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Clinical-Surgical Management of Closed Cervix Canine Pyometra: Clinical Case Report

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ABSTRACT

Pyometra is a bacterial infection with an accumulation of purulent exudate within the uterine lumen in intact female dogs. The diagnosis of this disease is made from the history, clinical and gynecological examinations, blood analyses, and ultrasonography of the abdomen. In this report, the clinical-surgical management of three cases of closed cervix pyometra is described. Three intact adult female dogs were presented to the veterinary emergency service because of general malaise, lack of appetite, and vomiting. The bitches showed estrus at least 3 weeks before the consultation, without vaginal discharge during this time. On clinical examination, the patients showed dehydration and apathy. Hematology, blood chemistry, and ultrasound were performed to confirm pyometra. Medical history, clinical, hematologic and chemistry findings, and abdominal ultrasonography were all consistent with a diagnosis of closed cervix canine Pyometra. Determinations of C-reactive protein were important to know the severity of inflammatory response before and post-surgery. Moreover, intraabdominal use of physiologic saline solution plus metronidazole and amoxicillin prevents secondary infections and decreases the inflammatory response. It concludes that the present report describes clinical and surgical management of closed cervix pyometra for optimizing monitoring, treatments, and saving the lives of patients with this disease.

Key words: Closed cervix, Female dog, Hematology, Uterine inflammation.

INTRODUCTION

Pyometra is uterine inflammation with an accumulation of purulent material inside the uterine lumen in intact bitches (Pratschke 2016), and it is associated with bacterial infection that results in systemic disease (Santana and Santos 2021). Despite the pathogenesis of pyometra is not fully understood, it is accepted that it is a hormonal disease especially of the diestrus, when the progesterone values rise to critical levels for the development of infection (Santana and Santos 2021). Some of these risk factors are associated with canine pyometra: middle age to older intact female dogs, bitches 7–8 weeks post estrus, exogenous estrogen therapy, subclinical urinary tract infection, nulliparous female, breed predilection (Collie Shepherd, Rottweiler, Bernese Mountain dog, Golden Retriever), hypoadrenocorticism and diabetes mellitus and endotoxemia (Davidson and Black 2016). One of the main causes of pyometra in bitches is the use of contraceptives (Sala et al. 2021).

Clinically, the bitches may present depression, lethargy, lack of appetite, polydipsia/polyuria, vomiting, dehydration, and abdominal distension (Smith 2006; Davidson and Black 2016). Bitches with pyometra may present prerenal azotemia and signs of dehydration accompanied by hyperproteinemia and hyperglobulinemia. Purulent or sanguine purulent vulvar discharge has been informed in most of the open canine pyometra. However, closed pyometra also occurs with no vulvar discharge seen (Davidson and Black 2016). Fever is not a common sign in the case of open cervix pyometra, but in closed cervix pyometra is commonly associated with fever and toxemia (Rubina et al. 2010). The diagnosis of this disease is made from the history, clinical and gynecological examinations,

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blood analyses and imaging study of the abdominal cavity. Ultrasonography is the diagnostic imaging technique commonly used in suspected pyometra cases, because detecting intrauterine fluid, and it provides important information about the size, morphology and pathological conditions of the uterus (Hagman 2017; 2018).

Ovariohysterectomy is the most effective treatment because the source of bacterial infection is eliminated, and recurrence is prevented, besides, it is an elective surgery for female dogs in which there is no interest in reproduction (Davidson and Black 2016; Hagman 2018). However, determinations of C-reactive protein (CRP) are increasingly used in the evaluation of the postsurgical period in dogs, since it serves as a marker to determine the severity of inflammatory processes and therefore, enable early detection of complications in female dogs undergoing surgery (Devey 2013). Therefore, the clinical-surgical management and the use of C-reactive protein as an inflammatory marker in three cases of pyometra with a closed cervix are described.

Case History

A 12 kg, 9-year-old intact female Cocker spaniel was presented to the veterinary emergency service because of 2 days of general malaise, lack of appetite, and one day of vomiting (case N° 1). The owner manifested that the bitch showed estrus two months before the consultation but was not mated and had not shown vaginal discharge during this time. The owner also reported that the bitch had her health plan up to date. On clinical examination, the patient was depressed, dehydrated (6%), congested palpebral mucous membranes and had hyperthermia (40.1°C). The measurements of heart rate and respiratory rate were normal. Also, the patient had a strong arterial pulse (femoral artery) and the superficial lymph nodes did not show pathological alterations. In a second case, 4-year-old intact bitch Creole was presented to the veterinary emergency with a history of general malaise, apathy and anorexia. According to the owner, the bitch had shown estrus one month ago. However, she had not shown vaginal discharge. Clinical examination revealed dehydration, apathy, hypothermia (36°C), polydipsia, polyuria, congested palpebral and vulvar mucous membranes, increased volume of the abdominal cavity and enlarged popliteal lymph nodes. In a third case, 5-year-old intact bitch Pit Bull breed was presented to the veterinarian with vomiting twenty-four hours ago, general malaise, and anorexia. The bitch had shown estrus three weeks ago and had not shown vaginal discharge. Clinical examination revealed dehydration, fever, and pain in the abdominal cavity. The owners informed the use of injectable progesterone as a contraceptive in the reproductive life of the three bitches. Hematology, blood chemistry and ultrasound were performed to investigate the cases, including pyometra as one of the differentials.

Hematological and biochemistry profiles are shown in Table 1. In case 1, a complete blood cell count revealed moderate leukocytosis with discrete neutrophilia, and decrease hematocrit. Case 2, hematology showed intense leukocytosis with neutrophilia and monocytosis. A serum chemistry panel identified elevated BUN and creatinine. Case 3, hematology showed intense leukocytosis, with neutrophilia and monocytosis, A serum chemistry panel identified elevated BUN. C-reactive protein (CRP) was observed to increase in all three cases. For detail results, see the Table 1.

Table 1: Hematological and biochemistry findings in the three cases of pyometra

Parameters		Clinical cases			References
	Units	1	2	3	values
Hematological findings					
RBC	x 10^{12}/L	5.4	6.1	6.8	5.5-8.5
Hb	g/L	12.3	16.5	16	13-19
Hm	%	37	50	48	39-56
WBC	x 10^{9}/L	18	66.3	21.8	5.8-16
NEU	x 10^{9}/L	14.6	47	17.8	3-11.5
EOS	x 10^{9}/L	0.2	4.5	0.2	0.1-1.2
LIN	x 10^{9}/L	1.1	5.3	1.9	1.4-4.8
MON	x 10^{9}/L	2.1	9.5	1.9	0.2-1.4
PLT	x 10^{9}/L	300	250	180	120-450
Biochemistry findings					
BUN	mg/dL	15	35	32	8-28
CRE	mg/dL	0.91	1.9	1.3	0.4-1.3
ALP	U/L	128	71	36	23-210
ALT	U/L	31	22	18	10-110
CRP [1]	mg/dL	75	95	87	<10
CRP [2]	mg/dL	185	220	199	<10
CRP [3]	mg/dL	25	32	30	<10

Reference values: Jitpean et al. (2017): Hematological findings: WBC: white blood cell count, RBC: red blood cell count, Hb: hemoglobin concentration, Hm: hematocrit, NEU: neutrophils count, EOS: eosinophils count, LIF: lymphocytes count, MON: monocytes count, PLT: platelet count. Biochemistry profile: BUN: blood urea nitrogen, CRE: creatinine, ALP: alkaline phosphatase, ALT: alanine aminotransferase, CRP[1]: C-reactive protein before surgery, CRP[2]: two days after surgery, CRP[3]: eight days after surgery.

Abdominal ultrasonography revealed uterine enlargement compatible with pyometra (Fig. 1). In the three bitches, the ultrasound revealed an enlarged uterus with thickened walls with content of hypoechoic density, compatible with a uterine collection of possible exudative material. It is explained because the pyometra appears sonographically as hypoechoic tubular structures that represent the uterine horns filled with exudative liquid material.

In this sense, acepromazine at a dose of 0.05mg/kg and atropine sulfate at a dose of 0.044 mg per kg were used as pre-anesthetics. Ketamine at a dose of 7mg/kg was used as a general anesthetic. Before surgery, the patients were stabilized with intravenous fluids of Lactate Ringer at a dose of 10mL/kg bwt to correct dehydration. In addition, the patients received intravenous tramadol (tramadol 5%) at a dose of 1mg/kg for three days, and enrofloxacin at a dose of 10mg/kg for 10 days. Before suturing the surgical planes, intra-abdominal washes were performed with 200mL of physiological saline solution + 10mL of metronidazole + 2mL of amoxicillin, to avoid possible post-surgical complications (Devey 2013; Hagman 2018; Marshall et al. 2019). During the first two post-surgery days, bitches received continuous intravenous infusions of Lactate Ringer solution a dose of 10mL per kg bwt, as well as enrofloxacin at dose of 10mg/kg for 10 days. After surgery, bitches were under observation for one week. CRP levels were determined on 2nd and 8th days post-surgery. Increased levels were observed at 2nd day, 185 mg/dL (case 1), 220mg/dL (case 2) and 199mg/dL (case 3), while at 8th day the CRP levels decreased to 25mg/dL (case 1), 32mg/dL

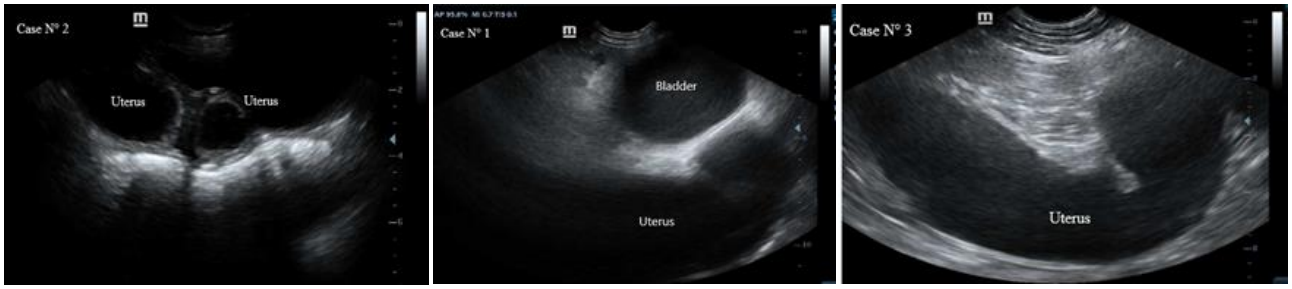

Fig. 1: Abdominal ultrasonography of the three bitches.

Fig. 2: Uterus with pyometra in the three bitches. Ovariohysterectomy was performed according to generally accepted surgical guidelines (Fig. 2).

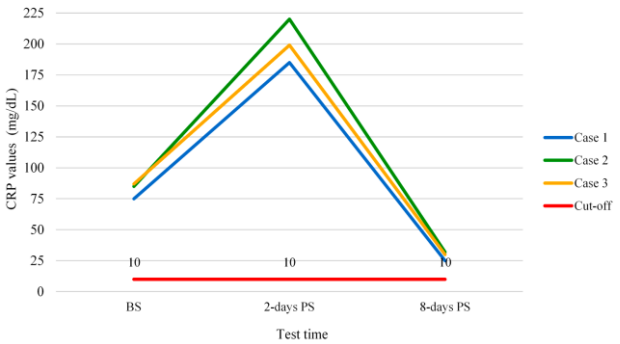

Fig. 3: C-reactive protein values in the three bitches: BS: before surgery, 2-days PS: 2 days post-surgery,8-days PS: 8 days post-surgery.

(case 2) and 30mg/dL (case 3) (Fig. 3). Two weeks after surgery, the three female dogs were recovered satisfactorily.

DISCUSSION

Pyometra is uterine inflammation with an accumulation of purulent material inside the uterine lumen in intact female dogs, associated with bacterial infection (Mattei et al. 2018). History, clinical findings, hematologic and chemistry findings, and abdominal ultrasonography of our cases are all consistent with a diagnosis of closed cervix canine Pyometra. Intact adult bitches after estrus with vomiting, general malaise, dehydration, leukocytosis with neutrophilia, without vaginal discharge, should be suspected in pyometra. The cause of these pyometra is related to the age and reproductive stage in which the bitches are, in addition to the administration of synthetic progesterone as a contraceptive that increases the number of progesterone receptors in the endometrial glands, causing thickening of the endometrium and cystic endometrial hyperplasia.

Removal and prevention of secondary infections are very important, and surgery must be performed to minimize the risk of bacterial sepsis and toxemia. Therefore, the treatment of choice for closed-cervix pyometra is total ovariohysterectomy. However, female dogs that are very sick should be clinically stabilized with intravenous liquids, antibiotics, and analgesics, before surgery (Smith 2006). Thus, perioperative management is very important to maintain hemodynamic function, pain management, and cellular oxygenation (Hagman 2018). In our cases, prior to surgery, patients were treated with intravenous Lactate Ringer solution to correct dehydration and renal dysfunctions, since the medical management (solely pharmacologic) of closed cervix pyometra is not the best choice due to possible complications of the patient's life, because can occur uterine rupture, with the possibility of sepsis and peritonitis (Smith 2006; Hagman 2018). Only pharmacological treatment is justified in young bitches or a patient when the anesthesia could be dangerous, e.g., with serious sickness or when complications by organ dysfunctions compromise the life of the patient (Davidson and Black 2016; Hagman 2018). Determinations of CRP are important to evaluate the severity of inflammatory responses. Therefore, high levels of CRP in female dogs with pyometra prior to surgery can result from the chronic inflammatory response and increased synthesis of CRP in hepatocytes mediated by a proinflammatory substance as interleukins released by activated macrophages (Dabrowski et al. 2009). Thus, concentrations of the CRP increase in sepsis and in complications related to difficult post-surgical wound healing and decrease during postoperative recovery (Hagman 2018). Therefore, determinations of proinflammatory proteins such as CRP are increasingly frequent in evaluating the post-surgical period in canines. This protein acts as a marker of the serious of inflammatory response and permits early detection of complications in patients undergoing surgery

and its possible corrective medication (Dabrowski et al. 2009). In our cases, significant increases were observed in the values of CRP before and two post-surgical days, reflect a severity inflammatory activity in the uterus and the tissue discontinuity by surgery, respectively. However, serum levels of CRP dropped significantly on post-surgery day 8, that indicates the decrease local inflammatory response, stimulation of angiogenesis and correct post-surgery wound healing (Hagman 2018), and therefore it would be useful for the follow-up of bitches undergoing surgery by closed-cervix pyometra. Undoubtedly, the use of enrofloxacin and tramadol, prior the surgery, favored this inflammatory response as has been informed by Dabrowski et al. (2009) who reported after the application of enrofloxacin the surgical wound showed important growth of granulation tissue, and the CRP values in these female dogs decreased progressively. On the other hand, da Silva et al. (2017) reported that the use of tramadol before and after surgery showed good control of pain and inflammation in bitches underwent ovariohysterectomy. Moreover, prior to the closing of the surgical plans, we think that is important to rinse the peritoneal cavity with several milliliters of physiologic saline solution plus 10 mL of metronidazole 0.5% and 2 mL of amoxicillin 20% to prevent secondary infections and decrease the inflammatory response. Thus, our CRP values on day 8 indicate that inflammatory response in female dogs undergoing surgery by pyometra is a good prognostic indicator to permit precocious detection of bacterial infections in postsurgical wounds.

Conclusion

It concludes, this case is an example that serves to see the relationship between inflammatory markers and the evolution of bitches subjected to surgery by pyometra. CPR could be included in the blood chemistry profiles in bitches with closed-neck pyometra to establish prognosis and clinical course after surgery.

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Authors' Contribution

JP, AAFM, RG and AG were involved in the drafting and preparation of the manuscript.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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