Clinical presentation of canine pyometra and mucometra: A review

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Abstract

Cystic endometrial hyperplasia (CEH) in the bitch can result in either pyometra, hematometra, or hydrometra, and many facets of these uterine diseases can make them difficult to differentiate. The conditions differ in their systemic effects, since pyometra, particularly closed-cervix pyometra, can be a life-threatening condition that must be recognized, managed, and treated expeditiously. Mucometra is an accumulation of sterile intraluminal mucoid fluid, hematometra is an accumulation of sterile, bloody fluid, and hydrometra is an accumulation of sterile, watery fluid; none of which have any significant systemic outward clinical signs. This paper will describe the definitions, signalment, historical findings, incidence, clinical signs, physical exam findings, and diagnostic findings in canine pyometra and mucometra, and hematometra and hydrometra.

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1. Introduction

Canine pyometra is a disease of intact bitches that is of particular importance to the veterinary practitioner, since early recognition, diagnosis and appropriate intervention is required to avoid disastrous consequences. Closed-cervix pyometra is particularly dangerous, because septicemia and toxemia may develop rapidly and left untreated can result in patient death. Although mucometra, hematometra, and hydrometra by themselves are not fatal diseases, they must be differentiated from pyometra. Several diagnostic aids are available to assist in diagnosing and differentiating pyometra, mucometra, hematometra, and hydrometra. For the purposes of this discussion, the conditions of hematometra and hydrometra can be used interchangeably with mucometra, unless otherwise noted.

2. Definition

Pyometra, by definition, is the accumulation of purulent material within the uterine lumen of intact bitches, typically occurring during or immediately following a period of progesterone dominance. Historically, it has been thought subacute endometritis is followed by cystic endometrial hyperplasia (CEH) which then predisposes bitches to develop pyometra [1,2]. Others suggest that, due to differences in clinical and histopathologic findings, CEH and pyometra should be classified separately [3]. It is common to see pyometra defined as the endometritis/cystic endometrial hyperplasia/pyometra complex (CEH/P) [4]. Pyometra is classically a disease of the diestral bitch and can be classified as open-cervix or closed-cervix, with the latter being a medical emergency requiring rapid intervention to prevent subsequent sepsis and potential patient death [5]. Mucometra, hematometra, or hydrometra are thought to occur with CEH, and the character
of the intrauterine fluid differs from pyometra in that they are classically all sterile and are the fluid is seromucous, bloody, or serous, respectively [3].

3. Signalment and history

Pyometra typically affects mature bitches that have undergone repeated estrous cycling, with a reported mean age of 7.25 years [6]. Reported ages for bitches diagnosed with pyometra range from as young as 4 months to as old as 16 years of age [7–16]. In a group of 192 bitches that were treated medically for pyometra, the mean age reported was 2.4 years [17]. Historical events of importance in evaluation of a diestral, intact bitch for pyometra include prior treatment with estrogens or progestins, whelping history, and date of last estrous cycle. There appears to be an increased incidence of pyometra in both nulliparous bitches and bitches greater than 4 years of age [18]. Prior reviews indicate that nulliparous bitches comprise approximately 75% of the bitches with pyometra [1,8]. Hormonal therapies that include either progestins for estrus suppression or estrogens for estrus induction or pregnancy termination may explain the development of pyometra in young bitches [12,19,20]. Young bitches with anatomic abnormalities of the vagina and vestibule, such as strictures and septums, may be predisposed to develop these conditions.

Some breeds reported to be predisposed to pyometra include the Rottweiler, Saint Bernard, Chow Chow, Golden Retriever, Miniature Schnauzer, Irish Terrier, Airedale Terrier, Cavalier King Charles Spaniel, Rough Collie, and Bernese Mountain dog [5,21]. Breeds with a low risk for pyometra include Drovers, German Shepherd dogs, Daschunds, and Swedish hounds [22]. Other studies have shown no breed disposition [9,12].

Most bitches present with pyometra within 12 weeks after the onset of the previous estrus, with a reported mean of 5.7 weeks. However, pyometra may occur at any stage of the estrous cycle or during pregnancy [6]. Nearly three-fourths of bitches in another study presented within 8 weeks of completion of the prior estrus [23]. No association has been shown between false pregnancy and pyometra [13]. Pyometra should always be considered in the differential diagnoses of any intact bitch presenting with malaise or illness, due to the potential for life-threatening disease.

4. Incidence

Reported incidences for pyometra include 9% [9] and 15.2% [24], whereas another study found an incidence of 2% in bitches greater than 10 years of age [22]. The incidence of mucometra is largely unknown, as the condition is usually an incidental finding during ovariohysterectomy or ultrasound examination of the reproductive tract. However, 13% of uteri in one study were found to have either mucometra or hydrometra [25].

5. Pathogenesis

Cystic endometrial hyperplasia develops after repeated progestational stimulation during the luteal phase of the estrous cycle [11]. Although CEH is generally thought to predispose the bitch to develop pyometra [1,2], the two conditions can develop independently of one another [3]. Furthermore, CEH is also associated with mucometra [7], as CEH can result in endometrial thickening with the accumulation of viscid fluid in the uterus. The main difference between mucometra and pyometra is that with mucometra the fluid accumulating in the uterus is sterile and with pyometra, it is contaminated with bacteria. During diestrus, a time of progesterone dominance in the bitch, progesterone increases endometrial gland secretory activity, increases endometrial proliferation, decreases myometrial contractility, and causes closure of the cervix [7]. These effects are cumulative after repeated estrous cycles, explaining the increased incidence in middle-aged to older bitches. Estrogen stimulation prior to progesterone dominance is also a component of the pathogenesis, although experimental exposure of the endometrium to estrogen alone causes no specific pathologic change [8,26].

Suppression of cellular immunity results from increasing progesterone concentration in the early luteal phase [27]. The combination of reduced local immunity and favorable uterine conditions for pathogens (increased glandular secretions and decreased myometrial activity) make bacterial colonization more likely during this phase. The most common bacteria isolated in cases of pyometra is Escherichia coli [7,25,28] which is also usually found in the feces of affected bitches [29]. Bacterial contamination of the uterus likely occurs prior to diestrus when the cervix is open, and in cases of CEH, the bacteria cannot be cleared prior to the luteal phase, leaving opportunistic organisms in a prime environment for colonization and proliferation. E. coli is a particularly dangerous organism in cases of pyometra, due to endotoxin release which may result in septic shock [30,31].

6. Clinical signs and physical exam findings

Clinical signs of pyometra in dogs depend primarily on whether the cervix is patent enough to allow drainage...
of purulent fluid. The most common clinical finding in bitches with open-cervix pyometra is a malodorous, sanguinous to mucopurulent vaginal discharge [14,17]. Bitches with open-cervix pyometra are generally less systemically ill than bitches with closed-cervix pyometra and early in the course of the disease affected bitches may show no clinical signs other than vaginal discharge [1,7–9]. Additional clinical findings may include lethargy, depression, inappetance/anorexia, polyuria, polydipsia, vomiting, and diarrhea [12].

In contrast, bitches with closed-cervix pyometra are generally very ill at presentation, with marked clinical signs of depression, lethargy, polyuria, polydipsia, vomiting, and diarrhea. Affected bitches are often dehydrated and septicemic, toxemic, and in shock. Fever may be present in bitches with pyometra, but those with toxemia may actually be hypothermic [7–9]. There is typically no evidence of vulvar discharge.

Pyometra causes varying degrees of systemic illness, but mucometra typically does not cause obvious clinical signs. Both entities can cause palpable uterine enlargement due to fluid accumulation. In pyometra, the size of the uterus is inversely proportional to the degree of cervical patency [8]. Care should be practiced when palpating for suspected pyometra to avoid uterine rupture. Uncomplicated CEH and mucometra may only cause the outward sign of failure to conceive, due to the abnormal endometrium [32].

7. Diagnostic findings

7.1. Clinical pathology

Cytologic examination of vaginal discharge is an initial and very helpful tool in diagnosing canine pyometra and in differentiating open-cervix pyometra from mucometra. Neutrophils which are often degenerative and present in large numbers are frequently seen on cytologic examination of vaginal discharge with pyometra. Intra- and extracellular bacteria may be seen in cytologic specimens. With mucometra, cytology may reveal lesser numbers of neutrophils, with or without degenerative changes, red blood cells, endometrial cells (usually with foamy cytoplasm), and varying amounts of amorphous debris. With hydrometra, scant red blood cells and white blood cells, moderate numbers of endometrial cells, minimal mucus and amorphous debris are evident. With hematometra, red blood cells are the predominant cell type, with scant white blood cells and minimal to moderate mucus, scant endometrial cells and minimal to moderate amorphous debris present.

A common pathologic clinical finding in bitches with pyometra is a peripheral leukocytosis, which is more pronounced in closed-cervix pyometra [33,34]. When a differential cell count is performed, a left shift is also a common finding [9,12,15]. A normocytic, normochromic anemia may be seen in cases of pyometra [7–12], with packed cell volumes ranging from 21 to 48% [10]. Abnormalities in serum chemistry include azotemia, hypergammaglobulinemia, and hypoalbuminemia [6]. Metabolic acidosis is a common finding [35–37]. Urinalysis findings are less consistent, as dehydration affects urine specific gravity. Decreased urine specific gravity has been reported in approximately 20% of cases of pyometra [7]. Specific renal abnormalities have been described in pyometra [7,38], including the decreased ability of the renal tubules to concentrate urine as a result of the effects of endotoxin, which accounts for both the decreased specific gravity and the clinical signs of polyuria and polydipsia. Proteinuria may be observed [7,39]. With mucometra, the serum chemistry, leukogram and urinalysis are typically without abnormality, except for a possible mild, regenerative anemia.

7.2. Diagnostic imaging

The diagnosis of pyometra is best made with the aid of ultrasonography [40], and findings typically include an enlarged uterus with convoluted, tubular horns filled with anechoic to hypoechoic fluid [41,42]. The luminal contents are usually homogeneous, but the contents may also be echodense with slow, swirling patterns [43]. A thickened endometrium with cystic structures is diagnostic for CEH [41], with or without pyometra. Endometrial edema may be present. Mucometra or hematometra are suspected if uterine luminal contents are echodense and hydrometra is suspected if luminal contents are anechoic in combination with a lack of clinical signs consistent with pyometra [44]. Radiography may also be used as an aid in diagnosing pyometra in the bitch, but can be frequently inconclusive. The normal nonpregnant and early pregnant uterus are of soft-tissue or fluid radiopacity [45–47]. Other uterine conditions that have similar soft-tissue radiographic characteristics are pyometra, mucometra, and uterine torsion [45–49]. These pathologic conditions of the uterus cannot be differentiated from early pregnancy in the bitch until fetal mineralization takes place, which is approximately 45 days after ovulation [46].
8. Conclusions

Mucometra, hydrometra, and especially pyometra, are disease entities that should be considered a rule out in all intact bitches with the aforementioned clinical signs. Signalement, history, and physical examination findings are very helpful in diagnosing these conditions. Differentiation of mucometra, hydrometra, hematometra, and pyometra can be made on the basis of cytologic examination, complete blood count, serum chemistry, urinalysis, and ultrasonography.

References


