

PYOMETRA: A LIFE-THREATENING REPRODUCTIVE DISORDER IN BITCH

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Abstract: Pyometra is one of the most common and life-threatening reproductive diseases affecting intact (unspayed) female dogs. It is characterized by the accumulation of purulent material within the uterus due to bacterial infection that usually develops during the diestrus phase of the estrous cycle under the influence of progesterone. Although, the disease is commonly diagnosed in middle-aged and older bitches, it can occur at any age after sexual maturity. Early clinical signs are often vague, causing many owners to overlook the condition until it becomes a medical emergency. Prompt diagnosis and treatment greatly improve survival, whereas delayed intervention may lead to septicaemia, kidney dysfunction, shock, and death. This article discusses the causes, risk factors, clinical signs, diagnosis, treatment, and preventive measures of pyometra in simple language to improve awareness among veterinarians and dog owners.

Keywords: Bitch, *Escherichia coli*, ovario-hysterectomy, progesterone, pyometra.

Introduction

Dogs are cherished companions, and maintaining their health is an important responsibility of every pet owner. Among the reproductive disorders affecting female dogs, pyometra is one of the most serious because it can develop rapidly and become life-threatening within a short period (Prasad *et al.*, 2018). Pyometra is a severe uterine infection that commonly affects unspayed female dogs, usually developing within one to four months after their heat cycle (Smith, 2006). Even with current therapeutic approaches, about 4% of affected dogs do not survive, largely because of associated kidney damage (Prasad *et al.*, 2018).

What is Pyometra?

Pyometra refers to the collection of purulent exudates within the uterus of unspayed bitches and usually occurs during or soon after the period when progesterone is the predominant reproductive hormone (Baithalu *et al.*, 2010; Pretzer, 2008). It is one of the most common reproductive disorders in female dogs and occurs in two forms: open-cervix and closed-cervix pyometra (Baithalu *et al.*, 2010; Kempisty *et al.*, 2013). Among the two forms, closed-cervix pyometra represents the more critical condition, as delayed intervention may rapidly result in

systemic infection, toxemia, and death (Prasad *et al.*, 2018; Pretzer, 2008). Although uncommon, stump pyometra can occur after ovariohysterectomy when a portion of the uterine tissue remains following surgery (Smith, 2006).

Causes and Risk Factors:

Pyometra develops because of the combined effects of hormones and bacterial infection (Domrazek *et al.*, 2026; Gogoi *et al.*, 2026; Karabolovski *et al.*, 2023). Continuous cyclic exposure to estrogen followed by sustained progesterone activity induces uterine changes that predispose bitches to pyometra (Krekeler and Hollinshead, 2023; Smith, 2006). Progesterone is recognized as the key hormonal driver for the pathological changes of pyometra (Gogoi *et al.*, 2026; Karabolovski *et al.*, 2023). Extended progesterone activity during diestrus predisposes the uterus to cystic endometrial hyperplasia (CEH) and subsequent pyometra (Rebordao *et al.*, 2017). CEH is an acute or chronic uterine disorder that develops during diestrus in adult bitches and is characterized by excessive growth of the endometrium with inflammatory cell infiltration extending into the uterine wall (Kempisty *et al.*, 2013). Ascending vaginal bacteria readily colonize the compromised uterus and multiply within the accumulated glandular secretions (Verstegen and Verstegen, 2006).

The bacteria responsible usually originate from the normal vaginal flora, with *Escherichia coli* being the organism most frequently isolated from affected dogs whether it is open or closed (Baithalu *et al.*, 2010; Kempisty *et al.*, 2013; Rebordao *et al.*, 2017; Renton *et al.*, 1971; Tyson *et al.*, 2026). While *Escherichia coli* is primarily a normal intestinal bacterium, certain pathogenic strains are capable of causing infections beyond the gastrointestinal tract (Rota *et al.*, 2026). Other bacteria such as *Streptococcus* spp. (Rebordao *et al.*, 2017), *Proteus* spp. and *Salmonella* spp. (Renton *et al.*, 1971) have also been reported.

Clinical Signs:

The clinical signs of pyometra vary depending on the severity of infection and whether the cervix is open or closed. Common clinical signs include vaginal discharge, loss of appetite, lethargy, increased urination (polyuria), excessive thirst (polydipsia), vomiting, and fever, which may progress to hypothermia in severe cases (Baithalu *et al.*, 2010; Smith, 2006; Verstegen and Verstegen, 2006). These changes occur because pyometra affects not only the uterus but also vital organs such as the kidneys.

Bitches with open pyometra commonly show purulent vaginal discharge, whereas closed pyometra is often associated with pronounced abdominal distension and no visible discharge (Renton *et al.*, 1971; Verstegen and Verstegen, 2006). These dogs often become seriously ill

within a short time and may present with abdominal enlargement, severe depression, septicemia, or even shock, making this form a true veterinary emergency (Verstegen and Verstegen, 2006).

Diagnosis:

Vaginal cytology typically reveals large numbers of neutrophils, many of which show degenerative changes in bitches affected with pyometra (Pretzer, 2008).

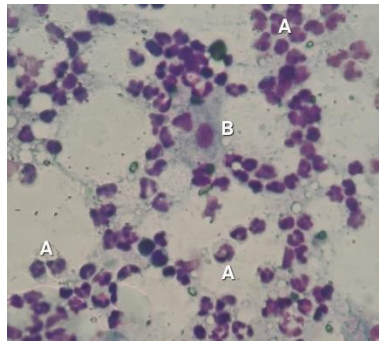


Fig. 1. Vaginal cytology of a bitch indicating large number of neutrophils (A: Neutrophil, B: Intermediate cell)

Bitches with pyometra exhibited a significant decline in packed cell volume (PCV), haemoglobin (Hb), total erythrocyte count (TEC), lymphocytes, and monocytes, accompanied by a marked increase in total leucocyte count (TLC) and neutrophils. The decreased PCV suggested regenerative anaemia in affected animals (Maharathi *et al.*, 2020). Anaemia observed in dogs with pyometra is primarily attributed to bone marrow suppression caused by bacterial toxins and the loss of erythrocytes into the uterine lumen (Maharathi *et al.*, 2020; Prasad *et al.*, 2018). It is also associated with significant biochemical alterations, including increased blood urea nitrogen (BUN), creatinine, total protein, and hepatic enzyme activities such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) (Chitra, 2025).

Pyometra is most accurately diagnosed using ultrasonographic and radiographic examinations. Ultrasonography reveals a fluid-filled uterus with variable wall thickness and proliferative changes (Smith, 2006). The uterus usually appears as convoluted tubular horns with a relatively thick, hypoechoic wall and homogeneous anechoic to hypoechoic luminal fluid, although small echogenic particles may occasionally be observed (Baithalu *et al.*, 2010). B-mode ultrasonography using a 5 MHz transducer has been reported to be an efficient and reliable technique for diagnosing pyometra in bitches (Prasad *et al.*, 2018).

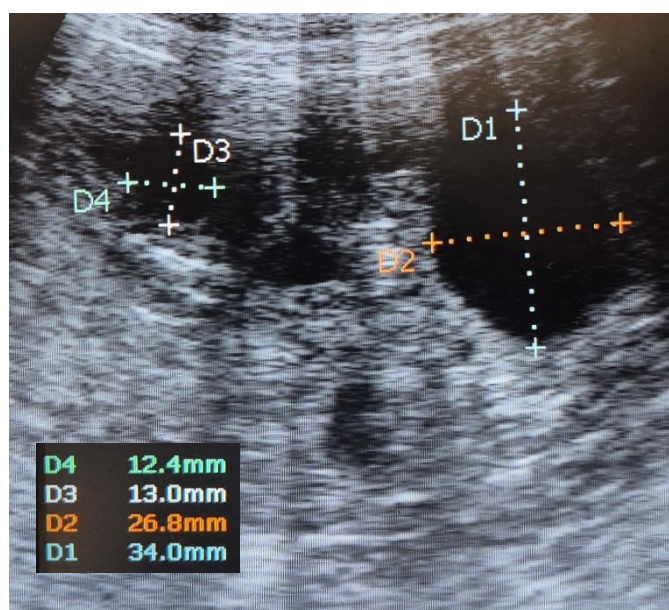


Fig. 2. Ultrasonography showing multiple anechoic pockets of different sizes

On lateral abdominal radiographs, an enlarged fluid-filled uterus typically appears as a sausage-shaped tubular structure located between the urinary bladder and the descending colon (Smith, 2006). This structure is usually seen in the ventral caudal abdomen, where it displaces the intestinal loops dorsally and cranially (Baithalu *et al.*, 2010).

Radiography and ultrasonography confirm uterine enlargement, but early pregnancy cannot be differentiated from pyometra before fetal skeletal calcification at around 42 days of gestation (Memon and Mickelsen, 1993). Radiographic findings differ according to cervical status. In open-cervix pyometra, extensive vaginal drainage of uterine contents may make the uterus difficult to visualize on radiographs (Baithalu *et al.*, 2010).

Treatment:

Ovariohysterectomy, involving the removal of both the uterus and ovaries, is the most widely recommended treatment for pyometra (Baithalu *et al.*, 2010; Fieni *et al.*, 2014; Memon and Mickelsen, 1993; Pitroda *et al.*, 2025); Prasad *et al.*, 2018; Verstegen and Verstegen, 2006; Xavier *et al.*, 2023). Since many dogs present in poor clinical condition, stabilization and management of shock should precede surgery, whenever necessary (Prasad *et al.*, 2018; Smith, 2006; Verstegen and Verstegen, 2006). Antibiotic selection should preferably be based on bacterial culture and antimicrobial susceptibility testing, although broad-spectrum bactericidal drugs effective against *E. coli* are recommended while awaiting the results (Memon and Mickelsen, 1993). Amoxicillin, amoxicillin–clavulanic acid, cephalosporins, and sulfonamides

have shown good clinical efficacy in the treatment of canine pyometra (Verstegen and Verstegen, 2006).

Prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) therapy induces luteolysis and uterine contractions in pyometra, while pretreatment with atropine, prifinium, or metopimazine helps minimize adverse effects (Smith, 2006; Fieni *et al.*, 2014). $PGF_{2\alpha}$ facilitates uterine evacuation by stimulating myometrial contractions and is administered subcutaneously at 0.1–0.25 mg/kg once or twice daily for approximately 3–5 days, or until the uterus is emptied (Memon and Mickelsen, 1993). PGE_2 may be used to dilate the cervix before uterine evacuation, while cabergoline or bromocriptine hastens luteolysis by suppressing prolactin secretion, improving the outcome of medical therapy (Verstegen and Verstegen, 2006). Successful medical management has been achieved using natural $PGF_{2\alpha}$ at a dose of 0.01–0.05 mg/kg, administered 2–5 times daily for 3–7 days, in combination with cabergoline (5 μ g/kg) or bromocriptine (25 μ g/kg) (Verstegen and Verstegen, 2006).

Repeated administration of aglepristone, alone or with low-dose cloprostenol, is an effective medical treatment for both open- and closed-cervix pyometra. As a progesterone receptor antagonist, it blocks progesterone activity in the uterus. However, this approach is suitable only for carefully selected cases and should not be used in bitches with hepatorenal failure or peritonitis (Fieni *et al.*, 2014). Treatment with aglepristone produces superior results when combined with cloprostenol rather than administered alone in dogs with either open- or closed-cervix pyometra (Baithalu *et al.*, 2010). Similarly, misoprostol enhances uterine motility, promoting expulsion of intrauterine exudate, and its adjunctive use with aglepristone has been associated with improved clinical resolution in medically treated bitches with pyometra (Al-Zubaidi *et al.*, 2024).

Medical treatment is associated with a high risk of recurrence, particularly during later diestrus cycles; therefore, breeding is recommended at the first estrus after recovery and in subsequent estrous cycles (Verstegen and Verstegen, 2006).

Prevention:

The most effective way to prevent pyometra is elective spaying before repeated estrous cycles expose the uterus to prolonged hormonal stimulation. Spaying completely eliminates the risk of pyometra and also reduces the occurrence of several other reproductive disorders. Owners of intact female dogs should carefully observe their pets after every heat cycle and seek immediate veterinary attention if signs such as loss of appetite, excessive drinking, vomiting, abdominal enlargement, or abnormal vaginal discharge develop. Hormonal drugs used for

estrus suppression or pregnancy termination should only be administered under veterinary guidance because they may increase the risk of pyometra.

Conclusion:

Pyometra is a life-threatening but preventable disease that demands early recognition and immediate veterinary care. Although it begins as a uterine infection, it can rapidly progress to septicemia, kidney dysfunction, and multiple organ failure if left untreated. Awareness of the early warning signs, prompt diagnosis, and timely treatment can save the lives of affected dogs. For pets not intended for breeding, elective ovariohysterectomy remains the most reliable method of preventing this potentially fatal disease.

Conflict of interest

The authors declare there is no possible conflict of interest.

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