THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
June 2024 Vol.4(6), 2211-2214

Popular Article

Pyometra in Female Dogs: What You Need to Know

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https://doi.org/10.5281/zenodo.12208268

Introduction

Canine pyometra is a common life-threatening and serious reproductive illness in unsprayed female dogs. The disease is characterized by accumulation of purulent exudate causing severe uterine infection. If not treated properly or well on time, it can lead to serious systemic illness. This condition usually develops within one to two months after the last heat especially during the luteal phase of the oestrous cycle. Canine pyometra occurs in two forms viz open-cervix pyometra in which pus drains out of the uterus through the cervix, and closed-cervix pyometra, where pus accumulates in the uterus due to closure of cervix, thus resulting in serious complications.

Causes and Risk factors

Pyometra is primarily caused by hormonal changes and also by *Escherichia coli* infection which commonly ascends from vagina to the uterus during estrus when cervix is more relaxed. After a period of heat, female dogs enter the diestrus stage in which progesterone hormone particularly increases which results in thickening of uterine lining so as to prepare the uterus for pregnancy. However, if pregnancy does not occur, the lining continues to thicken after multiple heat cycles leading to cystic endometrial hyperplasia (CEH). This results in increased uterine secretions, creating favorable environment for the growth of bacteria especially *Escherichia coli*. Other factors which contribute to the development of pyometra are failure of leukocytes to enter the uterus during oestrus,

which leads to uncontrolled proliferation of bacteria without immune interference. As the uterus is filled with pus and bacteria, the toxins produced eventually enter the bloodstream causing life threatening effects.

Symptoms

Severity of symptoms primarily depend on the status of cervix i.e. whether open or closed. In case of open cervix creamy or bloody vaginal discharge can be seen. In addition, signs of systemic illness may be encountered in both open and closed cervix which include fever, distended or painful abdomen, in appetency, sluggishness, polydipsia, polyurea, vomition.

Complications associated with closed canine pyometra

Closed canine pyometra is usually severe as compared to the open-cervix pyometra. Since, the cervix is closed, which leads to the failure of pus to drain out of the uterus thus resulting in more serious complications and rapid disease progression. Complications of Closed-Cervix Pyometra include:

Peritonitis occurs due to the rupture of uterus which results in pus spillage in the abdominal cavity, causing septic peritonitis. This condition can be life-threatening if not treated with immediate surgical intervention.

Endotoxemia and Septicemia may occur due to retained pus and toxins produced by bacteria especially *Escherichia coli*. These toxins eventually enter the bloodstream, leading to extensive inflammatory reactions in various organs especially kidneys and liver causing fatal effects.

Since, lack of any observable vaginal discharge in dogs with closed-cervix pyometra delays the diagnosis, this allows establishment of fatal systemic illness. Under extreme circumstances dogs may be presented with signs of shock which include dehydration, unconsciousness, pale gums, and finally collapse. In such cases prompt fluid therapy and supportive care is imperative.

Diagnosis

Diagnosis of canine pyometra is based on clinical signs, history of latest estrus, hemato-biochemical parameters, vaginal cytology and diagnostic imaging like X-rays and ultrasound which could image distended fluid-filled uterus.

Significant Haemato-biochemical alterations resulting from systemic inflammatory response and organ dysfunction can may be seen in canine pyometra. These changes help in the proper diagnosis and management of pyometra.

Commonly encountered haemato-biochemical alterations include:

Anemia: Mild normocytic, normochromic anemia due to inflammation and bone marrow suppression

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Published 19.06.2024

may be seen.

Thrombocytopenia: decreased platelet count, potentially due to disseminated intravascular coagulation (DIC) can also occur.

Leukocytosis/ Leukemoid response: marked increase in white blood cell (WBC) count i.e. upto 50,000 cells/µL, particularly neutrophils, often with a left shift can be observed. This condition often mimics leukemia and typically results from severe infection and inflammation as is seen in canine pyometra. Other changes in neutrophils include Dohle bodies, toxic granulation and cytoplasmic vacuolation indicating a severe inflammatory response. In such cases, in order to combat the infection, bone marrow becomes hyperactive and starts producing and release more bands and metamyelocytes into the circulation. Leukemoid response is driven by the release of certain inflammatory cytokines such as interleukins and tumor necrosis factor-alpha (TNF-α), that stimulate bone marrow. Additionally, endotoxins present in the blood stream exaggerate the response.

Azotemia: Elevated levels of blood urea nitrogen (BUN) and creatinine indicating impaired kidney function, due to the kidney damage caused by bacterial endotoxins.

Electrolyte Imbalances including hyponatremia and hyperkalemia which may can occur due to dehydration and renal dysfunction

Elevated Liver Enzymes: Usually due to the dysfunction of liver and reduced liver perfusion due to septic shock or endotoxemia. This results in Increased alkaline phosphatase (ALP) and alanine transaminase (ALT) levels.

Hyperbilirubinemia: indicates liver dysfunction or hemolysis due to severe infection and systemic illness.

Hyperglobulinemia and Hypoalbuminemia: increased globulin levels are associated with chronic inflammation and immune response against bacterial infection. Lower albumin levels may be outcome of increased vascular permeability and protein loss.

Hyperglycemia or Hypoglycemia: Due to severe sepsis, endotoxemia and stress produced by inflammation, blood glucose levels can be affected.

Vaginal Cytology

Vaginal smears are important diagnostic tools to evaluate nature and severity of canine pyometra. Vaginal smears are prepared by collection of samples from vaginal discharge or vaginal wall using a swab or a cyto-brush. Then smears are stained with Diff-Quik or Wright-Giemsa and examined under a microscope to identify cellular and bacterial components.

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Published 19.06.2024

Vaginal cytological findings in Canine Pyometra include:

Increased number of degenerated neutrophils and bacteria: Increased neutrophils with predominant *Escherichia coli* and other Gram-negative rods can be seen. In addition, Gram-positive cocci like *Staphylococcus* and *Streptococcus* species can also be encountered. Intracellular presence of bacteria in the neutrophils strongly indicate pyometra.

Other cell types include epithelial cells from the wall of vagina or lining of uterus. Presence of intermediate and parabasal cells depends on the stage of the oestrous cycle.

Limitations of vaginal cytology

Presence of neutrophils and bacteria is a nonspecific finding and can be observed in other conditions such as vaginitis. Cytological findings can be affected by stage of estrus cycle in dogs with different epithelial cell types at various stages.

Management and Treatment

In order to resolve the infection, surgical removal of infected uterus and ovaries i.e. ovariohysterectomy is crucial. However, this procedure is quite complex as compared to normal spaying due to prevailing infection and expected post operative complications. So, supportive treatment by antibiotics, anti-inflammatory drugs and fluid therapy are essential part in recovery. In addition, continuous monitoring which involves tracking the clinical signs and regular blood tests for any indications of systemic effects should be done. Timely spaying of female dogs and regular visits to the health professionals are effective preventive measures against canine pyometra.

Prognosis

The prognosis of canine pyometra is usually good following early diagnosis and proper treatment. However, if treatment is delayed, complications such as uterine rupture, peritonitis and generalized septicemia can significantly make the prognosis poor.

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Published 19.06.2024