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Therapeutic Management of Open Pyometra in Canines

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ABSTRACT: When reproductive activity is desirable, conservative medical treatment is a possibility, but there is a risk of recurrence. The present study was designed to evaluate the efficacy of various treatment protocols for open pyometra in canines. The study was conducted in the Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Anjora, Durg, Chhattisgarh. The suspicion of open pyometra was based upon the history of diestrus, mating without conception 15 days earlier, and clinical signs of inappetence or anorexia, lethargy, polyuria, polydipsia, vomition, nausea, and vulvar discharge were observed. These dogs were divided into 4 groups having 4 animals affected with open pyometra in each group based on different treatment protocols followed for its therapeutic management. The treatment protocol followed for groups I, II, III, and IV were Parentral Antibiotic + Intrauterine flushing, Parentral Antibiotic + Intrauterine flushing + Misoprostol, Parentral Antibiotic + Intrauterine flushing + $PGF_{2\alpha}$ and Parentral Antibiotic + Intrauterine flushing + Misoprostol + $PGF_{2\alpha}$, respectively. The efficacy of treatment protocols was evaluated based on the percentage of animals recovered or unrecovered in groups of different treatment protocols. The treatment response was found to be 100% in all hormonally treated groups and 50 % in the remaining group of open pyometra-affected dogs. It can be concluded that the administration of prostaglandin $F_{2\alpha}$ along with prostaglandin E_1 (misoprostol) resulted in increased uterine contraction with expulsion of uterine contents and cervical dilatation. The recurrence of pyometra was thought to be more in prostaglandin F_2 and E_1 treated dogs due to hormonal imbalance during the estrus cycle.

Keywords: Intrauterine flushing, Parenteral Antibiotic, Misoprostol, $PGF_{2\alpha}$.

INTRODUCTION

Pyometra is considered one of the most common reproductive diseases of bitches, which reveals as life-threatening. Many factors like age, mating, microbial and hormonal, are involved in the pathogenesis of pyometra (Hagman, 2017; Liao *et al*., 2020). Pyometra, resulting from bacterial infection and endogenous or exogenous steroid hormones like, estrogen or progesterone (Sureshkumar *et al.,* 2023). An increase in estrogen concentration during the estrous phase plays a role in enhancing the endometrial response to progesterone, while in diestrus, an increase in progesterone concentration causes an elevation in endometrium proliferation, endometrial glands secretion and a decrease in the contraction of myometrium and cervix (Kumar and Saxena 2018; Limmanont *et al*., 2021). Several complications related to the pyometra *i.e.* peritonitis, cervical stump abscess, hemorrhage, sepsis, swelling of wound, fistulous tract development, uveitis, conjunctivitis, pyelonephritis, urinary tract infection, myocarditis arrhythmia were observed in every affected dog (Jitpean *et al*., 2017; Hagman, 2022). Various treatments including parenteral and intrauterine antimicrobials, antiprogesterone, prostaglandins, and anti- dopaminergic have been used for canine pyometra. Stabilization of the general systemic condition of the bitch followed by ovariosalpingohysterectomy is still the most recommended treatment for pyometra (Santana and Santos, 2021). When reproductive activity is desirable, conservative medical treatment is a possibility, but there is a risk of recurrence (Melandri *et al*., 2019). Therapeutic protocols usually have some common goals: (i) blocking progesterone effects by promoting luteolysis or blocking progesterone receptors; (ii) drainage of the purulent exudate by relaxing the cervix and inducing uterine contractions with prostaglandins or progesterone receptor antagonists; (iii) prevent bacterial growth with antibiotic therapy; and (iv) favor uterine regeneration, by prolonging the anestrus by using mibolerone, an androgen receptor-agonist (Verstegen *et al*., 2008). The

present study was designed to evaluate the efficacy of different treatment protocols for canine open pyometra.

MATERIALS AND METHODS

A. Source of study

Sixteen female dogs with open pyometra of various breeds, ages ranging between 2-12 years, were examined on clinical aspect at Teaching Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Dau Shri Vasudev Chandrakar Kamdhenu University, Anjora, Durg, Chhattisgarh. The suspicion of open pyometra based upon the history of diestrus, mating without conception 15 days earlier and clinical signs of inappetence or anorexia, lethargy, polyuria, polydipsia, vomition, nausea and vulvar discharge was observed for pyometra and further confirmed by transabdominal ultrasonography using a curvilinear transducer with 5-6.5 MHz. These dogs were divided into 4 groups having 4 animals affected with open pyometra in each group based on different treatment protocols followed for its therapeutic management.

B. Treatments protocols

Group I - Four female dogs affected with open pyometra were treated with antibiotic injection of ceftiofur sodium (Xceft) at a dose rate of 4.4 mg/kg body weight subcutaneously for 7-15 days along with intrauterine flushing with 5 ml of Gentamicin and 15 ml of metronidazole. Supportive therapy with intravenous fluid, antiemetic, antipyretic, gastric acid secretion inhibitors and multivitamins were also administered.

Group II - Four female dogs affected with open pyometra were treated with tablet Misoprostol 200 mcg intravaginally for 3 days continuously, antibiotic ceftiofur sodium (X-ceft) at a dose rate of 4.4 mg/kg body weight subcutaneously for 7-15 days along with intrauterine flushing with 5 ml of Gentamicin and 15 ml of metronidazole. Supportive therapy with intravenous fluid, antiemetic, antipyretic, gastric acid secretion inhibitors and multivitamins were also administered.

Group III - Four female dogs affected with open pyometra were treated with injection of prostaglandin (Injection Vetmate) at dose rate of 2 mcg/kg body weight intramuscularly for 3 days continuously, antibiotic ceftiofur sodium (X-ceft) at dose rate of 4.4 mg/kg body weight subcutaneously for 7-15 days along with intrauterine flushing with 5 ml of Gentamicin and 15 ml of metronidazole. Supportive therapy with intravenous fluid, antiemetic, antipyretic, gastric acid secretion inhibitors and multivitamins were also administered. Atropine sulfate (0.04mg/kg) and Meteclopromide (0.5mg/kg) were also administered intramuscularly before prostaglandin injection.

Group IV - Four female dogs affected with open pyometra were treated with injection of prostaglandin (Injection Vetmate) at dose rate of 2 mcg/kg body weight intramuscularly and tablet Misoprostol 200 mcg intravaginally for 3 days continuously, antibiotic Ceftiofur Sodium (X-ceft) at dose rate of 4.4 mg/kg body weight subcutaneously for 7-15 days along with intrauterine flushing with 5 ml of Gentamicin and 15 ml of metronidazole. Supportive therapy with intravenous fluid, antiemetic, antipyretic, gastric acid secretion inhibitors and multivitamins were also administered. Atropine sulfate (0.02 mg/kg) and Meteclopromide (0.5 mg/kg) were also administered intramuscularly before prostaglandin injection.

Following the start of treatment, the animals were daily examined clinically to evaluate treatment response in terms of activity, appetite and vulvar discharge. The assessment of uterine distention was confirmed by follow-up ultrasonography and heamato-biochemical analysis on days 7 and 14 and, if required, on days 30. Attempts were made to contact the owners of the bitches that recovered after various treatments to obtain follow-up data. All the data pertaining to post-treatment return to oestrus, breeding, conception and recurrence were obtained. Therapeutic efficacy was assessed in terms of the return of abnormal parameters to either normal or near-normal values as compared to the untreated control group, the intensity of side effects and post-treatment reproductive status. All bitches in the control group and recurred bitches had undergone ovariohysterectomy

C. Statistical Analysis

The efficacy of treatment protocols was evaluated based on a percentage of animals recovered or unrecovered in groups of different treatment protocols. Therapeutic efficacy was assessed in terms of the return of abnormal parameters to either normal or near-normal values as compared to the untreated control group, the intensity of side effects and post-treatment reproductive status.

RESULTS AND DISCUSSION

The treatment response was found to be 100% in all hormonally treated groups and 50 % in the remaining group of open pyometra-affected dogs as mentioned in Table 1. The recovery was confirmed based on a reduction in the diameter of the uterus as determined by ultrasonography and normalization of hematological and biochemical profiles. In group I, two out of four dogs died due to septicemia. One of the two recovered dogs was mated in the successive estrus resulted in maceration of the fetus, while the other dog after one month of recovery underwent ovariohysterectomy. The uterine drainage and lavage as illustrated in this study was performed in an attempt to shorten the duration of treatment of pyometra in the bitch as well as achieve both high clinical recovery and pregnancy rates post-treatment. In group II, all the dogs recovered successfully with a good prognosis and no recurrence of pyometra in successive estrus. One of the recovered dogs underwent ovariohysterectomy after one month of complete recovery. In group III, all the affected dogs recovered successfully with a fair prognosis. Ovariohysterectomy was advised to all the dogs after one month of complete recovery, to avoid its recurrence. In group IV, all the affected dogs recovered successfully in a short duration of time as compared to groups II and III.

Table 1: therapeutic efficacy of treatment protocols in different groups.

Groups (4 Dogs/Group)	Recovered (No.)	Unrecovered (No.)	Treatment response (%)
Group I	2	0	50
Group II	4	0	100
Group III	4	0	100
Group IV	4	0	100

In group I, the general treatment including the use of antibiotics, and fluid therapy could be helpful. The bitches should be medically stabilized with appropriate intravenous fluid therapy. Fluid therapy is essential to ensure the correction of dehydration, and minimum renal toxic effects (Rautela and Katiyar 2019). The complications associated with septicemia and uremia are common; therefore, attention should also be given to plasma electrolytes and the acid-base status of the animal. No previous reports were found on the use of intra-uterine antiseptics in bitches. The direct antiseptic effect of the flushing medium itself may thus have contributed to its success. The fact that a residual, undetermined amount of flushing medium must have remained in the uterus might have had an osmotic effect and/or irritant post-flushing or lasting antiseptic effect. Likewise, it may be assumed that an undetermined but probably small amount of pus may have remained in the uterus post-flushing. It was very clear that the mixing of the flushing medium in the uterus led to a significant reduction in the viscosity of the exudate. This reduction in viscosity eased the flushing procedure as it progressed but must also have aided in improved drainage. Intrauterine catheters cause mechanical drainage and a reduction in uterine diameter (De Cramer, 2010).

Mechanical stimulation of the uterine wall was supported by a case that was subjected to unilateral drainage of the uterus for a few days. Since drainage took place along and not through the plastic catheters, it is difficult to understand how one catheter could exert its selective effect by facilitating the escape of exudate from the drained horn. A more plausible explanation for the asymmetrical involution of the uterus could be that the catheter stimulated the contraction of the uterine horn either directly or indirectly. It may be speculated in the current study that the flushing medium induces increased motility in the same fashion. The direct irritant properties might also have had a stimulating and rejuvenating effect on the endometrial epithelium. The flushing of the uteri may also have had the effect of releasing endogenous prostaglandins which in turn could have induced luteolysis, uterine motility and expulsion of septic debris, but this was not confirmed in this study.

In group II, Misoprostol given intravaginally is a synthetic analog of natural prostaglandin E_1, the pharmacological action of misoprostol on uterine contractions by increased frequency and amplitude, also causes expulsion of uterine contents and cervical dilatation (Plumb, 2018; Oliveira *et al*., 2023). Misoprostol is used to treat pyometra without side effects when using $PGF_{2\alpha}$, especially when given intravaginal which results in agreement with Romagnoli (2017) and Sharma (2022).

In group III, $PGF_{2\alpha}$ was given subcutaneously after appearing of vaginal discharge led to an acceleration in evacuating of the uterus from the pus due to its uterotonic, luteolytic, and stimulation of the muscle musculature (Hagman, 2023). Further, our findings are in harmony with many papers associated with the efficacy of $PGF_{2\alpha}$ in treating pyometra in dogs (Jena *et al.*, 2013; Shah *et al.*, 2016; Hagman, 2018; Rodrigues *et al.,* 2021). Prostaglandin F2α (PGF2α) facilitates smooth muscle contraction in the uterine wall leading to expulsion of uterine contents in cases of pyometra. It is this expulsion of uterine contents that is suspected to be responsible in part for recovery. The duration of prostaglandin administration is thus dictated by the uterine dimension, the time it takes for vaginal discharges to subside and ultimately by the return of the White blood cell count to normal and the patient to clinical normality (De Cramer *et al*., 2010).

In group IV, a combination of prostaglandin $F_{2\alpha}$ along with misoprostol was used in animals with apparently fair body conditions even after being affected with pyometra. It resulted in a contraction in the uterine wall and expulsion of pus mixed uterine content in a shorter course of time with the effective recovery of the all clinical cases of open pyometra.

CONCLUSIONS

It can be concluded that the administration of prostaglandin $F_{2\alpha}$ along with prostaglandin E_1 (misoprostol) resulted in increased uterine contraction with expulsion of uterine contents and cervical dilatation in a shorter duration of time. The recurrence of pyometra was thought to be more in prostaglandin F_2 and E_1 treated dogs due to comparatively more hormonal manipulation during the estrus cycle, but recovery was quite effective.

Conflict of Interest. None.

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