

Theriogenology Question of the Month

This feature is sponsored by the American College of Theriogenologists. Readers of the *JAVMA* are invited to submit contributions. Contributions should provide a learning exercise about theriogenology. A specific question should be posed for the readers. The author's answer to the question and a brief discussion should be presented. Possible topics include commonly seen problems in domestic or exotic animals. Herd problems in dairy and beef cattle, sheep, goats, horses, and exotic hoofstock, problems in kennels or catteries, or flock problems in domestic and exotic fowl also are appropriate. Please contact Dr. Craig A. Smith, Associate Editor (800/248-2862, ext 259, or FAX 847/925-1329), for further details.

History

A 10-month-old sexually intact female Persian cat was admitted to our veterinary medical teaching hospital with serosanguineous vulvar discharge of 3 weeks' duration. Prior to admission, the queen had been given an undetermined dose of amoxicillin orally 3 times daily for 14 days and then twice daily for 8 days. However, the discharge continued. The cat was housed with 6 other cats (3 castrated males, 1 sexually intact male, and 2 sexually intact females). Males were separated from the females when the queens were in estrus but were allowed to commingle when the females were not in estrus. To the best of the owner's knowledge, this queen had not been in estrus.

Physical examination revealed that the cat's rectal temperature as well as pulse and respiratory rates were within reference ranges. The vulvovaginal area was clean, but there was evidence of loss of hair in the perineal area, and black crusty spots were detected around

This report was submitted by Marcela von Reitzenstein, MV, MS; Louis F. Archbald, DVM, PhD, DACT; and Susan M. Newell, DVM, MS, DACVR; from the Departments of Large Animal Clinical Sciences (von Reitzenstein, Archbald) and Small Animal Clinical Sciences (Newell) at the Veterinary Teaching Hospital, College of Veterinary Medicine, University of Florida, Gainesville FL 32610-0136.

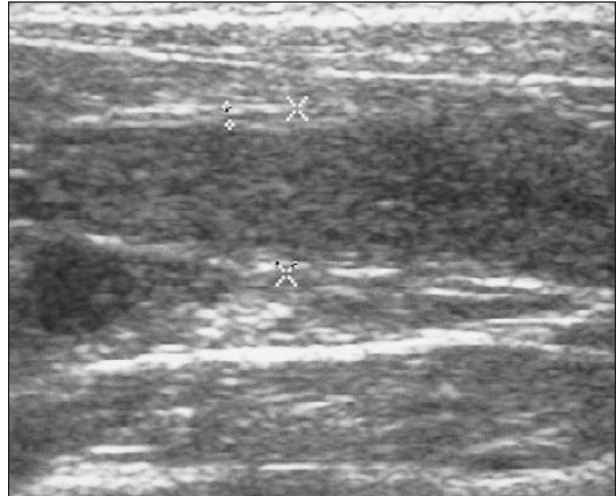


Figure 1—Longitudinal cross-sectional ultrasonographic view of the right uterine horn of a 10-month-old female Persian cat with serosanguineous vulvar discharge. The uterine horn (indicated between the X symbols) is 8.6 mm in diameter, and the uterine wall (indicated between the + symbols) is 0.9-mm thick. There is homogeneous echogenic material within the uterine lumen.

the anal sphincter. Attempts to obtain a blood sample for a CBC were unsuccessful.

Abdominal ultrasonography was performed. The body and horns of the uterus were large, with the body being 8.3 and 9.3 mm in diameter, respectively, at 2 locations, as determined on a longitudinal cross-section view (Fig 1). The uterine wall was thin (0.9 mm), and the lumen (6.6 mm in diameter) was filled with homogeneous echogenic material. The entire length of each uterine horn could be observed and evaluated. Other abdominal organs were considered within normal limits.

Question

What are the differential diagnoses for uterine enlargement in this unmated cat? *Please turn the page.*

Answer

Pyometra, hydrometra, or mucometra.

Discussion

In many cats, puberty is observed when cats are between 6 and 9 months old, although it is believed that purebred cats reach puberty later than mixed-breed cats.¹ The reproductive cycle of domestic cats consists of multiple waves of follicular growth during proestrus and estrus followed by quiescent periods of interestrus or seasonal anestrus, unless they are interrupted by ovulation.¹ Until recently, cats were considered to be strictly induced ovulators, but there is evidence suggesting that cats can have spontaneous ovulations. In one study,² more than a third of older cats housed separately in a colony ovulated despite only indirect, nontactile contact with other members of the colony. In another report,³ 13 of 15 young group-housed queens had ≥ 1 ovulations and pseudopregnancies without mating during a 4.5-month period. Because they are considered to be induced ovulators, it is generally believed that cats are less predisposed to the cystic endometrial hyperplasia-pyometra complex than are dogs. The possibility of nongravid periods during which a queen has a prolonged luteal phase alters this supposition. It has been suggested that repeated nongravid periods can increase the risk of cystic endometrial hyperplasia, a continuum of proliferative and degenerative changes of the endometrium associated with aging.^{4,5} The combination of opportunistic bacteria that ascend from the vagina and an abnormal endometrium predispose cats to pyometra.^{4,6,7} Pyometra is the accumulation of purulent material in the uterus resulting from uterine infection.

The effect of progesterone on the uterus is an important component of the pathogenesis of pyometra in dogs and cats.^{1,6,7} Progesterone causes hyperplasia of the endometrium and endometrial glands, increased secretory activity of the endometrium and endometrial glands, and decreased myometrial contractility.⁷ Progesterone also inhibits local leukocyte responses to infection in the uterus.⁴ It is produced during the luteal phase of the ovarian cycle, which, for induced ovulators such as queens, corresponds to pregnancy or pseudopregnancy.⁷ Therefore, repeated ovulatory cycles that do not result in pregnancy can increase the risk of pyometra in older queens. On the basis of clinical and pathologic features of endometrial hyperplasia, pyometra, and endometritis observed in 79 cats,⁵ it has been suggested that prolonged secretion of progesterone by corpora lutea may not be the primary cause of cystic endometrial hyperplasia in this species. It is possible that it could result from chronic estrogenic stimulation of the endometrium, because cystic endometrial hyperplasia-pyometra has been diagnosed in queens that have ovaries containing only follicles and that have a basal (low) serum progesterone concentration.⁵ However, because pyometra and endometritis are correlated with functional corpora lutea, it has been suggested that progesterone may be a strong contributing factor, especially in combination with estrogen.⁵ Estradiol causes an increase in the number of endometrial estrogen and progesterone

receptors and influences uterine response to continued stimulation with estradiol or concurrent or subsequent stimulation by progesterone.⁶ Estrogen causes cervical dilation during estrus and allows bacteria (especially *Escherichia coli* and *Streptococcus* spp) that are part of the normal vaginal flora to ascend into the uterus.^{4,7}

Most queens with pyometra were in estrus during the 60-day period preceding onset of clinical signs.⁶ Thus, clinical history is strongly suggestive of pyometra when onset of clinical signs is during a time of progesterone stimulation. Vulvar discharge, abdominal distention, enlargement of the uterus, and dehydration are the most common signs; however, 15 to 30% of affected queens do not have detectable vulvar discharge.⁶ Many, but not all, cats with pyometra have an increase in WBC count (mean of 35,000 cells/ μ l), a shift to a relative increase in immature neutrophils on a WBC differential count, or both.¹ Unfortunately, it was not possible to obtain a blood sample from the queen reported here to enable determination of serum progesterone concentration or a CBC count.

Hydrometra or mucometra is infrequently detected in cats with advanced cystic endometrial hyperplasia. Mucometra also may result from intrauterine foreign material (eg, nonabsorbable suture) or obstruction of drainage through the cervix. Hydrometra and mucometra are characterized by variable amounts of mucus within the uterine lumen. In females with hydrometra, mucin is a thin watery fluid. In cats with mucometra, mucin may be thick or even a semisolid mass. Bacterial infection is not a component of either of these conditions.⁵ Typically, the only clinical signs of hydrometra or mucometra are abdominal distention with or without serous or mucoid vulvar discharge. These conditions are not accompanied by signs of systemic illness.⁶

Treatments for pyometra include ovariohysterectomy or administration of prostaglandin.¹ Prostaglandin is available in natural (dinoprost tromethamine^a) or synthetic (cloprostenol^b) form, although neither is approved for use in dogs or cats. Treatment with prostaglandin is controversial because of adverse effects and possible complications, including vocalization, restlessness, panting, intense grooming behavior, kneading, tenesmus, salivation, mydriasis, vomiting, and diarrhea in cats.¹ Signs generally appear within 10 minutes after injection and last for up to 2 hours.⁶ Therefore, treated cats need to be hospitalized and closely monitored. Treatment of closed-cervix pyometra can be considered when an affected queen is medically stable and can be closely monitored. If the cervix does not open after a few days of treatment or the clinical status of the queen begins to deteriorate, ovariohysterectomy should be performed immediately.¹ On the other hand, results for treatment of cats with open pyometra have been promising, with 80 to 90% producing litters subsequent to treatment with prostaglandin.⁶

Prostaglandin F_{2 α} causes contraction of myoepithelium and evacuation of uterine contents. It also induces luteolysis, removing the trophic effect of progesterone on the endometrium.⁶ The dosage of dinoprost tromethamine for treatment of cats is 0.1 mg/kg

(0.045 mg/lb) of body weight, SC, every 24 hours for 3 to 5 days. Synthetic prostaglandin (ie, cloprostenol) is not recommended in small animals because of its higher potency, which may result in death.⁴ Concurrent antibiotic treatment is recommended.¹

Outcome and Management

In the queen reported here, ovariohysterectomy was recommended as the method of treatment, because the owner was not willing to subject the queen to the potential adverse effects associated with administration of prostaglandin. The diagnosis of pyometra was confirmed during ovariohysterectomy when corpora lutea were identified in the ovaries. This case appeared to be unusual because of the age of the cat and the high probability that spontaneous ovulation resulted in formation of corpora lutea that secreted progesterone and aided the development of pyometra.

^aLutalyse, Upjohn and Pharmacia, Kalamazoo, Mich.

^bEstrumate, Bayer Corporation, Agriculture Division, Animal Health, Shawnee Mission, Kan.

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Correction: Public Veterinary Medicine: Public Health—Rabies surveillance in the United States during 1998

In “Rabies surveillance in the United States during 1998” (*JAVMA*, 215, pp 1786–1798), data were incorrectly listed in Table 1. The total number of bats in the states of NE and NV were inadvertently listed under the column labeled foxes.