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PREVALENCE, ETIOLOGY, MODERN DIAGNOSTICS, AND TREATMENT METHODS OF PYOMETRA IN DOGS

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Abstract:
Pyometra is a common reproductive organ disease in dogs, often beginning with mild clinical signs but posing a serious threat to the animal’s life if not treated in time. Although studies conducted in recent years have contributed to a better understanding of this condition, hypotheses regarding the etiology of pyometra — including the role of bacteria, pre-existing uterine lesions, and even dietary factors — indicate that this disease requires further in-depth investigation. Considering these aspects, this article provides information on the etiology, modern diagnostic methods, and treatment approaches of pyometra based on a review of the scientific literature.

Keywords. Dog, pyometritis, lesion, estrus, diestrus, E.coli, uterus, ovariohystroctomy.

Introduction

The Resolution No. 21 of the Cabinet of Ministers of the Republic of Uzbekistan dated January 18, 2021, titled “On Further Development and Improvement of the Activities of the National Cynology Center of the State Customs Committee of the Republic of Uzbekistan,” was adopted, and Section 3, Paragraph 3 of this resolution outlines the following tasks regarding “Ensuring the effective implementation of breeding activities in the Center and introducing new methods for training service dogs”**:**

- expanding cooperation with kennel facilities of law-enforcement agencies, dog-breeding clubs, as well as cynology services of foreign countries for the exchange of purebred dogs;
- increasing the number of purebred service dogs for the cynology units of customs authorities and other agencies, and improving the breeding system by studying the best practices of countries with advanced cynology and breeding sectors;
- carrying out activities based on leading international experience to introduce new directions in cynology and new methods of training service dogs;
- establishing effective use of advanced teaching and training methodologies to enhance the abilities of service dogs;

 establishing cooperation with specialists from veterinary services in the Republic and foreign countries;
 organizing scientific research in veterinary service by qualified specialists at the Center, and initiating the development of literature and manuals.
organizing the breeding and sale to the public of dog breeds not used in the service of customs authorities (such as Central Asian Shepherd Dog, Caucasian Shepherd Dog, Siberian Husky, Akita Inu, and others) at the Center;
ensuring the active participation of specialists of the customs authorities' cynology service in international and national exhibitions and competitions, achieving high results;
arranging for the Center's specialists to undergo special training courses abroad (such as conformation/exterior evaluation, assessment of working abilities of service dogs, and judging preparation for competitions) in order to improve their qualifications.These tasks emphasize that ensuring the reproductive health of service dogs is of significant importance. [1]

Disease Prevalence. Pyometra is characterized by the accumulation of purulent exudate in the uterine cavity and is the most common reproductive disease in dogs [2]. Examination of purulent samples collected from the uterus of affected dogs shows that **Escherichia coli** is the most frequently isolated bacterium [2,3,4]. In addition, **Staphylococcus pseudintermedius** and **Streptococcus canis** are also detected. Recent studies have identified several less common pathogens, including **Brucella abortus** and **Corynebacterium** spp. [5,6]. According to researchers, more than 25% of intact female dogs (those that have not undergone ovariohysterectomy) develop pyometra. Although pyometra can occur in dogs from 3 months to 20 years of age, it is most commonly seen in middle-aged and older dogs, with an average age of around 9 years [4,6,9].
The high incidence of pyometra in middle-aged and older dogs is believed to be associated with repeated estrous cycles. During diestrus, progesterone increases the secretory activity of endometrial glands, stimulates endometrial proliferation, and leads to closure of the cervix [8]. In addition, diestrus reduces local leukocyte activity and the uterus's resistance to bacterial infection [5,10]. The cumulative effects of these physiological changes over successive estrous cycles progressively increase the risk of pyometra with each heat cycle [10].

Etiology of the Disease. Although pyometra is highly prevalent in dogs, its etiopathogenesis has not been fully elucidated. This disease is considered polyetiological and arises due to the following factors: bacterial infection, hormonal changes (or a favorable endocrine environment), genetic predisposition, and pre-existing uterine lesions [13]. Various types of bacteria can contribute to the development of pyometra in dogs [6,39]. For instance, *E. coli* is among the most common microorganisms and has been detected in 90% of canine pyometra cases. In addition to *E. coli*, other members of the *Enterobacteriaceae* family, such as *Klebsiella pneumoniae* and *Proteus mirabilis*, are frequently found. Bacteria of the genera *Streptococcus*, *Staphylococcus*, and *Enterococcus* have also been identified [7,12,13]. Furthermore, pyometra in dogs has been shown to develop as a consequence of complications from endometritis and from various lesions in the uterus caused by different factors.

Clinical Signs. Pyometra typically presents with both local and systemic clinical signs. The condition usually occurs 2–4 months after estrus [9,10,13]. In cases of open-cervix pyometra, the most common clinical sign is a mucopurulent or hemorrhagic vaginal discharge (Figure 1a) [10]. In contrast, in dogs with closed-cervix pyometra, the accumulation of pus within the uterus often leads to abdominal distension

Clinical signs of pyometra can vary; however, common manifestations typically include anorexia, depression, polydipsia, polyuria, and tachycardia [8,11,12]. Pyometra is considered a life-threatening condition due to the potential for serious complications such as uterine rupture, nephropathy, peritonitis, endotoxemia, and, most commonly, sepsis [10,11].

Diagnosis. Clinical diagnosis of this condition is often relatively straightforward in cases of open-cervix pyometra. However, in the absence of vaginal discharge, diagnosis can be considerably more challenging due to the variability of other clinical signs [8]. Typically, diagnosis relies on the patient's medical history, clinical signs, and imaging techniques such as abdominal radiography and ultrasonography. Additional investigations, including hematological analysis, leukogram evaluation, and assessment of liver function, can also provide valuable information.

According to researchers, ultrasonography has been shown to be useful for detecting intrauterine fluid even when the uterine diameter remains within normal limits. Furthermore, it offers the advantage of identifying subsequent pathological changes in the tissues and ovaries, such as ovarian cysts or cystic endometrial hyperplasia [4,9].

Treatment and Prevention. Antibiotic therapy is recommended as a primary component in the treatment of pyometra. The use of antibiotics that are particularly effective against **E. coli** has been shown to yield favorable outcomes.

According to numerous studies, the following antibiotics have been found to be effective in the management of pyometra:

- Ampicillin: 15 mg/kg every 12 hours;
- Enrofloxacin: 10–20 mg/kg every 6–8 hours;
- Amoxicillin: 10–20 mg/kg every 12 hours;
- Sulfadoxine-trimethoprim: 15 mg/kg every 12 hours.

Additionally, antibiotics such as cephalothin, streptomycin, and gentamicin may also be used. Pyometra is an emergency condition, and currently, ovariohysterectomy remains the most effective method for both treatment and prevention. Typically, the general condition of the dog improves within 15 days following the surgery; however, the main disadvantage of this approach is permanent infertility [7,9].

Conclusions

Pyometra is a disease characterized by the accumulation of pus in the uterus and is one of the most common reproductive disorders in dogs. Although it occurs in approximately 25% of intact (non-ovariohysterectomized) dogs, the full etiopathogenesis of the disease has not been completely elucidated.

For diagnostic purposes, even when the uterine diameter remains within normal limits, ultrasonography is considered the most advanced method for detecting intrauterine fluid.
While ovariohysterectomy is the most effective approach for both prevention and treatment of the disease, permanent infertility remains the major disadvantage of this method.

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