

Vaginoscopic guided flushing for treatment of canine pyometra

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Abstract

Canine pyometra is a frequent post-oestral syndrome in female dogs. It is typified by purulent exudate building up in the lumen, endometrial inflammation, and bacterial infection with clinical signs like vomiting, polydipsia, vaginal discharge, etc. The classical treatment of pyometra consists of either ovariohysterectomy or medical interventions. Vaginoscopic guided flushing using normal saline to constitute a 5% povidone-iodine and Lenovo-AP solution was performed satisfactorily in 6 female dogs with pyometra. Following treatment, normal endometrial thickness, TLC and BUN were observed, coupled with a 100% recovery rate and a 16.66% recurrence rate. The approach was found to provide good recovery and gestation rates in female dogs intended for subsequent breeding, along with a faster recovery period as compared to other treatments for canine pyometra.

Keywords: Female dog, Pyometra, Vaginoscopic-guided flushing

Highlights

- Pyometra in dogs is a severe uterine disease, and the choice of treatment is only ovariohysterectomy, which causes economic loss to the breeder. Hormonal treatment can also significantly affect the fertility and conception rate of the affected female dogs. Therefore, this technique has been designed to retain or maintain the fertility of female dogs so that they can remain fertile even after developing this severe uterine condition, breed naturally, and conceive normally with a regular conception rate.
- Medicinal management of pyometra with vaginoscopy-guided flushing along with the combination of Lenovo-AP and 5% povidone-iodine saline is effective and safe in reversing the clinical signs and abnormal ultrasonographic appearance of the uterus in female dogs.
- This study possibly shortens the length of treatment in addition to achieving high rates of gestation and clinical recovery.

INTRODUCTION

Pyometra can be defined as hormone-induced uterine bacterial infection and inflammation, leading to a pus-filled uterus affecting intact middle-aged and older female dogs (Smith, 2006). Purulent exudate building up in the uterine lumen, bacterial infection, and endometrial inflammation are defining features of canine pyometra (Santana and Santos, 2021). In female dogs, the pathophysiology of pyometra is complex and is affected by several factors including bacterial infections, neutrophilic activity, uterine motility, and concentration of immunoglobulins (Schlafer and Foster, 2016). Age, parity, breed, and hormone administration are some of the predisposing risk factors for pyometra in dogs (Rautela and Katiyar, 2019). It has been demonstrated that uterine drainage and lavage with antiseptic solutions have a considerable therapeutic effect in instances of pyometra. Antibiotics

and antiseptics along with povidone-iodine have been used effectively as intra-uterine lavage to treat uterine infections in female dogs.

A subsequent infection that develops inside the reproductive tract of a female as a result of hormonal changes is known as pyometra. The hormone progesterone remains increased for two months or more after estrus (heat) and thickens the uterine lining to get ready for pregnancy. If there is no pregnancy for subsequent estrous cycles, the uterine lining thickens until cysts form within the uterine tissues (a condition known as cystic endometrial hyperplasia). Secretion of fluid from the cystic lining provides a perfect habitat for bacteria to thrive. Furthermore, perhaps due to uterine wall thickening or excessive amounts of the hormone progesterone, the uterine muscles are unable to contract effectively. It is, therefore, unable to remove the fluids and bacteria that have built up inside the uterus.

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White blood cells (WBCs), which typically protect against infection by destroying bacteria, are prevented from accessing the uterus while it is in estrus. Whether or not the cervix stays open determines the clinical symptoms. If there is an open cervix, the pus will leak from the uterus to the outside via the vaginal canal. Pus or an abnormal discharge, is frequently noticed on the hair or skin beneath the tail, as well as on bedding and furnishings in which the animal has previously lain. Anorexia, fatigue, fever and sadness are all possible symptoms. If the cervix is closed, pus cannot escape to the outside. It builds up inside the uterus, leading to the abdomen to expand. Toxins are generated and released by the bacteria, which are taken into the bloodstream. Closed pyometra causes dogs to become seriously unwell very quickly. Dogs suffering from closed pyometra become anorexic, sedentary, and depressed with the presence of vomiting or diarrhoea often.

General therapeutic management of pyometra in canines includes the use of antibiotics and fluid therapy along with the oral supplementation of antioxidants and some hormonal combinations like antiprogesterins, prostaglandin F_{2α} and anti-prolactin drugs. However, the ovariohysterectomy is considered as a choice of treatment for pyometra in canine which causes economic loss to the breeder. Hormonal treatment can also significantly affect the fertility and conception rate of the affected female dogs. Therefore, this technique has been designed to retain or maintain the fertility of female dogs so that they can remain fertile even after developing this severe uterine condition, breed naturally, and conceive normally with a regular conception rate.

MATERIALS AND METHODS

The research was carried out in the Veterinary Clinical Complex, Department of Veterinary Gynecology and Obstetrics, College of Veterinary Science and Animal Husbandry, Jabalpur (M.P.), India. For this study, we selected 6 female dogs. Any female dog that showed clinical signs of pyometra was included in the treatment group irrespective of age and breed until 6 female dogs were taken. All cases included the acquisition of informed owner permission. The selection of individual female dog cases was predicated on the manifestation of some or all of the common symptoms associated with pyometra, whereas confirmatory diagnosis is made by ultrasonography and hematological profile.

All the selected female dogs exhibited all or some of the classic pyometra symptoms characterized by anorexia, depression, polyuria, polydipsia, pyrexia, vomiting and purulent discharge from the vagina. All the selected female dogs were suffering from an open type of pyometra, so, there was the continuous

existence of pus discharge from the vagina.

Further, cases of canine pyometra were confirmed by performing trans-abdominal ultrasonography, which showed an enlarged uterine diameter and a uterus filled with anechoic to hypoechoic fluid and uterine content along with the presence of pus pockets.

Reproductive history of selected female dogs: Six female dogs, aged three to ten years, representing various breeds i.e., German Shepherd, Labrador, Saint Bernard, Siberian Husky, Lhasa Apso and Pomeranian, were chosen for this study. All of the dogs had pyometra three to seven weeks after estrus.

Hematology and hematochemical profile: Three mL of blood was aseptically collected from the saphenous vein of all the selected female dogs before the treatment i.e., on day 0, and after the treatment i.e., on day 10. Out of this (3 mL), 1 mL of blood sample was taken with EDTA for hematological parameters i.e., CBC, TLC, DLC, and the remaining 2 mL of blood sample was taken without EDTA for estimation of serum biochemical parameters i.e., BUN, creatinine, SGPT, SGOT and TP.

Four female dogs showed normocytic normochromic anemia, whereas all the female dogs showed neutrophilia with degenerative left shift. Some of the selected dogs suffering from pyometra were also represented with hyperproteinemia and elevated BUN, SGPT, and creatinine.

Pre-flushing therapy: Four cases were anorexic and showed mild normocytic normochromic, non-degenerative anemic condition along with emesis. These cases were first established by using fluid therapy, multivitamin, hematinic syrup, and anti-emetic drugs.

As soon as the pyometra was diagnosed, all the female dogs were medicated with ceftriaxone @ 20 mg/kg body weight once daily, meloxicam @ 0.2 mg/kg body weight once daily, ranitidine @ 0.5 mg/kg body weight once daily and ondansetron @ 0.5 mg/kg body weight once daily.

Vaginoscopic guided flushing methods: The flushing medium selected was a mixture of Lenovo-AP (containing levofloxacin hemihydrate, alpha-tocopherol acetate, and ornidazole solution) with normal saline at a ratio of 50:50 to constitute a 5% povidone-iodine suspension.

The 6 female dogs were premedicated with atropine sulfate @ 0.02 mg/kg body weight and followed by ketamine @ 5 mg/kg body weight. The vaginal area was washed by using water and an antiseptic solution. Lubricant and lignocaine jelly were applied over the vaginoscope (probe), and it was inserted through the

vagina under the guidance of a camera to view the uterine environment (Fig. 1). Now, the pipette's end was fitted with a 50 mL syringe, and normal saline was infused along with a 5% Betadine saline mixture, and at last a 5-10 mL Lenovo –AP solution was infused. The greatest volume introduced into the uterus at any single time was based on the uterine size, and it varied between 20-50 mL (Fig. 2). This overall procedure was performed 3-4 times on alternate days.

Post-flushing case management: Fluid therapy at the rates of maintenance was injected following lavage. Ceftriaxone was also given for 7 days, whereas meloxicam and pheniramine maleate were given after completion of every flushing. For fourteen days following the flush, daily records of the appetite, vital signs, volume, and type of vaginal discharge were noted. Most of the female dogs became normal after 3 days post flushing, but one Labrador showed a vaginal discharge on the 8th day post flushing, which was subsided by one extra flushing.

RESULTS

The therapeutic responses of the vaginoscopic lavage technique in the form of recovery and relapse rate from canine pyometra were studied and the recovery rate was found to be 100% (six out of six dogs) after the completion of the treatment. The relapse rate was assessed based on the recurrence of the pyometra during the period of study and found the lowest percentage of relapse rate, which was 16.66% (one out of six dogs). After the therapy, all six of the animals underwent recovery and returned to normal estrus.

After the completion of flushing protocols, all the female dogs were normal, and there was an absence of vomiting, depression, and vaginal discharge after 14 days. Ultrasonographic examinations were also performed at 0 days (pre-treatment), 7th day, and 14th day, which revealed normal uterine lumen diameter and endometrium thickness with an absence of any pus pocket after the completion of the treatment. On ultrasonographic examination of pyometric dogs, the mean total uterine diameter (mm) on day 0 was 7.16 ± 0.53 which

significantly decreased from day 0 to day 7 and day 14. However, the mean endometrium thickness (mm) of the uterus on day 0 was 4.96 ± 0.36 mm, which also decreased significantly ($p < 0.05$) from day 0 to day 14 in all the treated dogs (Table 1).

Hematological examinations were also performed after 14 days, in which the total leucocyte count was shown to be elevated from the normal range on the day of initiation of treatment. These values decreased significantly from day 0 (pre-treatment) to day 7 and day 14 (post-treatment) in all the treated dogs, whereas 2 dogs showed a slight elevation in serum glutamic oxaloacetic transaminase (SGOT), blood urea nitrogen (BUN), and one dog showed slight anemia. These dogs were further supplemented with renal and hematinic syrup for 15 days. By the 14th day following the flushing, the total leucocyte count had gone back to normal levels in all female dogs.

All the treated female dogs were monitored for 6 months. The inter-estrus interval did not seem to be impacted by this flushing. Treated female dogs showed a normal estrous cycle and were mated every other day starting on the first day of standing heat and at least twice a day thereafter. Three of the total treated female dogs were conceived.

DISCUSSION

Treatment of canine pyometra with vaginoscopy-guided flushing along with the mixture of Lenovo-AP and 5% povidone-iodine saline was effective and safe in reversing the clinical signs and abnormal ultrasonographic appearance of the uterus in all-female dogs. Intra-uterine antibiotics and antiseptics, including povidone-iodine, have been used successfully in treating uterine infections.

Sethi *et al.* (2020) used a mifepristone tablet combination for the management of pyometra in dogs and reported an 87.50% recovery rate with a reduction in uterine lumen diameter and endometrial thickness upon completion of the treatment. The consequences of pyometra are reflected in the hemato-biochemical parameters of the animals. Leucocytosis is typically considered a classical sign in the case of canine pyometra. The marked leucocytosis observed in cases

Table 1. Effect of vaginoscopic guided flushing in the treatment of canine pyometra

Parameters	Endometrial thickness		
	Day 0	Day 7	Day 14
Endometrium thickness (mm)	$4.96^{aA} \pm 0.36$	$3.45^{aB} \pm 0.29$	$1.01^{aC} \pm 0.52$
Total uterine diameter (mm)	$7.16^{aA} \pm 0.53$	$3.70^{bB} \pm 0.65$	$2.58^{cC} \pm 0.49$
Total leucocyte count (TLC)	$16.53^{bA} \pm 1.80$	$13.61^{bB} \pm 1.06$	$12.35^{bB} \pm 1.01$
Blood urea nitrogen (BUN)	$34.13^{aA} \pm 2.41$	$21.55^{aA} \pm 2.40$	$18.98^{aB} \pm 1.83$
Aspartate amino transaminase (AST/SGOT)	$42.26^{bA} \pm 2.51$	$35.66^{bB} \pm 1.71$	$34.85^{bB} \pm 1.73$

Mean values bearing different superscripts (A, B) in a row and (a, b) in a column differ significantly ($p \leq 0.05$)

Vaginoscopy: A tool for canine pyometra



Fig. 1. Insertion of vaginoscope (probe) into the vagina through the vulva



Fig. 2. Infusion of the flushing medium into the vagina

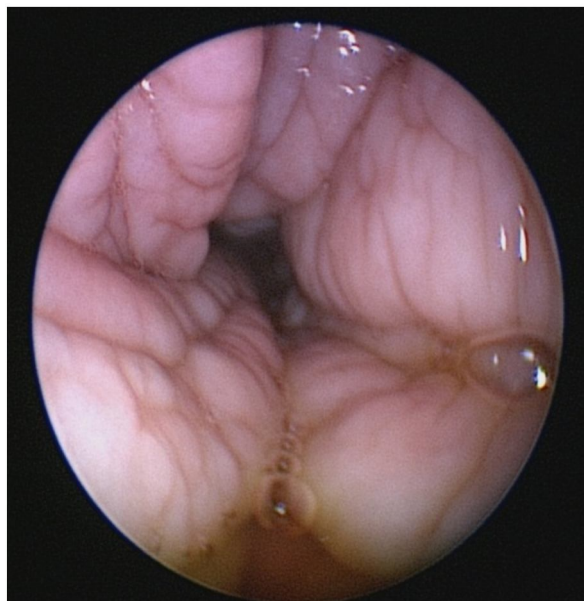


Fig. 3. Luminal view of vaginal wall showing entry of flushing medium

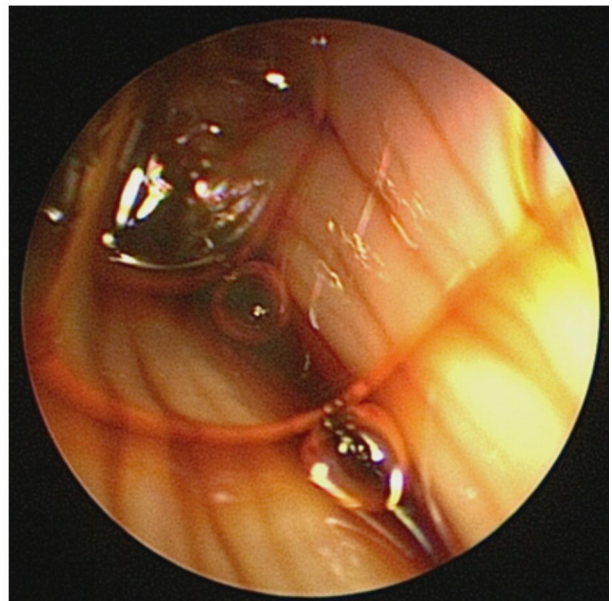


Fig. 4. Internal view of vaginal wall showing the presence of flushing medium

of pyometra is due to bone marrow inflammatory response (Lakshmikanth *et al.*, 2016) and diffused suppurative inflammation within the uterus to combat the infection. Shah *et al.* (2017) reported that elevated BUN levels in pyometric dogs indicate the capacity of kidneys to remove nitrogenous waste from the bloodstream, and a decrease in elevated BUN levels during treatment is indicative of a positive response to the treatment and elimination of toxemia in the affected dogs.

De Cramer (2010) illustrated that the use of evacuation and lavage of the uterus shortened the length of pyometra therapy in female dogs as well as achieved high rates of clinical recuperation and conception. He further concluded that lavage of the pyometra-affected uterus might be a safe substitute for current approaches to curing the condition, leading to quicker recovery times, improved clinical outcomes, and a higher likelihood of conception in canines intended for future breeding.

This study aimed to determine whether vaginoscopy-guided lavage is possibly employed as a secure substitute therapeutic approach for the management of canine pyometra. This study also possibly shortens the treatment duration in addition to achieving high clinical recuperation and gestation rates. The findings of this research demonstrated that the duration of therapy was 7 days or shorter as compared to other hormonal and surgical treatments, and 100% recovery and 0% relapse rates were achieved. This technique can also retain or maintain the fertility of female dogs so that they can remain fertile even after developing this severe uterine condition, breed

naturally, and conceive normally with a regular conception rate.

Conflict of interest: The authors declare that there is no conflict of interest in the study.

Author's Contribution: SC: Conducted research and prepared the original draft; NKB: Involved in the conceptualization, investigation, data generation and reviewed the original draft; SNS: Engaged in conceptualization, data curation and supervision; SJ, JK, SS: Contributed to conducting research.

Ethical Statement: The study does not apply to ethical statements. It governs the protection of animals used for scientific or educational purposes. Good Clinical Practice guidelines for perioperative standard-of-care management of spontaneously sick dogs (including analgesia) were observed, and a written consent form was signed by the owners of the dogs before any clinical diagnostic manoeuvres.

Data availability statement: All the data supporting the research findings have been presented in this paper. The corresponding author is willing to provide the raw data upon reasonable request.

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