

*Review Article*

## **PYOMETRA IN BITCHES: A CRITICAL ANALYSIS**

**\*A Thangamani<sup>1</sup>, M Srinivas<sup>2</sup> and B Chandra Prasad<sup>3</sup>**

<sup>1</sup>M.V.Sc Scholar (ICAR Nominee & JRF), <sup>2</sup>Professor, <sup>3</sup>Assistant Professor,  
Department of Veterinary Gynaecology and Obstetrics  
NTR College of Veterinary Science, Gannavaram, Krishna (dt), Andhra Pradesh-521 102  
E-mail: thangamtamil19@gmail.com (\*Corresponding author)

**Abstract:** Critical evaluation of pyometra in bitches revealed that it is the single largest reproductive disorder in referral cases, its incidence ranges from three year to above seven years of age, and its affects bitches towards or mid diestral stage of estrous cycle. The etiology of the condition continues to be partly understood with continues exposure to progesterone hormone during diestrous in intact sexually mature bitches, progesterone dominant phase coupled with bacterial infection of uterus appears to be the precipitating factors. In most studies open pyometra was prevalent and postulated to be because of uterine infection keep the cervical canal open. During recent years it has been mentioned that due to severe uterine infection and toxemia blood parameters evaluating liver and kidney function tests can be used as prognostic indicators for the future outcome of pyometra affected bitches. Diagnostic evaluation of the pyometra continues to be Ultrasonography and Radiography. The success of management of the condition lies in the correct and timely diagnosis of condition and early referral to referral centers. In cases young bitches presented within 3-4 days of the problem diagnosed, for maintaining the future reproductive potential medical therapy is often successful in correction of the problem failing which pan hysterectomy should be performed, immediately. Toxaemia and anaemia is observed in many bitches post-surgically and can be managed by fluid therapy, haematinics and higher antibiotic therapy intravenously. Management of general clinical condition of the patient is of utmost significance for the bitch survival. It was concluded that liver and kidney function test can forecasting the outcome of pyometra and early presentation to referral centers culminating in successful either medical or surgical management of the condition with high bitch survival.

**Keywords:** Bitch, Clinical pathology, Medical therapy, Panhysterectomy, Pyometra.

## **INTRODUCTION**

Pyometra in bitches usually occurs in a diestrous phase of estrous cycle and is defined as the hormonally mediated diestral reproductive disorders (Smith, 2006). It is bacterial infection of the uterus in intact, sexually mature bitches, culminate to accumulation of purulent material in the uterine horn (Prasad et al., 2017). Approximately one third of the diestrous bitches can be diagnosed with pyometra. The mucopurulent (or) serosanguineous malodorous discharges through vagina (*open pyometra*). Less commonly the cervix closed and cause *closed cervix pyometra*. Pyometra is one of the complicated reproductive disorder in bitches culminating in death of the patient. Because of the rapidity of septicaemia and

toxaemia with systemic inflammatory response syndrome that develop, pyometra must be considered as emergency. Pyometra can result into toxaemia if left untreated (Smith, 2006). A rare case of pyometra in a bitch with heart failure (Pelander et al., 2008). Pyometra is considered to be a more frequent reproductive disorder in bitches compared to cat (Smith, 2006). Here we analyse the incidence & signalment, etiology, clinical sign, clinical pathology and nature of pyometra and management of pyometra in bitches.

**INCIDENCE AND SIGNALMENT:** The incidence of pyometra is considered to be higher in bitches although most reported data originate from clinical records and less records from breeder at organized kennels, that may be due to utilization of bitches for every estrous cycle for breeding followed by special care with immunization, deworming, health control management. Data involving clinical cases report that pyometra is considered to be the single largest diestral reproductive disorders in bitches with an incidence as high as from three year to above seven years of age.

The age of the bitches diagnosed with reproductive disorder like pyometra ranges from young as 4 months of age to 16 years old (Baithalu, 2010). More often observed in aged and most frequently in 7-8 years of age and an increased incidence in Nulliparous bitches and moreover in bitches greater than 4 years of age (Pretzer, 2008). Some breeds are predisposed for pyometra such as Retriever, Terrier, Saint Bernard, Rottweiler dog (Antonov et al., 2015). However no association between breed of dog for incidence of pyometra (Martins et al., 2015). There was an association between nulliparity and pyometra (Contri et al., 2014).

**ETIOLOGY:** The exact etiology of a higher incidence of pyometra in bitches continuous to be poorly understood. Exogenous estrogens therapy for misalliance and progesterone therapy for estrus suppression have been associated with increased risk for pyometra; moreover Progesterone has been shown to stimulate endometrial glandular secretion followed by suppress contractions of the uterus, thus creating an intrauterine environment make susceptible to bacterial growth. Moreover Nulliparous bitches are highly prone for pyometra (Smith, 2006)

**NATURE OF PYOMETRA:** A non-pregnant intact uterine horn may affected with bacterial infection at mid to late diestrous, at end of diestrous, or sometimes towards anestrous. The horn may be involved either right (or) left (or) both. The point of cervix can be open and discharge was oozed out through vagina is malodorous, sanguineous to mucopurulent in nature (Feldman et al., 2004). Pyometra generally occurs at late diestrous and towards anestrous in bitches and accumulation of pus in the right side of the uterine horn (or) both.

Open cervix pyometra is common in bitches although in one study closed type of pyometra was predominant and it particularly dangerous, because rapidity of septicaemia and toxemia and if left untreated can result in death of bitch (Smith, 2006). A preponderance of open cervix pyometra in bitches is postulated to be because of the infected uterus keep the cervical canal open.

**CLINICAL SIGNS:** The usual clinical signs are the onset of gradual inappetance to anorexia and frequent vomiting more common in severely ill patients (Jitpean et al., 2014). The common features recorded in open cervix pyometra affected animals were polyuria, polydipsia, malodours and sanguineous to mucopurulent vaginal discharge (Feldman et al., 2004). The other commonly encountered clinical signs are abdominal pain, fever, congested mucous membranes and sternal recumbency (Ros et al, 2014; Ukwueze et al, 2014). The clinical signs of endotoxaemia may be evident depending upon the severity of pyometra and progression towards systemic inflammatory response syndrome (SIRS).

**CLINICAL PATHOLOGY:** The pathophysiological alteration (haematology and serum biochemistry) that occur following pyometra have been recently reviewed (Prasad et al., 2017). These alterations have been proposed to be used as prognostic indicators for pyometra (Prasad et al., 2017). A brief mention is made of a few of the recorded parameters.

***Uterine changes:*** Infection of the uterus followed by accumulation of pus causes distension of uterine horn. Inflammatory changes of uterus can cause loss of wall elasticity and gradually distended from their normal size. Macroscopically following pyometra of the uterus, the colour of the uterine wall changes from rose-pink to purple to gray; indicating the progressive metabolic deterioration of the uterus. The damage to the uterus and systemic status can be accessed from plasma and serum indicators, viz. blood urea nitrogen (BUN), creatinine and plasma proteins (Prasad et al., 2017).

***Blood components:*** Clinical studies on the haematology and blood biochemistry of pyometra affected bitches have shown marginal differences (Prasad et al., 2017, Verstegen et al., 2008). Pyometra affected bitches suffer from non-regenerative anaemia, which was either normocytic normochromic (or) microcytic hypochromic anaemia (Schepper et al., 1987) due to accumulation of metabolic waste products (or) diapedesis of erythrocyte into uterine lumen and toxic depression of bone marrow (Janja et al., 2006). The leukogram of these bitches reveals neutrophilia of which up to 35% were band cells (Verstegen et al., 2008), which indicated the severity of inflammation and suppurative nature of the disease (Greene, 2006). Moreover leukopaenia associated with pyometra yields a very poor prognosis (Hagman et al.,

2006). The altered haematological parameters such as total leukocyte with neutrophilia can be assumed to return to their normal ranges by 7 to 14 days after panhysterectomy (Debrowski and Wawron, 2014). The increase in albumin and globulins was attributed by dehydration and chronic antigenic stimulation of the immune system; moreover hyper gammaglobulinaemia and hypoalbuminaemia were documented in bitches affected with pyometra (Ravishankar et al., 2004)

**Liver and Kidney functions:** Following pyometra and after correction by medical (or) surgical treatment, the activities of Alanine amino Transferase (ALT), Aspartate amino Transferase (AST), Gamma Glutamyl Transferase (GGT) are increased (Schepper et al., 1987, Debrowski and Wawron, 2014). The elevated levels of serum enzymes return to their respective reference values after medical (or) panhysterectomy (Patil et al., 2013, Colombo et al., 1988). At the time of presentation of a pyometra cases, a substantial increase in plasma urea and creatinine indicate poor prognosis (Prasad et al., 2017). Moreover, the presence of a stress-induced decrease in blood flow to kidneys, shock, dehydration and nephropathy resulting from toxemia due to accumulation of purulent material in the uterine lumen may cause acute (or) chronic renal insufficiency, leading to decrease in the BUN, creatinine elimination (Wheaton et al., 1989).

**Markers:** The valuable markers for predicting the early renal damage was *Gamma Glutamyl transpeptidase, N-acetyl B-D Glucosaminidase and B-Glucuronidase*. These markers were significantly higher in dog with renal damage associated with pyometra and reliable test for assessing the early renal damage than other plasma indicators (Palacio et al., 1997). *Urine protein and creatinine ratio* exceeding 1.0 indicates renal damage (Maddens et al., 2011). It can be concluded that haematology and biochemical status must be carried out to prognosticate the time of hospitalization and post-operative care (Martins et al., 2015).

## **DIAGNOSIS:**

**I) Tentative diagnosis:** Diagnosis is easy when the abnormal symptoms appears during diestrous (or) towards anestrus period. A typical history of a case of pyometra will indicate that the animal decreased in feed intake, dehydration, sero-sanguineous to mucopurulent vaginal discharge (Feldman et al., 2004).

**II) Confirmatory diagnosis:** Radiography might be used as an aid in diagnosing pyometra in bitches, but not frequently conclusive because through radiograph other simulate reproductive problems can't be differentiate. A sausage like fluid filled tubular organ placed under the descending colon and visualised through radiograph (Bigliardi et al., 2004). The

diagnosis of pyometra was best made with the aid of B-mode Ultrasonography with a 5 MHZ transducer when compared to radiograph. Findings through USG typically included an enlarged uterus with convoluted, tubular structure of horn filled with anechoic to hypoechoic fluid often presenting flocculation (Matton and Nyland, 1995).

## **TREATMENT**

Medical treatment of pyometra with compounds promoting expulsion of the uterine content, in combination with higher antibiotics can be tried based on the young future breeding bitches with early presentation followed by status of uterus and the general condition of the bitch (Funkquist et al., 1983). Prostaglandins or its analogues therapy was evoked for young bitches early presentation with open pyometra (Gobello et al., 2003). Drainage/ evacuation of intra-uterine content was tried as a treatment modality of choice for pyometra in bitches. But, this was considered to result in high rate of recurrence (Nelson and Feldman, 1986). High rate of recurrence was recorded in pyometra with medical management in bitches (Carroll, 2003). Medical management of closed cervix type pyometra was inadvisable due to potential life threatening complications (Risso et al., 2004) and it did not bring about any expected therapeutic result and therefore panhysterectomy was only the treatment modality of choice for pyometra in bitches (Dabrowski and Wawron, 2014). Several practitioners tried medical management with drugs such as Aglepristone, Cloprostenol sodium, higher antibiotics Amoxicillin-clavulanate with dopaminergic agonist (anti-prolactin), Cabergoline (Fieni et al., 2014; Stone et al., 1988; Johnston et al., 2001).

Panhysterectomy, was most often practiced by the small animal practitioners for pyometra after stabilization by administration of intravenous fluids and broad-spectrum higher antibiotics. This was deemed as recommended treatment in all bitches without significant reproductive value, or when the owner had not willing to breed the bitch. Due to the harmful nature of the disease and uncertain clinical signs, patients were often admitted in poor condition for anaesthesia and surgery. Kidney function tests and liver enzymes were recommended to be evaluated to prognosticate the condition of the animal. Seriously ill bitches with pyometra could be managed with appropriate systemic intravenous fluid therapy and broad spectrum antibiotics prior to panhysterectomy (Smith, 2006). The common post-surgical complication includes, *acute peritonitis (ruptured uterus, spillage of uterine content)*, *urinary tract infection*, *stump pyometra*.

## Conclusion

Based on published data it appears that pyometra is the single largest reproductive disorder in bitches during diestrus or towards anestrus. It appears to originate because of continuous exposure to progesterone hormone during diestrus in intact sexually mature bitches, progesterone dominant phase coupled with bacterial infection of uterus appears to be the precipitating factors. Liver and kidney function tests can be used as prognostic indicators for the future outcome of pyometra affected bitches and early presentation to referral centers culminating in successful either medical or surgical management of the condition with high bitch survival.

## References

- [1] Antonov AL, Atanasov AS, Fasulkov IR, et al. (2015). Influence of some factors on the incidence of pyometra in the bitch. *Bulgarian Journal of Veterinary Medicine*; 18(4): 367–72p.
- [2] Baithalu RK, Maharana BR, Mishra C, et al. (2010). Canine pyometra. *Veterinary World*; 3(7): 340–42p.
- [3] Bigliardi E, Parmigiani E, Cavirani S, et al. (2004). Ultrasonography and cystic hyperplasia–pyometra complex in the bitch. *Reproduction of Domestic Animals*; 39:136–40p.
- [4] Carroll GL. (2003). Anaesthesia and Analgesia for the Trauma or Shock Patient. In: *Textbook of Small Animal Surgery, Vol 2(3)*. Netherlands: Elsevier, 2538–45p.
- [5] Dabrowski R, Wawron W. (2014). Acute phase response in monitoring postoperative recovery in bitches after ovariohysterectomy. *Ann Anim Sci*; 14(2): 287–95p.
- [6] Feldman EC, Nelson RW, Kersey R. (2004). Cystic endometrial hyperplasia/pyometra complex. In: *Canine and feline endocrinology and reproduction*. USA: WB Saunders Co.; 852–67p.
- [7] Fieni F, Topie E, Gogny A. (2014). Medical Treatment for Pyometra in Dogs. *Reproduction of Domestic Animals*. 49(2): 28–32p.
- [8] Funkquist B, Lagerstedt AS, Linde C, et al. (1983). Intra-uterine drainage for treatment of pyometra in the bitch. *Journal of Veterinary Medicine Series A*. 30: 72–80p.
- [9] Hagman R, Kindah IH, Lagerstedt AS. (2006). Pyometra in Bitches Induces Elevated Plasma Endotoxin and Prostaglandin F<sub>2α</sub> Metabolite Levels. *Acta Veterinaria Scandinavica*. 47: 55–68p.

- [10] Jitpean S, Holst BS, Emanuelson V, et al. (2014). Outcome of pyometra in female dogs and prediction of peritonitis and postoperative hospitalization in surgically treated cases. *BMC Vet Res.* 10: 6p.
- [11] Johnston SD, Root Kustritz MV, Olson PNS. (2001). *Canine and Feline Theriogenology*. Philadelphia: WB Saunders Co. 168–224p.
- [12] Maddens B, Heiene R, Smets P, et al. (2011). Evaluation of kidney injury in dogs with pyometra based on proteinuria, renal histomorphology, and urinary biomarkers. *J Vet Int Med.* 25(5): 1075–83p.
- [13] Nelson RW, Feldman EC. (1986). Pyometra. *Veterinary Clinics of North America.* 16: 561–76p.
- [14] Palacio J, Liste F, Gascon M. (1997). Enzymuria as an index of renal damage. *The Veterinary Record.* 140: 477–80p.
- [15] Pretzer SD. (2008). Clinical presentation of canine pyometra and mucometra: A review. *Theriogenology.* 70: 359–63p.
- [16] Ravishankar N, Manoharmurli B, Balchandran C, et al. (2004). Haemato-biochemical alterations and pathological changes in canine pyometra. *Ind J Vet Pathol.* 28(1): 14–17p.
- [17] Ros L, Strom H, Hagman R. (2014). A retrospective study of bitches with pyometra, medically treated with Aglepristone. *Theriogenology.* 82: 1281–6p.
- [18] Rubio A, Boyen F, Tas O, et al. (2014). Bacterial colonization of the ovarian bursa in dogs with clinically suspected pyometra and in controls. *Theriogenology.* 30: 1–6p.
- [19] Smith FO. (2006). Canine pyometra. *Theriogenol.* 66: 610–12 p.
- [20] Tanja P, Barbara C, Kristina D, et al. (2006). Haemostasis impairment in bitches with pyometra. *Acta Veterinaria.* 56(5–6): 529–40p.
- [21] Verstegen J, Dhaliwal G, Verstegen-Onclin K. (2008). Mucometra, cystic endometrial hyperplasia, and pyometra in the bitch: advances in treatment and assessment of future reproductive success. *Theriogenology.* 70: 364–74p.