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Clinical Report

Surgical Management of Pyometra Infection in a Pet Rabbit

Vahid Ganjiani, Amin Bigham-Sadegh*

Department of Clinical Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran.

ARTICLE INFO	ABSTRACT
<p><i>Article History:</i></p> <p>Received 9 May 2022 Revised 4 July 2022 Accepted 13 June 2022 Online 13 June 2022</p> <hr/> <p><i>Keywords:</i></p> <p>Rabbit Pyometra Ovariohysterectomy</p>	<p>A 3.5-year-old mixed breed pet female rabbit with a 2.3 kg weight was referred to the Veterinary Teaching Hospital of Shiraz University. The main complaint of the owner was abdominal distension. The peculiarity of the present report is that the patient had no mating or parturition antecedent according to its history. Based on diagnostic methods and clinical examination, the presence of an enlarged organ containing fluid material and occupying most of the caudal abdomen led to the provisional diagnosis of pyometra. Exploratory laparotomy was performed under general anesthesia. After the abdominal wall incision, the uterus was immediately evident and the uterine wall was over-distended and penetrated, with purulent material free in the abdominal cavity. Next, an ovariohysterectomy was performed and the abdominal incision was closed routinely. Based on a literature review, this is one of the rare reports regarding pyometra in pet rabbits.</p>

Introduction

Pyometra is the aggregation of purulent pus in lumen of uterus along with uterus wall inflammation.^{1,2} Pyometra specific signs include vaginal discharge, hematuria, and abdominal distension along with common clinical signs like anorexia and depression.³ Pyometra is classified as close-cervix and open-cervix. Closed-cervix pyometra is an emergency situation requiring immediate intervention; as toxemia and septicemia may progress fast and left untreated will cause patient death.³⁻⁶ But, the disorder is not always associated with vaginal discharge (closed-cervix type) and hematuria, and may be no other clinical signs present due to mild pyometra. The condition should be diagnosed immediately, and surgery be performed as soon as possible.

Case Description

A 3.5 year-old mixed breed pet female rabbit with 2.3 kg weight was referred to the Veterinary Teaching Hospital of the Shiraz University. The main complaint of the owner was abdominal distension. Also, he said that the patient had had lack of appetite and activeness during last two weeks, but no vaginal discharge had been evident. Based on history, the patient had no mating or parturition antecedent. Physical examination revealed normal rectal temperature (38.9° C, normal range: 38.5-40° C), mild dehydration (7%), and severe pale mucosal membranes. Vital signs assessments displayed normal heart rate (159 beat/min, normal range: 120-325/min), while tachypnea was obvious (88 beat/min, normal range: 30-60/min) which is due to pressure of abdominal organ(s) on diaphragm.

* Correspondence to: Amin Bigham-Sadegh, Department of Clinical Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran. Email: dr.bigham@gmail.com

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Abdomen was severely enlarged, suggesting the existence of either abdominal effusion or extended organ. A complete blood count (CBC) sample was sent to Clinical Pathology laboratory to assess any hematology abnormalities which the results were shown in Table 1.

Radiology graphs (Figure 1) exhibited a significant abdominal enlargement with poor details; the organs were difficult to diagnose because of severe peritoneal effusion. Stomach, liver, kidneys, and cecum were so difficult to diagnose, and a large organ had dislocated the small intestine dorsally and cranially. The organ had grabbed the mid- and caudal parts of abdomen. Trans-abdominal ultrasonography revealed normal kidneys, urinary bladder, and displaced intestines, but huge amount of unclear fluidly content in several hyper-echoic cystic spots were seen in uterus lumen that severe progressive pyometra was suspected.

Treatment and Outcome

Based on evidences, final diagnosis was pyometra. Exploratory laparotomy and ovariohysterectomy was scheduled for the next day. Fluid therapy with Ringer's solution (Shahid Ghazi Pharmaceutical Co., Iran) was carried out to treat the patient dehydration every 12 hours (80 ml/kg/day, IV). On the next day, the rabbit received cefazolin (22 mg/kg, IM; Daana Pharmaceutical Co., Iran) as prophylactic antibiotic therapy. Anesthesia induction was performed by a

Table 1. Hematological results in affected rabbit before the surgery.

Parameter	Measured level	Normal range
WBC	$9.1 \times 10^3/\mu\text{l}$	$6.3\text{--}10.06 \times 10^3/\mu\text{l}$
RBC	$4.81 \times 10^6/\mu\text{l}$	$5.2\text{--}6.8 \times 10^6/\mu\text{l}$
HGB	9.5 g/dl	11.5–15.1 g/dl
HCT	28.1 %	36.6–47.4 %
MCV	58.4 fl	64.6–76.2 fl
MCH	19.8 pg	21.1–24.5 pg
MCHC	33.8 g/dl	29.5–33.9 g/dl
PLT	$517 \times 10^3/\mu\text{l}$	$225.45\text{--}905.3 \times 10^3/\mu\text{l}$
RDW	11.0%	0–50%
PCT	0.26%	0–2.9%
MPV	5.1 fl	0–20 fl
PDW	16.1%	0–50%

WBC: white blood cell, RBC: red blood cell, HGB: hemoglobin, HCT: hematocrit, MCV: mean corpuscular volume, MCH: mean corpuscular hemoglobin, MCHC: mean corpuscular hemoglobin concentration, PLT: platelet, RDW: red blood cell distribution width, PCT: platelet crit, MPV: mean platelet volume, PDW: platelet distribution width. Note: A mild anemia was diagnosed in present CBC test.

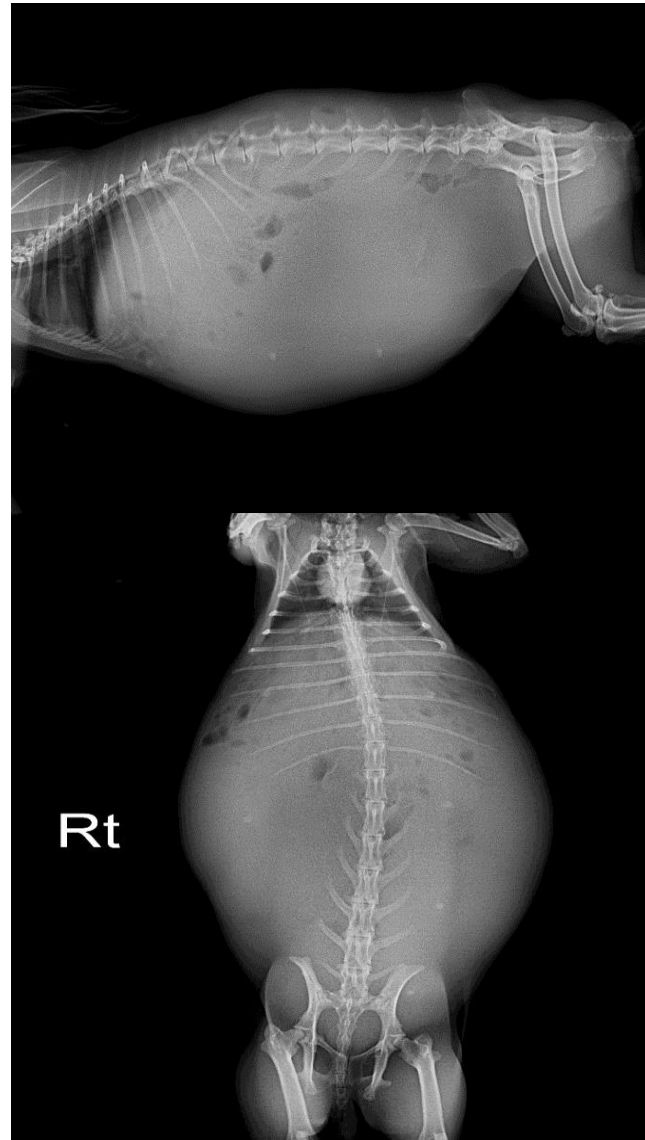


Figure 1. Radiographs, lateral (left) and ventrodorsal (right) views. The "Rt" (marker) on the ventrodorsal view indicates the right side of patient. As shown in radiographs, a markedly abdominal enlargement is observed with poor details; the organs were difficult to diagnose because of severe peritoneal effusion.

mixture of ketamine (30 mg/kg; Bremer Pharma GmbH, Germany), xylazine (3 mg/kg; Alfasan, the Netherlands), and midazolam (2 mg/kg; Midazolam 5 mg/ml, Exir Pharmaceutical Co., Iran), and maintained via isoflurane by facial mask. By cephalic vein catheterization, the patient was receiving Ringer's solution as 10 ml/kg/h during surgery. The patient was constantly monitored in terms of heart rate, oxygen saturation (SpO₂), and respiratory rate. At first, the rabbit was placed in dorsal recumbency and limbs were secured properly. Abdominal wall was shaved and disinfected surgically with povidone-iodine. Next, local analgesia was used in incision site (Vetacaine, lidocaine

hydrochloride 2%, Abouraihan Pharmaceutical Co., Iran). Surgical drapes were located around surgical site. The peritoneal cavity entered by a 3 cm ventral midline incision. Immediately after opening, a purulent material was emitted out from the incision. Uterus was extremely enlarged occupying most of abdominal cavity. Uterus was gently brought to incision and pulled out carefully (Figure 2). Presence of purulent liquid in peritoneum was associated with damage to uterus wall. The ovarian blood vessels were carefully ligated by a circumferential and a trans-fixation sutures. The uterus along with ovaries were removed after double ligations of uterine body via two trans-fixation sutures the abdominal cavity was lavaged with pre-warmed sterile sodium chloride 0.9% (Normal Saline, USP, Sterile Grade) as long as the suctioned fluid became completely clear. Finally, *linea alba* was sutured using simple continuous pattern by 2-0 Vicryl (Supabon, Supamedical Devices Co., Iran). Then, skin was sutured using simple interrupted pattern by 2-0 nylon (Supalon, Supamedical Devices Co., Iran). After uterus removal, a caseous like white dense material existed in its lumen. Uterus was transferred to Microbiology Department of Shiraz University Veterinary School to identify the etiologic agent and antimicrobial susceptibility testing. The rabbit was recovered without excitation, and discharged after two hours. Meloxicam (0.5 mg/kg, P.O., q24h, Tehran Chemie Pharmaceutical Co., Iran) was prescribed for three days and also antibiotic therapy was began by enrofloxacin (5 mg/kg, q12h, Rooyan Darou Pharmaceutical Co., Iran) until the antimicrobial susceptibility testing reveals the appropriate antibiotic. Unfortunately, Microbiology Department stated that no agent was grown on culture media, so antimicrobial susceptibility testing was failed. By the way, we had to continuous the antibiotic therapy by enrofloxacin. Two and seven days after surgery, the owner was contacted for patient following; the owner said that the patient felled fine and appetite was so well

Clinical Relevance

Pyometra is a common condition in dogs and cats, while its prevalence in rabbits is sporadically.⁴ In addition, the probability of its occurrence in pet rabbits is one third of those live in industrial farms.³ *Staphylococcus aureus* and *Pasteurella multocida* are two major agents which are associated with pyometra in lagomorphs.⁷ Pyometra often occurs after parturition in rabbits,³ while the present case had no history of mating or parturition. About post-operative antibiotic

therapy, enrofloxacin is widely used in pet rabbits infections especially those caused by *P. multocida*.^{8,9} This agent is effective against several gram-negative and some gram-positive bacteria.² Since the most major agent in rabbits' pyometra is *P. multocida*, and enrofloxacin is effective on this agent, it will be the first option to start post-operative antibiotic therapy after pyometra surgery, and given that our antimicrobial susceptibility testing results failed, our final option for antibiotic therapy has been enrofloxacin. The patient's subsequent follow-up showed that this antibiotic (enrofloxacin) was effective enough. Ten days after surgery, the patient came for sutures removal; no signs of infection or inflammation were seen at the surgical site, the surgical site was healed and there was no discharge. The patient was also alert and active. Antibiotics were discontinued from that day.

In conclusion, the present article explains the surgical management of pyometra in a pet rabbit which had no history of parturition or mating, and also no signs of vaginal discharge. Based on history, diagnostic imaging techniques, and physical examinations, pyometra was diagnosed and treated successfully by ovariectomy surgery.



Figure 2. Intra-operative image from the patient. The enlarged uterus was pulled out from the abdomen, while purulent material was free in abdominal cavity which indicates the damage to uterus wall. Ovariectomy was performed to remove the involved uterus.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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