Canine Pyometra

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Introduction

Pyometra is defined as an accumulation of purulent material within the uterus and is a potentially life-threatening condition.[4] It is a relatively common disease among intact bitches and the incidence increases with age.[8] Bitches clinically affected with pyometra have a wide range of presentation from general malaise to severe life threatening septicemia.[4] Therefore, this disease should be considered and ruled out for any sick, intact, sexually mature bitch in spite of the clinical presentation.[3]

Hormonal influence plays an important role in the pathophysiology of this disease and is an important concept to understand in order to accurately rank on a differential diagnosis list. Pyometra can present as either open-cervix, closed-cervix, or in rare cases as a stump pyometra and treatment options include medical management or ovariohysterectomy.[4] Prognosis is influenced based on the type of pyometra present, the time from onset to diagnosis, as well as receiving prompt and appropriate treatment.[4] Pyometra is a clinically significant disease process among intact bitches and it is important to recognize its presentation, pathophysiology, diagnosis, treatment and prognosis.

Pathophysiology

The exact etiology of pyometra is unknown, but the significance of estrogen exposure (endogenous or exogenous) followed by intervals of sustained progesterone levels in intact bitches causes hormonally induced endometrial changes including proliferation and glandular secretion.[3] These hormonally induced endometrial changes are considered to be cumulative, indicating a positive correlation between the percent incidence and increase in age.[9] Overtime, increased endometrial thickness, glandular secretions, and the effects of progesterone inhibiting uterine contractions to expel fluid, predisposes the uterus to a bacterial infection.[3]

While the bitch is in estrus and under the influence of estrogen, the cervix is relaxed and can allow introduction of bacteria into the uterus. As the bitch enters diestrus, the influence of estrogen ceases and progesterone levels increase causing the cervix to tighten and close. Bitches, unlike queens, enter an obligatory diestrus cycle of 2 months duration regardless of pregnancy status.[6] This predisposes them to increased effects from progesterone dominance including increasing uterine glandular secretions as well as inhibition of the myometrial tone and contractility thus preventing expulsion of excess uterine fluid.[9]

Rarely, a stump pyometra can occur in any bitch following ovariohysterectomy. This occurs when complete excision of the ovarian tissue is not achieved during OHE and can allow an accumulation of purulent material in the vestige of the uterine tissue that remains.[4] Treatment with exogenous progesterone or estrogen can predispose to pyometra in these cases.[4] Abdominal exploratory is usually needed to accurately diagnose a stump pyometra and removal of the remaining ovarian and uterine tissue is necessary.[4]

While most cases of pyometra are due to endogenous hormonal influence, exogenous hormonal influence can also incite this disease process.[3] These exogenous cases are most commonly seen when bitches are treated with progesterone or estrogen compounds.[4] Progesterone compounds are administered exogenously to either delay estrus to prevent conception or manage behavioral changes or to prevent premature labor contractions.[3] Estrogen compounds are administered exogenously in the treatment of urinary incontinence.[3]

History and Presentation

Pyometra should be considered and ruled out for any intact, sexually mature female dog that presents with vaginal discharge, abdominal discomfort, or suspected systemic illness. Pyometra is considered a relatively common disease with one article citing an incidence of

15.2% in a group of colony raised beagles greater than 4 years of age[2] while another retrospective study indicated a prevalence of 25% in intact females up to 10 years of age.[8] The incidence of pyometra increases with age with the common presenting patient being greater than 6 years of age.[3] Typically, cases of pyometra present clinically ill during diestrus, 4 to 8 weeks following estrus.[4] Although rarely reported, a previously ovariohysterectomized bitch can develop a form of pyometra referred to as stump pyometra due to an ovarian remnant.[4]

Common clinical signs include lethargy, inappetance, depression, polyuria, polydipsia, vomiting, and diarrhea.[4] As the disease process progresses towards systemic bacteremia and eventual sepsis, clinical signs and mentation will worsen.[5] Physical exam may or may not reveal pyrexia depending on the progression of the disease process at presentation and patients are typically dehydrated.

Pyometra cases may present with purulent vaginal discharge that may be blood-tinged indicating an open-cervix pyometra, or without vaginal discharge indicating a closed-cervix pyometra.[5] Abdominal distension may be present and careful abdominal palpation of a closed-cervix pyometra will reveal an enlarged cervix and uterus while an open-cervix pyometra will have less appreciable changes on palpation.[5] A closed-cervix pyometra is considered an emergency that can quickly progress to a fatal disease process as bacteremia and endotoxemia causes systemic illness.[5] Therefore, a closed-cervix pyometra requires rapid diagnosis and treatment to prevent life-threatening sequelae.[3]

Differential Diagnoses

Pyometra should be included on the differential diagnoses list and ruled out for all intact bitches presenting clinically ill. When pyometra is ranked higher on your differential diagnoses list, other rule outs to include and differentiate between include[5]:

- Pregnancy
- Other diseases causing polydipsia and polyuria including diabetes mellitus, hyperadrenocorticism, and primary renal disease
- Vaginal Disease
- Metritis
- Retained fetal membranes if shortly following parturition
- Hydrometra, which is defined as an accumulation of sterile, watery fluid[7]
- Mucometra, which is defined as an accumulation of sterile intraluminal mucoid fluid[7]
- Hematometra, which is defined as an accumulation of sterile, bloody fluid[7]

Diagnostic Approach and Considerations

After performing a thorough history and physical examination, a minimum database should be performed including a CBC, serum chemistry, and urinalysis. A typical pyometra will cause a left shift neutrophilia with or without toxic changes with a mild normocytic, normochromic, non-regenerative anemia.[5] Other typical abnormalities include hyperglobulinemia, hyperproteinemia, hypoalbuminemia, hypercholesterolemia, an elevated C-reactive protein.[5] Frequently an azotemia with elevated BUN and creatinine is appreciated. ALT and ALP will be increased if septicemic or severely dehydrated, and several electrolyte abnormalities may be present depending on the course and duration of the disease.[5] Urinalysis will reveal isosthenuria, bacteriuria, glucosuria and proteinuria.[5] It is important that the sample collected for urinalysis is retrieved via urinary catheterization or ultrasound-guided cystocentesis of the urinary bladder with extreme caution taken to not puncture the uterus and risk rupture.[5] Free catch sample will commonly be contaminated with vaginal discharge and is therefore less diagnostic and not ideal.

Following a minimum database, cytologic examination of the vulvar discharge can be performed but in itself is not considered diagnostic.[5] In addition to cytologic examination, bacterial culture and sensitivity of the discharge can be submitted to determine appropriate antibiotic selection.[4] Prostaglandin $F_{2\alpha}$ metabolites are frequently increased as well as progesterone concentrations above 2 ng/mL.[5]

Abdominal radiographs may reveal a distended, fluid filled uterus as well as deviation of other abdominal organs.[4] Abdominal ultrasonography will reveal distended uterine horns that are filled with hypo- to hyperechoic fluid that may have thin or thickened walls depending on the amount of distension present.[5] Irregular edges that may be cystic indicated by hypoechoic areas may be present in cases with chronic cystic endometrial hyperplasia (CEH).[5] Imaging modalities can also be utilized to rule out pregnancy as a differential diagnosis. Abdominal ultrasound can detect fetuses 20-24 days post ovulation while abdominal radiographs will reveal fetal ossification at greater than 45 days of gestation.[5]

Treatment and Management

The treatment for pyometra in intact bitches is ovariohysterectomy, ovarian remnant removal with revision of the uterine stump in cases of stump pyometra, or medical management in select cases. Medical management should only be considered in metabolically stable, valuable, breeding animals and is most appropriate for open-cervix pyometra.[4]

Medical management of pyometra includes broad-spectrum antibiotics that are adjusted based on culture and sensitivity results. As most patients presenting with pyometra are dehydrated, hydration status should be restored with intravenous fluid administration and any electrolyte abnormalities or acid-base disturbances should also be addressed medically as needed[1]. Prostaglandins ($PGF_{2\alpha}$) are administered for their ecobolic and luteolytic effects to

decrease progesterone's influence to open the cervix and allow expulsion of uterine fluid.[4] Trans-cervical endoscopic catheterization is a newer non-surgical management technique has been described to facilitate flushing the uterus with warm sterile saline and prostaglandins in select patients.[5] With medical management, owners must be educated on the risk of uterine rupture and subsequent sepsis.[4] Refractory, chronic, or cases unresponsive to medical therapy should have an ovariohysterectomy performed as uterine rupture inciting peritonitis is a potentially fatal sequelae.[4]

Surgical intervention through performing an ovariohysterectomy is the treatment of choice for the majority of pyometra cases. Indications include bitches not intended for breeding, bitches greater then 4 years of age, evidence of CEH, and those patients presenting clinically unwell and requiring immediate emergency care and stabilization measures.[5] Patients should be stabilized prior to surgery to correct dehydration, acid-base abnormalities, and electrolyte abnormalities with intravenous fluid administration and electrolyte supplementation if indicated.[4] Broad-spectrum antibiotics should be started immediately and adjusted according to culture and sensitivity results. Any other abnormalities such as shock, systemic inflammatory response syndrome (SIRS), disseminated intravascular coagulation (DIC), arrhythmias, and endotoxemia must also be addressed if present.[4]

A standard ovariohysterectomy procedure removing the ovaries, uterus, and entire cervix is performed with an incision extension allowing for easier retrieval and removal of the exudate-distended uterus. Great care must be taken to carefully handle the uterus so that rupture and subsequent peritonitis is not incited. Intravenous antibiotics should be started during pre-surgical stabilization in systemically ill patients and further dosing every 90 minutes intra-operatively is recommended to counteract possible bacteremia that may result during manipulation of the

uterus.[1] Saline-soaked laparotomy sponges should be packed into the abdominal cavity to prevent leakage or purulent material from the uterus into the peritoneal cavity.[5] Abdominal lavage with copious amounts of warm sterile saline can be performed and is indicated if peritonitis is confirmed or suspected.[4]

Following surgery, patients should be monitored closely for signs of septicemia and antibiotic selection should be adjusted based off of culture and sensitivity results from the purulent uterine fluid collected and should be continued for a minimum of 14 days.[4] Adequate pain medication should be administered and anti-anxiolytics may be indicated in some patients.[4] An Elizabethan-collar should be worn at all times and activity restriction should be implemented until the incision is deemed healed by a veterinarian 10-14 days post-operatively.

Expected Outcome and Prognosis

Outcome depends on the treatment option selected. If medical management is pursued, there has been a high rate of reoccurrence reported.[4] It is suggested that bitches be bred during their next estrus as a pregnancy decreases the risk of reoccurrence.[5] Ovariohysterectomy should be performed after the desired number of litters has been achieved as pyometra can persist or reoccur in approximately 20% of dogs that undergo medical therapy.[4] In patients that have an ovariohysterectomy performed, the outcome is good as it inhibits the chance for reoccurrence.

Prognosis for survival is good with surgical treatment, with mortality rates as low as 5-8%.[4] Uterine rupture greatly decreases prognosis with a mortality of 57%.[4] Prognosis improves with prompt diagnosis and treatment.

Conclusion

Canine pyometra is a clinically important disease process that requires quick diagnosis and appropriate treatment. It should be considered in any intact, and rarely spayed, bitch that

presents ill. Presentation ranges from general malaise to severe systemic illness depending on the progression of disease. Pyometra can present as an open- or closed-cervix pyometra and in rare cases as a stump pyometra in spayed bitches. Medical management may be chosen in select patients, but ovariohysterectomy is considered the treatment of choice. Prognosis is good in patients that are treated in a timely and appropriate fashion without uterine rupture.

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