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Endometritis in bitch: An review

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Abstract
In the last some years, veterinarians are now frequently requested to solve fertility problems in the dogs, mainly due to the increased popularity of purebred dogs as well as for sentimental or financial reasons. Endometritis is one of the very common post-partum/post estrus complication that usually remains unnoticed until the appearance of notifiable clinical sings. Primary sins observed by the clinician is purulent vaginal discharge, may be associated with fever, dehydration, anorexia. Reports have shown that E. coli is the main bacterium associated with it but some case also shows mixed infection of several bacterium. In the case of nursing mother care of puppies also challenging due to dam unable to nurse them or puppies have been isolated due to the antibiotic residue found in dam's milk. History and clinical signs are the first approaches for diagnosis, it is more adventitious to diagnose by the use of modern technique like ultrasonography, ABST and blood picture profile. Antibiotics and ecbolic drugs with supportive therapy give results in most of the case if the patient in stable condition.

Keywords: Endometritis, antibiotics, ecbolic drugs

Introduction
Uterine diseases directly connected with the estrous cycle are an important cause of infertility in carnivorous females, frequently found last few years. Endometritis is the most frequent and complex pathology of uterus in domestic bitches. Metritis is postpartum inflammation of the endometrium of the uterus due to some bacterial infection, most usually occurring within a week after whelping. (Zdunczyk *et al*., 2006; Bigliardi and Pamigiani 2004) [33, 5] Metritis may occurs after an estrus accompanied by mating or If instruments were used to help the puppies deliver, they may have caused an infection and retained placentas or fetuses, these may be causing sepsis, and can be acute or chronic (Orfanou *et al*., 2008) [20]. Uterine infections are consider as emergencies that can be fatal if not treated. Metritis sometimes follows after long or difficult labor. Metritis devloping process involves several immunological changes as well as molecular mechanisms that are responsible for inflammation with hyperplasia in the female uterus. (Sokolowski, 1980) [27, 28] (Nelson and Feldman, 1986) [18]. Hyperplasia of the endometrium is accompanied by a light red or brownish secretion from the reproductive tract of the bitch. The presence of this secretion is a characteristic sign of endometritis, but it depends on the extent of opening in the uterine cervix, and it may not appear in every case. (Bedrica and Sacar 2004; Fransson *et al*. 1997) [4, 10]

Predisposing factor
Bitch having Prolonged delivery, retained placenta and natural or medical abortion associated with the more chance of inserting infection in the uterus because of a prolonged cervix opening persistence.
Dystocia and retained fetuses, requires manual traction or other operation performed on fetus the chances of debris and causative agent to enter to uterus. Infected instruments used in dystocia are gives direct infection to uterus that results into endometritis. After a non-sterile artificial insemination also contribtibute to infection (Orfanou *et al*., 2008) [20].

Etiology
There are many causative bacteria involved likly Streptococci, staphylococci, Proteus spp, are isolated less frequently. As Escherichia coli is the most common bacterium isolated from the affected uterus, by uterine secretion culture. (Johnston *et al*. 1985; Arora *et al*., 2006) [13, 2]

Clinical sings
The first clinical signs is purulent vulvar discharge. Bitches with metritis are usually depressed, with signs of fever, lethargy, dehydration and inappetence, and may neglect their offspring.

Addiction sings vomiting, diarrhea, fast heart rate, panting, aglactia and a purulent fetid reddish to chocolate brown vaginal discharge (pus mixed with blood). Pups may become restless and cry incessantly due to from ingesting toxins passed in the milk, so they should therefore be hand-fed. Any postpartum animal with signs of systemic illness and abnormal vaginal discharge should be considered Metritis. (Tomas Baker *et al*., 2009) [29]. Persistent palpably enlarged uterus even after several day of whelping. (Lack of normal involution). (Orfanou *et al*., 2008; Davidsonand Baker, 2009b) [20, 8].

Diagnostic Criteria

Historical Information-

In general previous history of estrous, matting and dystocia are to be discussed with the owner to find out the more specific diagnosis.

Gender Predisposition

As it well known Intact (non spayed), postpartum female is the only to be affected.

Age/Breed Predisposition

It is not restricted with age because it is the disease only affects the uterus not any other organ much involved.

Laboratory Findings

Hemogram

Hemogram can be normal early in the course of metritis but become anemic in pregnancy and chronic illness case. neutrophilia with left shift (may be degenerative) or neutropenia. Marked neutrophilic leukocytosis with shift to left occurs because pyometra being a severe bacterial infection stimulates bone marrow to release more number of immature neutrophils into the peripheral circulation in an attempt to combat the infection (Fransson *et al*., 1997; Mojzisova *et al*., 2000) [10, 17].

(Groppetti *et al*. 2010) [12]. Anemia of chronic disease can be caused by a variety of disorders including chronic inflammation, in which lactoferrin and other acutephase reactants mediate an iron sequestration within the myeloid cells in the bone marrow, withdrawing iron from the normal erythropoiesis (Nelson and Couto, 1998) [18]

Bio-chemical profile

Hyperproteinemia (Hypoalbuminemia Hyperglobulinemia) in these cases was suggested to be due to acute phase reaction in pyometric bitches (Gayakwad *et al*., 1999 and Singh *et al*., 2006) [11].

Reidun *et al*., 2007 suggested that the cause of hyperglobulinemia, concurrent with hypoalbuminemia was due to renal loss of albumin, but later studies have demonstrated only a mild to moderate urinary protein loss (Sevelius *et al*., 1990) [24] and interpreted the changes in serum proteins as part of an acute phase reaction (Verstegen *et al*., 2008) [30]. Hypoglycemia indicates severely of metritis may indicate sepsis. Coagulopathy in more severely affected dams may indicate sepsis. blood urea nitrogen (BUN) and plasma creatinine indicate about kidney damage (Roberts, 1999) [23]

Vaginal cytology

Cytology of vaginal discharge demonstrates neutrophilic inflammation with both extracellular and intracellular bacteria (septic inflammation). Normal postpartum lochia can be neutrophilic and hemorrhagic but without evidence of sepsis. (Watts and Wright, 1995; Watts *et al*., 1997) [31, 32].

Aerobic and anaerobic culture of the cranial vagina is often taken to get positive result for a single organism rather than normal mixed vaginal flora if taken from caudal vagina.

Other Diagnostic Findings

Abdominal ultrasonography

On abdominal ultrasound anechoic fluid-filled uterine horns seen that don't having any change with period of parturition. Other findings of ultrasound are to be diagnosed as retained placenta or fetus. Some other complication found as evidence of peritonitis that develops due hypoproteinmia (hyper echoic mesentery, ascites). (Davidson and Baker, 2009a) [7].

Radiography

Radiographs is of limited use in this case, should be taken to determine only for whether fetuses is present or not. (Renton *et al*. (1991) and Ayyappan *et al*. (1997) [3]

Diagnostic Differentials from-

- Normal lochia— normal vaginal discharge is not purulent, septic, or malodorous. (Kutzler 2017)
- Sub involution of placental sites—vaginal discharge is hemorrhagic, nonpurulent, and nonseptic (Devender *et al*., 2018)
- Vaginitis, cystitis, urethritis- scant vaginal discharge
- Coagulopathy causing prolonged postpartum hemorrhage- vaginal discharge is hemorrhagic.
- Uterine torsion-"acute abdomen," rapid clinical deterioration, confirmed with ultrasonography.

Uterine rupture/peritonitis-"acute abdomen," rapid clinical deterioration, confirmed with ultra-sonography.

Treatment Recommendations

Initial Treatment

First line of treatment includes with IV fluids to stabilize the patient. IV infusion of antibiotics indicated if the dam is in severe ill. Antibiotic therapy should be based on culture and antibiotic sensitivity testing of the vaginal discharge. But broad-spectrum antibiotics should be initiated immediately if the dam having in critical condition while awaiting culture and sensitivity results. If the dam having normal appetite and relatively stable with subnormal temperature, oral administration of antibiotics can be attempted.

The choice of antibiotics should be based on her status and if dam having nursing puppies with it then antibiotic therapy should be safe for neonates with limited metabolic capabilities. (Watts and Wright, 1995; Watts *et al*., 1997) [31, 32]

Like first-generation cephalosporins (cephalexin 20 mg/kg), potentiated penicillins (amoxicillin with clavulanic acid 12–13.75 mg/kg) considered safe for neonates in many case studies. (MSD manual)Dam nursing is only advised if the dam is in stable condition, responding to the therapy and the neonates continue to thrive. if culture and sensitivity results indicate other antibiotics that are harmful for nursing puppies like fluoroquinolones, then the neonates should be weaned immediately and given supple- mental feeding.

Prostaglandin therapy given to uterine fluid evacuation and for increase uterine defense machnism. (Sokolowski, 1980; Nelson and Feldman, 1982; Meyers-Wallen *et al*., 1986) [27, 28,

[16]. Prostaglandin F2-α most frequently used @ 0.10–0.20 mg/kg Sc.
Oxytocin (5–20 IU, IM, dividing dose) may help evacuate the uterine contents. Oxytocin is unlikely to promote effective uterine evacuation when administered >24-48 hours postpartum. (Smith, 1986) [26]
Ergonovine (0.2 mg/15 kg given once IM) is also an effective ecbolic agent, but may cause rupture of a friable uterine wall. (Magne, 1986; Orfanou *et al*., 2008) [15, 20]

Alternative treatment-
Ovariohysterectomy is last and usually performed when dam health stabilized and if future reproduction is unimportant. (P. W. Concannon and V. N. Meyers-Wallen 1991) [21]

Supportive Treatment-
Anipyratic drugs should be administrated on the basis of regular temperature monitoring like meloxicam @ 10 mg/kg
Antiemetics (metoclopramide: 0.1–0.2 mg/kg Sc or PO bid).it is also safe among other aniemetics for suckling neonates) should be used if nausea and vomiting occurs in side-effect with the use of prostaglandins. (Sing *et al*. 2008) [25]

Patient Monitoring
Over duration the therapy, multiple ultrasonography scanning should be performed to evaluate the size of the uterine horns and fluid content of the uterine lumen.
Continuous monitoring of physical examination to evaluate clinical signs and vital parameters.
Serial blood sample taken on alternate day, to evaluate complete blood count and resolution of biochemical profile.
Daily basis vaginal discharge cytology to evaluate amount and degree of inflammation. (Amstutz *et al*., 1998) [1]

Home Management
- Administration of antibiotics as prescribed, including the complete duration as indicated.
- The use of probiotic supplements considered if diarrhea occurs in association with the use of antibiotics.
- Feedings should be timed and frequency of feeding should be multiple in a day to minimize nausea from prostaglandin administration.
- Good hygiene of the whelping should be maintained regularly basis.
- Neonatal monitoring (daily weight, vigor, and normal behavior) is essential. (Feldman *et al*., 2000) [9]

Treatment Contraindications
- Oxytocin is not very to effective uterine evacuation when administered >24 to 48 hours postpartum.
- Some drugs also can be withdrawal in milk, resulting in toxic level doses to the nurslings. Such nephrotoxic and hepatotoxic drugs should be avoided.

- NSAIDS (immature neonatal renal and hepatic development).
- Aminoglycosides (nephrotoxicity).
- Sulfa drugs (myelotoxicity).
- Chloramphenicol (myelotoxicity).
- Fluoroquinolones (arthropathy).

Prognosis
Favorable Criteria
- Early recognition and intervention.
- Response to antibiotics and other therapeutic agents.
- Return of normal appetite and maternal behavior.
- Normal temperature.

Improvement in normal blood parameters.

Unfavorable Criteria
- Sepsis.
- Fever
- Persistent vaginal discharge
- Peritonitis.
- Fetal or placental retention.
- Concurrent diseases that affecting the immunocompetency of the dam.
- Concurrent mastitis.

Conclusion
In this review physiological, pathological, therapeutic aspect of endometritis were discussed. If endometritis set up in recently parturated bitch treatment of should started as early as possible because it also affect new born. Moreover, the important role of good home management, patient monitoring and with proper treatment is require for favorable recovery.

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