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https://doi.org/10.5281/zenodo.4917307 **Research Article**

DIAGNOSIS AND MEDICATION OF PYOMETRA IN A FEMALE DOG

Healthcare

Keywords: female dog, diagnosis, histopathology, ovariohysterectomy, ultra-zoography.

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Abstract

Pyometra, the purulent inflammation of uterus, is a common disease of genital apparatus of the dog. Diagnosis and treatment of this pathology is object of a lot of studies. Diagnosis is based on history and anamnesis, clinical and lab findings, Ultrasonography and histopathology, as a "gold standard" of it. Thirty-five female dogs (mean 7.6± 1.33 years old) of cross and pure bred, affected by pyometra (open and closed cervix) were diagnosed by ultrasonography and 12 uteri were used for histopathological studies. Pyometra was found out in 57.44% of nulliparous controlled female dogs. Ultrasonographic evaluated shown an enlargement and thickened of horns of uteri, lumen content was homogenous to anechoic/echogenic. Histopathological changes are related to Endometrium and its changes like as enlargement of cystic glands and presence of the pus in lumen of uterus. Ovariohysterectomy were realized in all female dogs. Three of them were euthanized some days after. The study aims to emphasize that ultrasonography and histopathology are the best techniques to diagnose pyometra because of some tests may not be definitive. Ovariohysterectomy is the appropriate, safest, the most effective and immediate medical intervention to save life's animal.

Introduction

The pyometra is one of the most frequent disorders in female dogs of aged over 8 years (Kida et al. 2006). The pathogenesis of the disease is related to the activity of progesterone but the etiological mechanisms and differential diagnosis of pyometra are undefined and its pathogenesis is still unknown (De Bosschere et al. 2001).

Pyometra is usually a silent pathology, with infertility being the main symptom in the early stages of the disease (von Reitzenstein M et al., 2000). The female dogs with pyometra are usually asymptomatic, at this stage. Lab results, abdominal Ultrasonography and Histopathology tools are the valid methods for pyometra diagnosis (Feldman EC et al. 2004). They correlated thoroughly with the history and clinical examination and a single test may not be conclusive (Franson et al., 2004; Gurbulak et al., (2005); Singh et al., (2010); Kumari et al., (2012); Hagman, (2012), Sumathi et al., (2015). Other authors reported that the diagnosis of canine pyometra could be made accurately with ultrasonography (Bigliardi et al., (2004); Baithalu et al., (2010), Jena et al., (2013) Sreenu et al., (2015).

Pyometra is a medical emergency that requires rapid intervention to prevent Sepsis condition. Without treatment, the infection is fatal (F. Fieni et al., 2014).

The aim of this study was to show ultrasonography and histopathologies are the best techniques to diagnose pyometra because of a single tool may not be definitive. Ovariohysterectomy is the right medical intervention to save life's animal.

Materials and Methods

The study was performed in Veterinary Hospital "Pet hospital", and Faculty of Veterinary Medicine, Agricultural University of Tirana, Albania. The study was carried out during January - September 2019.

Thirty-five female dogs from 3-15 years old (mean aged 7.6 ± 1.33 years old) of cross and pure bred, 3 to 16 kg, affected by pyometra (open and closed cervix) were included in the study. All animals, except of physical and lab examinations, were diagnosed by Ultrasonography and Histopathology techniques.

Ultrasonographic Examination: Two-dimensional Ultrasonographic evaluations of the uterus were carried out with a 5-7.6 MHz convex transducer (SIEMENS ACUSONX700 ULTRASOUND MACHINE - 2012 model). The animals were positioned in lateral Recumbency and gently restrained on left or right side. Examined zone was clipped and gel was applied to skin before scanning. Sometimes uterine horns could be seen cranially of the bifurcation of uterus, but their identification is difficult if they aren't enlarged of.

Immediately after ovariohysterectomy, 12 uteri tissue samples were taken from the middle region of each uterine horn. They were fixed in a 10% formalin solution for 12-24 h. Samples were rinsed in some graded alcohol solutions and cleared in xylene. Then tissue samples were paraffinized cut in 5 μm serial histological sections and were stained with Hematoxylin and Eosin (H&E).

All dogs underwent ovariohysterectomy (OHE) under general anesthesia.

Results and Discussion

In the present study the majority of cases have been in the late stages of the disease and with advanced clinical signs (Fig.1).

Fig 1. Pyometra in a female dog with affected symmetric horns

The ultrasonography of female dogs with pyometra revealed an enlarged uterus with tubular horns filled with anechoic to hypoechoic fluid in 83.33 per cent of the cases (M. Llazani et al. 2021).This observation agreed with the findings of Jena et al., (2013) who reported ultrasonography to be conclusive for pyometra in 89.29 % of animals.

Fig. 2. **Fig. 3**

Fig 2. Pyometra in a female dog with thick, irregular and mix echogenic walls. Enlarged ovaries with well-defined hypoechoic areas, with distal acoustic reinforcement.

Fig 3. Uterus filled with mixed echogenicity material, visible bifurcation with hyper and hypoechogenic areas, with irregular wall, horns filled with hypoechoic material, thickened and hyperechoic walls with areas with peritoneal inflammation.

Echography report of female dogs with pyometra shown the luminal contents were echogenic and thick, irregular and hyperechoic walls (Fig. 2). There were present areas with peritoneal inflammation. The horns of uteri were filled with hypo- to hyperechoic material. Sometimes, enlarged ovaries with well-defined hypoechoic areas are seen in Echography (Fig. 2). However, ovaries are usually small, strong, and seemingly normal if viewed.

The presence of intramural cystic glands was not identified in any of the cases presented. This is due to the emergency and clinical condition of the animals.

Involvement of retroperitoneal lymph nodes and increased reactivity of the medial iliac lymph nodes is also observed in many cases (Fig. 3).

Larger dilatation of the uterus, in clinical cases, has also given oppression of the abdominal aorta and it has been associated with hypotension, giving a poor prognosis for the animal.

The ovariohysterectomy performed in female dogs affected with pyometra, confirmed the ultrasonographic findings. These findings closely corroborated with the reports of several previous authors (Bigliardi et al., 2004; Pretzer 2008 and Baithalu et al., 2010).

Our study shows application of ultra-sonography is a very efficient tool in different diseases of uterus, especially in pathological status as pyometra. Diagnosis by ultra-sonography in cervix -close pyometra is an essential technique because of non-clear clinical and physical condition of animal.

Histopathological Examination

The female dogs with pyometra showed some different histological features. The Epithelium of Endometria was composed of columnar cells (Fig 4). Connective tissue was invaded by lymphocytes inflammatory cells and plasma cells (Fig 5). There are enlarged uterine glands in size and number, and they are filled with inflammatory cells. (Fig 6). These findings are referred from other authors (H. De Bosschere et al., 2001; E. C. Feldman et al., 1987). Microscopically, the most significant feature is the enlarged cystic glands (Fig 6).

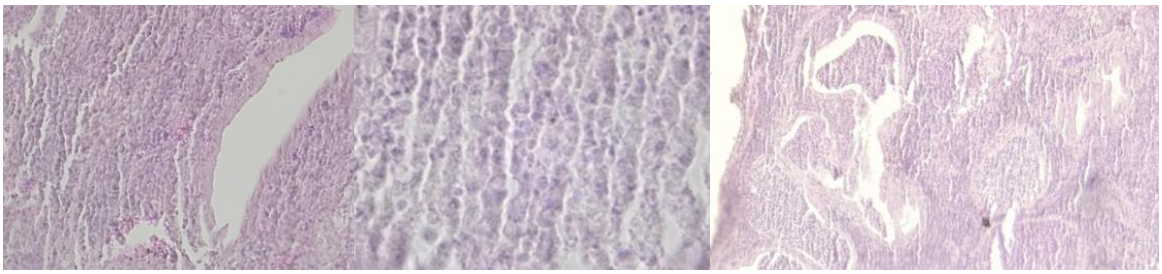

Fig. 4 Fig.5 Fig. 6

Fig. 4. Columnar cell of the Epithelium of Endometria
Fig. 5. Lymphocytes, inflammatory cells and plasma cells invaded connective tissue
Fig. 6. Enlarged uterine glands in size and number, filled with inflammatory cells.

Treatment of Pyometra

A pyometra is a serious infection and requires urgent surgery to remove the infected uterus. Surgical treatment, Ovariohysterectomy is safest and most effective because the source of infection and bacterial products are removed and recurrence prevented (Hardy R.M. et al., 1974) (Fig 7).

Preoperative Assessment and Stabilization

Prior to surgery we obtain full hematological and biochemical panels; it is extremely useful. Neutrophilia and anemia of chronic disease have been present. Alterations in biochemical indices are present, as well as (Results presented in different items) (M. Llazaniet al., 2021).

In case of animals under shock we have to stabilized, before anesthesia. Intravenous fluid therapy with crystalloids and/or colloids is used by us, in order to restore circulating volume and to correct any specific abnormalities (e.g. hypo or hyperglycemia, acidemia, etc) (Fantoni D., et al., (2017). We started broad spectrum antibiotics in life-threatening peritonitis, severe sepsis, or septic shock, a combination of antimicrobials is usually recommended for covering a wider range of pathogens (DeClue A. (2016).

In case of a patient with ruptured uterus, we have administered dopamine/noradrenaline (start with an infusion of 5 µg/kg /min iv and increase by 1 µg/kg/min every 2-3 min up to maximum of 15 µg/kg/min) because of hypotension, which may be unresponsive to fluid therapy.

Fig. 7 Preparation of Animal to Pyometra surgery

Anesthetic Management

The choice of anesthetic agents will depend on the severity of the patient's systemic condition (J. Verstegen, et al., (2008); (DeClue A. (2016). We have executed a protocol similar to that used for an elective ovariohysterectomy in mildly affected animals. Our protocol, in case of sicker patients, unlikely needed a sedative for Preanesthetic medication, was administrated an opioid to provide intraoperative analgesia (DeClue A. (2016). So, in these cases we used alpha-2 adrenoceptor agonists and Phenothiazines with very good results. Pre-oxygenation via a tight – fitting facemask for 3-5 minutes before induction is recommended (Fig. 8).

Fig. 9 A female dog with a tight-fitting face mask after surgery

In case of severely compromised animals, induction of anesthesia was achieved with an opioid (fentanyl 5-10 µg/kg iv) in combination with a benzodiazepine (diazepam 0.2-0.5mg/kg iv) (Fantoni D., et al., (2017).

For maintenance, intravenous infusions of an opioid (fentanyl or remifentanil 10-40 µg/kg/h), a benzodiazepine (midazolam 0.1-0.2 mg /kg/h), ketamine (5-10 µg/kg/min) and /or lidocaine (only in dogs, 2mg/kg bolus followed by 16.6-50 µg/kg/min) were used to decrease the requirements for general anesthetic agents.

Intensive monitoring of the respiratory and cardiovascular systems was necessary during anesthesia; monitoring should include capnography, pulse oximetry, arterial blood pressure (ideally by invasive measurement in critical cases) and ECG (Roberto Rodrigues da Rosa Filho, et al., (2020).

Animals with pyometra are prone to hypotension when positioned in dorsal Recumbency as a result of compression of the vena cava by the full uterus, which causes a decrease in venous return and CO_2. Hypotension in these patients was treated with aggressive intravenous fluid therapy and positive inotropes as described above.

Postoperative Care

We should continue with fluid therapy into the postoperative period, until patient can maintain its fluid balance, and blood was be analyzed periodically to evaluate the progression of abnormal parameters (Amstutzet al., 1998); Devender Kumar, et al., (2019).

Postoperative analgesia was administered using opioids (e.g. a full opioid for the first 24 hours, followed by a partial agonist such as buprenorphine for the next 2-3 days).

The neutering of female dog has the advantage of surgery being performed in a healthy individual. In many countries, it is recommended female dogs should be preventatively spayed because pyometra is one of the main risks of the animals' life.

Conclusions

This study was carried out to use ultrasonography and histopathology techniques to diagnose pyometra in female dogs naturally affected.

The application of ultrasonography technique could provide right indication on the therapy of pyometra to be applied. The ultrasonography technique is a very good tool to diagnose canine pyometra before clinical signs to be seen.

Histopathological diagnosis is the "gold standard" for the diagnosis of pyometra of the female dogs. Ovariohysterectomy is the appropriate, safest and most effective medical intervention to save life's animal.

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