench.

### 2.3. Hematology and Biochemistry

Venous blood was collected from the affected dog for blood routine and biochemical examination. See Table 1 for blood routine examination results and Table 2 for blood biochemical examination results on the day of treatment.

### 2.4. B-ultrasound Examination

The dog was supine in Baoding, shaved under the abdomen to expose the skin, coated with a coupling agent, contacted the skin with a 5.0mhz probe and then scanned laterally and longitudinally upward from the front edge of the pubis. Adjust the technical parameters such as contrast, sensitivity, and window depth to obtain the best image and freeze and store it. The results of B-ultrasound images are shown in Fig. 1 and Fig. 2.

## 3. DIAGNOSIS AND PROCEDURES

### 3.1. Diagnosis

Leukocyte counts ( $41.2 \times 10^9/L$ ) and neutrophil count ( $35.4 \times 10^9/L$ ) of affected dogs were higher than normal (Table 1). In the image of the uterus scanned by B-ultrasound in Fig. 1 and Fig. 2, there are multiple enlarged circular hypoechoic liquid dark areas in the cross-sectional scan. The liquid dark areas on the left are obvious, and there are tubular hypoechoic areas in the longitudinal scan. Combined with the clinical symptoms such as red fluid flowing out of the vagina of the affected dog, sensitive palpation of the abdomen, painful reaction, and obvious abdominal distension, it was diagnosed as an open canine uterine abscess.

### 3.2. Treatment and Nursing

#### 3.2.1. Preoperative preparation

According to the blood routine examination results of the affected dog, the number of red blood cells, hemoglobin and other indicators has decreased. It is judged that the condition of the affected dog is serious. It is suggested to carry out an ovarian hysterectomy, and the owner agrees. Because the appetite of the affected dog has been lost for several days, it is necessary to check the blood gas of the affected dog before the operation to master the acid-base balance and electrolyte balance of the affected dog. The inspection results are shown in Table 3.

**Table 1:** Hematology results of dog suffering from uterine abscess

Parameter	Unit	On treatment day	Postoperative		Before discharge	Reference value
			1st Day	3rd Day		
White blood cells	$\times 10^9/L$	41.2 ↑	72.1 ↑	40.5 ↑	18.2 ↑	8.0-17.0
Lymphocyte	$\times 10^9/L$	7.1 ↑	7.4 ↑	7.6 ↑	5.4 ↑	0.8-5.1
Neutrophils	$\times 10^9/L$	35.4 ↑	63.0 ↑	30.9 ↑	11.8	4.0-12.6
Red blood cell	$\times 10^{12}/L$	4.18 ↓	4.25 ↓	3.62 ↓	5.32 ↓	5.50-8.50
Hemoglobin	g/L	96 ↓	99 ↓	89 ↓	111	110-190
Hematocrit	%	28.1 ↓	29.0 ↓	25.2 ↓	36.0 ↓	39.0-56.0
MCV	fL	67.3	68.3	69.7	69.3	62.0-72.0
MCH	pg	22.9	23.2	24.5	23.5	20.0-25.0
MCHC	g/L	341	341	353	343	300-380
Platelet	$\times 10^9/L$	426	461 ↑	482 ↑	459	117-460
Mean platelet volume	fL	6.7 ↓	7.2	7.4	7.2	7.0-12.9

Note: ↓ or ↑ indicates that the inspection result is lower or higher than the reference values. MCH=Mean corpuscular hemoglobin; MCHC=Mean corpuscular hemoglobin concentration; MCV=Mean corpuscular volume. The reference value comes from the reference range of Mindray bc-2800 vet automatic animal blood cell analyzer system.

**Table 2:** Blood biochemical test results (on the day of treatment)

Tests	Unit	Detection result	Reference value
Alanine aminotransferase	U/L	11	10-118
Aspartate aminotransferase	U/L	12	8.9-48.5
Urea nitrogen	mmol/L	0.28 ↓	2.5-9.6
Total bilirubin	$\mu\text{mol}/L$	0.234 ↓	1.7-10.3
Creatinine	$\mu\text{mol}/L$	53	27-124
Alkaline phosphatase	U/L	57	40-300
Ca	mmol/L	2.25	1.98-2.95

Note: ↓ indicates that the inspection result is lower than the reference value. The reference value comes from the reference range of Celercare V5 system, a fully automatic biochemical analyzer for animals.

**Table 3:** Blood gas examination results (before operation)

Tests	Unit	Detection result	Reference value
Sodium	mmol/L	144	138-160
Potassium	mmol/L	3.7	3.7-5.8
Chloride	mmol/L	117	106-120
TCO <sub>2</sub>	mmol/L	21	16-25
Glucose	mg/dL	90	80-130
pH	--	7.456 ↑	7.25-7.40
pCO <sub>2</sub>	mmHg	28.3 ↓	33.00-51.00
HCO <sub>3</sub> <sup>-</sup>	mmol/L	19.9	13.00-25.00
BEecf	mmol/L	-4	(-5.00) - (2.00)

Note: ↓ or ↑ indicates that the inspection result is lower or higher than the reference values. The reference value comes from the reference range of Abbott blood gas analyzer i-stat300-g system

The results of the blood gas examination showed that the pH value increased and PCO<sub>2</sub> decreased, indicating that the affected dog had slight respiratory alkalosis. In addition, the temperature of the affected dog was 40.2°C, and it was in a state of fever. Therefore, before the operation, it was planned to make the physiological indexes of the affected dog at a normal level through antibiotic treatment, rehydration, and other methods.



Fig. 1-2: B-ultrasound image results of abscess of dog.



Fig. 3: Restraining and anesthesia applied.



Fig. 4: Disinfection of infected dogs.

### 3.2.2. Prescription for Surgery

Intramuscular injection of Analgin (1.5mL) was injected as antipyretic. Injected 100mL of 0.9% normal saline intravenously and added 0.2g sug along with an intravenous injection of 5% glucose 100mL and addition of 5mL albumin. For the electrolyte regulation, we give an intravenous injection of the compound NaCl 250mL. On the second day after treatment, the body temperature of the affected dog decreased to 39.4C and slightly improved the state. Fasting for 12 hours and water for 4 hours before the operation, ready for operation.

### 3.2.3. Anesthesia

Atropine 1mL was injected subcutaneously to reduce the secretion of salivary glands and respiratory glands. Two branches of batroxobin were injected intravenously to reduce the operation site and postoperative bleeding. We used Tongliding 3.5mL to relieve postoperative pain and 10 minutes later, 1.7mL of Domijing was injected intravenously as basic anesthesia. After entering the light anesthesia stage smoothly, endotracheal intubation was connected to the respiratory anesthesia machine and isoflurane was used for inhalation anesthesia. The concentration in the induction period was 3% and after 3 minutes, the concentration was changed to 1.5% to maintain the depth of anesthesia. (Fig. 3).

### 3.2.4. Operation

**Disinfection:** The affected dog lay on his back in Baoding. The operation Department used 5% iodine tincture to disinfect gradually from the operation department's center and then deiodinated with 75% medical alcohol. Cover the wound towel cloth and fix it with wound towel pliers (Fig. 4). **Exposure of abdominal cavity:** A 10cm longitudinal incision was made on the posterior midline of the umbilicus with a scalpel to separate the muscle layer; The operator used tooth forceps, and the assistant uses curved hemostatic forceps to lift and clamp the peritoneum. Check the lifting part with two fingers to confirm that the abdominal cavity contents are not clamped. Cut a small incision between the forceps and forceps. The operator extends the two fingers into the incision to isolate the peritoneum and intestine, slowly opened the peritoneal incision, and exposed the abdominal cavity (Fig. 5).

**Hysterectomy and Ovariectomy:** Find the uterine body in the abdominal cavity and carefully pull the expanded uterine body out of the incision to fully expose the uterine body, ovary, and ovarian suspensory ligament. Clamp the proper ovarian ligament with hemostatic forceps and lift it up. Flatten the uterine horn. After exposing the ovary, passively separate the ovarian suspensory ligament, fixed the tissue around the ovarian artery and vein with hemostatic forceps. Then double ligated the mesangium and blood vessels on both sides of the ovary, cut these in the middle of ligation, loosen the hemostatic forceps, and put them back into the abdominal cavity after hemostasis at the incision (Fig. 6). Clamped the arteriovenous tubes behind the uterus with hemostatic forceps and ligated the uterine horns on both sides and the back of the cervix. Sort out the broad ligament of the uterus and slowly separated the broad ligament of the uterus backward along the uterine horns on both sides until the bifurcation of the uterine horn. Then clamped the ligation pre-cut place with a hemostatic forceps, cut off the uterine body along the hemostatic forceps with a scalpel, and took the uterine body out after hemostasis (Fig. 7).

**Suture:** checked the abdominal cavity without active bleeding. After counting the surgical instruments, washed the abdominal cavity with normal saline, sprinkle a layer of ampicillin sodium, sutured all abdominal wall layers, and continuously sutured the peritoneal layer, the nodule, the muscle layer the skin (Fig. 8). Turned off the respiratory anesthesia machine while starting to suture the skin and pull out the trachea when the affected dog is ready to wake up.



Fig. 5: Cut the tissue and expose the abdominal cavity.



Fig. 6: Ovariectomy.



**Fig. 7:** Hysterectomy.



**Fig. 8:** Suture and disinfection.

### 3.2.5. Postoperative care

After the operation, put the affected dog on Elizabeth's collar to prevent licking and wiped the wound. Sukangtai was used to spray the wound every day to accelerate wound healing. The postoperative recovery of the affected dog was observed and measured the body temperature every day. On the first day after the operation, the temperature of the affected dog was 40.1°C, the temperature was high, and there was no appetite. She was injected with 100mL of metronidazole, 100mL of 0.9% normal saline, 0.2g of Suke, 100mL of 5% glucose injection, and 5mL of albumin. After continuous use for 3 days, the body temperature of the affected dog returns to normal, and she could take a small amount of nutritional cream. On the 5<sup>th</sup> day, the dogs recovered well, and their mental state improved. Only injected 1mL of Baili. The results of blood routine examination of dogs after the operation are shown in Table 1.

After the operation, the recovery of the affected dogs was observed through blood routine examination. The results in Table 1 show that the number of leukocytes and lymphocytes increased significantly on the first day after the operation due to the reasons for the operation; With the postoperative recovery, the number of indicators decreased gradually (Table 1). On the 8th day after the operation, the appetite of the affected dog recovered, the wound healed well, and removed the skin sutures. The results of blood routine examination after suture removal are shown in Table 1. The results showed that the number of leukocytes and lymphocytes was close to normal. The affected dog recovered well and can be discharged from the hospital. One month after discharge, the owner asked to bring the dog for examination, and the owner said that the dog had returned to a normal state.

## 4. DISCUSSION

### 4.1. Etiological Analysis of Pyometra

The causes of pyometra in dogs are complex and diverse, related to the age, breed, estrous cycle, birth, and parity of dogs, and are also affected by pathogenic bacteria (Sachan et al. 2019; Li et al. 2022). In this case, the dog only developed the disease in the late stage of estrus. The owner mistakenly thought that the estrus was not over and did not make a timely diagnosis and treatment, delaying the condition. However, the incidence rate of pyometra in the uterus is high for female dogs over 6 years old who have not given birth (Lu et al. 2016), so the breeders should pay attention to it.

### 4.2. Diagnosis of Pyometra

The diagnosis of canine pyometra is generally divided into clinical examination, hematological examination, and imaging examination (Gasser et al. 2020; Wu et al. 2022). For pyometra cases, the clinical symptoms are mainly mental depression, loss of appetite, and systemic symptoms such as vomiting and diarrhea. Among them, the open symptoms are purulent or mucinous vaginal secretions, mostly grayish-yellow or reddish-brown, with a foul smell. The symptoms of closed cases included no vaginal secretions, abdominal circumference enlargement, and palpation of the lower abdomen can touch the uterine horn and have wave motion (Yan and Wu 2007).

Neutrophilia was common in blood routine examination, accompanied by a left nucleus shift. Blood biochemical examination can show whether liver and kidney metabolism is normal and provide the basis for differential diagnosis. Ultrasound examination is more sensitive and can be used to evaluate the size of the uterus, the thickness of the uterine wall, and the contents of the cavity, providing a definitive basis for uterine pyometra (Hagman 2018; Zhang 2021). This case has red secretion flowing out of the vagina, and the palpation of the abdomen was sensitive, with pain reaction, obvious abdominal distention, and other clinical symptoms. The results of blood routine examination showed that leukocytes increased, and neutrophils increased significantly at the initial stage; B-ultrasonic examination showed that there were multiple enlarged circular hypoechoic dark areas and thickened uterine wall in the cross-sectional scan of the uterus. Based on the above diagnostic results, it was confirmed that this case belonged to open pyometra (Hadiya et al. 2020; Pugliese et al. 2020).

#### 4.3. Treatment of Pyometra

Two methods are often used for the treatment of pyometra: conservative treatment and surgical treatment (Ni et al. 2010). Conservative treatment is mainly used for open pyometra. Drugs stimulate the contraction of uterine smooth muscle to promote the evacuation of pyometra. Prostaglandins have the best clinical effect (Zhang et al. 2010). Surgical treatment refers to the surgical removal of the uterus and ovaries of sick dogs, which can reduce the stress response and pain of animals and shorten the recovery time of animals after surgery. At present, it is considered to be the most effective method for the treatment of pyometra (Hao 2018). For the treatment of this disease, conservative treatment can preserve the reproductive capacity of the affected dog, but it is easy to relapse. Generally, conservative treatment is not recommended. It has been clinically proved that ovariectomy is the best method to cure the pyometra in dogs. The choice of surgical treatment should be combined with antibiotic treatment and reasonable fluid replacement to provide nutrition and energy so as to improve the success rate of surgery.

#### 4.4. Prevention of Pyometra in the Uterus

The owners of dogs should strengthen the awareness of prevention and treatment of the disease, pay attention to the health status of dogs at ordinary times, and help clean the vagina after taking the dogs out every day; At the same time, pay attention to avoid giving the dog hormone drugs; This disease mostly occurs in the late estrus, and is developed from endometrial hyperplasia caused by endocrine disorders. Therefore, for dogs without fertility requirements, sterilization is the best preventive measure (Xue 2021). Sterilizing the female dog as soon as possible can reduce the occurrence of pyometra or other reproductive tract diseases, improve the quality of life of the animals, prolong the lives of the animals and reduce their pain of the animals.

**Conclusion:** Pyometra has become one of the common diseases in female dogs. The incidence rate is also on the rise. At the initial stage of the disease, it is easy to be ignored by pet owners because the clinical symptoms are not obvious. With the development of the disease, systemic symptoms will appear. Suppose the disease is not diagnosed and treated in time. In that case, the toxic substances in the uterus will be absorbed by the body, causing toxemia and seriously threatening the lives of animals. In this paper, the diagnosis and treatment of open canine pyometra were summarized, which provided some reference data for the surgical treatment of canine pyometra.

#### Author's Contribution

Xiaolu Hou handled case follow-up, writing, and revising articles. Dongxian He collect and analyze case pictures and data. Guiyu Xin handled docking with pet hospitals. Lancheng Xu was responsible for overall design of disease cases and review of articles.

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