Journal of the Andaman Science Association Vol 29 (2): 109-116 (2024)
ISSN 0970-4183, Printed in India

Ultrasonographic diagnosis and surgical management of open pyometra in a bitch

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Abstract

A three years old intact Labrador bitch was admitted on 12th September 2023 to the Teaching Veterinary Clinical Complex, OUAT-College of Veterinary Science and Animal Husbandry, Bhubaneswar, Odisha. The bitch was presented with a clinical history of brownish coloured purulent discharge from genitalia since a week and was found to be restless with frequent licking around the perianal region, vomition, loss of appetite since the last morning. However, pulse rate, temperature (101.8ºF), heart beat and respiration rate were normal. Proestrus bleeding was observed three months prior with no history of mating. On abdominal palpation, bulged tube like structure was felt, vulval swelling was noticed and physical examination of vagina revealed no excess growth. Based on history and clinical symptoms, tentatively diagnosed as open pyometra, which was later confirmed by ultrasonography. Owner was advised to go for symptomatic therapy for reducing systemic infection and then ovario-hysterectomy was recommended. The basic steps of ovario-hysterectomy were performed successfully and a broad spectrum antibiotic, an anti-inflammatory drug and an antihistaminic drug were prescribed to be administered following the operation. Follow up of the case was done on regular basis and eventually the animal was recovered completely within a week of surgery. In conclusion, confirmatory diagnosis of pyometra in bitch can be done by ultrasonography and the pyometra can be treated successfully by ovario-hysterectomy to prevent further complications.

Keyword: Open Pyometra, Ovario-hysterectomy, Ultrasonography

Introduction

Generally, around 24% cases in bitches of 10 years old or less than 10 years old are more affected with pyometra (Hagman, 2000). Because, at this time, progesterone levels are elevated that help to create the favourable condition for bacterial infection. This progesterone-primed condition stimulates uterine glandular secretion in the uterus, which suppresses uterine contraction and inhibits the effect of infection-fighting blood cells in the uterus (Agudelo, 2005). This effect stimulates an estrous cycle, resulting in more glandular activity and creating higher level of inflammatory cells which form mucous or pus that may or may not be seen in the vaginal discharge. Already established vaginal infection, urinary tract infection or fecal contamination can be source of bacterial pathogens which enter into the uterus and multiply there to cause uterine infection (Schlafer, 2012). These bacteria produce much endotoxin in the uterus that is capable of initiating the cytokine cascade and release of inflammatory mediators. Local or systemic inflammatory reactions occur during pyometra by *E. coli* mostly. In some cases, cystic endometrial hyperplasia (CEH) often precedes the diseases, but it can also be found in many older bitches with no sign of pyometra. Severe pyometra leads to fetal and systemic infection and reduces infertility. It is one of the common reproductive problems encountered in pets worldwide (Juyena *et al.*, 2005). In 2002, Mattoon and Nyland opined that canine cystic endometrial hyperplasia–pyometra complex is secondary to an abnormal response to repeated progesterone stimulation and uterine infection. Cystic Endometrial Hyperplasia (CEH) usually precedes pyometra in bitches older than 6 years, whereas younger bitches may develop pyometra without concurrent cystic endometrial hyperplasia (Arora *et al*., 2006). With cystic endometrial hyperplasia, endometrial thickening occurs as endometrial glands increase in size and number in response to progesterone. Sterile luminal

mucin fluid accumulation may occur, causing hydrometra or mucometra (the difference depends on degree of mucin hydration). Differential diagnoses for a fluid-filled uterus include hydrometra and mucometra. These two conditions are less common than pyometra. They may be suspected if the luminal contents are anechoic (hydrometra) or echogenic (mucometra) and the clinical signs of pyometra are lacking.

Two-dimensional ultrasonographic evaluations of the uterus were carried out with ultrasound machine (Aloka Prosound Alpha 6) having a micro convex (7.5 Hz), convex (2-5 Hz) and linear probe (5-10 Hz). An ultrasound examination is usually performed to confirm a clinical diagnosis of pyometra, either from signs referable to an open pyometra or from systemic illness when the cervix is closed. Ultrasound evaluation has also been used to diagnose pyometra before the appearance of clinical signs (Kealy and Mc Allister, 2000). The ultrasonographic findings include an enlarged uterus with enlarged uterine horns. The enlargement is usually symmetric, but segmental or focal changes can occur. The luminal contents are usually homogeneous and may be anechoic with strong distal enhancement; or they may be echogenic, in which case, the movement of pus, characterized by slow and swirling pattern, is often noted (Mattoon and Nyland, 2002). Ultrasonographic picture revealed the anechoic fluid and hypoechoic tubular uterus with enhancement effect. Large quantity of uterine fluid with thick echogenic uterine wall were observed due to higher thickness in 83.33 per cent of the cases (Llazani *et al.,* 2021; Mattoon and Nyland, 1995) having the opinion the uterus presentation in imaging ultrasonographically having technique specifically allows pyometra type to be recorded (showing localization, segmentality or uniformly distributed in tubular in nature) along with uterine wall integrity. A thickened endometrium with cystic structures is diagnostic of cystic endometrial hyperplasia with or without pyometra. Ultrasonography is generally done for confirmatory diagnosis of pyometra in bitches (Coggan *et al*., 2008). Different treatment methods are applied during pyometra, but the popular and effective method is ovariohysterectomy (Feldman and Nelson, 1996; Johnston *et al.,* 2001).

Pathogenesis

Canine pyometra is a diestrual disease typical of adult intact bitches whose development is strongly influenced by sequential progestational stimulations (normal diestrus or treatment with progestins) of the uterus. Bitches whelping rarely or never in their lives have a greater chance of developing pyometra with rare or no occurrence of pregnancy (Concannon, 2011). For unknown reasons, gestation has a protective action on the canine endometrium, causing pyometra not to develop in areas of the endometrium where placental attachment has occurred (although pyometra can occur pregnant animal, in one horn with pregnancy, in the opposite horn pyometra). During a progestational stimulation the canine endometrium proliferates and starts secreting the so called “uterine milk” while the cervix remains closed and myometrial contractibility is inhibited. Fluid accumulates into the endometrial glands which then dilate becoming fairly large (upto 0.3-2.0 cm diameter). The endometrial pattern that develops is referred to as cystic endometrial hyperplasia which is a prerequisite for the development of pyometra due to the fact that the uterine milk in itself constitutes an inflammatory stimulus as well as an excellent culture media for bacteria (De Bosschere *et al*., 2001). CEH is a physiological phenomenon which starts resolving during the second half of diestrus normally. However, with time and number of “open” (non-pregnant) cycles CEH may not entirely disappear from some sections of the endometrium, thus increasing chances of endometrial inflammation (Dow, 1959a; Dow, 1959b; De Cock *et al*., 1997). Fecal/perineal bacteria (*E. coli, Streptococcus* spp., *Staphylococcus* spp., *Klebsiella, Proteus* and *Pseudomonas* are the most common ones) often concur to the development of uterine lesions and clinical signs (especially if they cannot be cleared from the uterus prior to onset of the luteal phase), but are not

necessary for the clinical manifestation of the disease. *E. coli* can produce an endotoxin which, upon bacterial death (i.e., following an antibiotic treatment), is released into the uterine lumen and absorbed. The resulting endotoxemia may cause a severe shock reaction and proves fatal for the bitch, depending upon the amount of endotoxin released and the physical condition of the dog (antibiotics have no effect on concentrations of endotoxins). Clinical signs of endotoxemia include disorientation, hypothermia and shock (Schlafer and Gifford, 2008).

Renal lesions are frequent in bitches with pyometra (especially in older bitches), being due to either the disease itself (because of pre-renal azotemia due to dehydration or glomerular/tubular disease due to the bacterial infection or endotoxemia) or because they were already present when pyometra developed. Bone marrow, liver and spleen disease can also be either already present or caused by the disease itself in bitches with pyometra (Johnton *et al*., 2001).

Laboratory results, abdominal ultrasonography and histopathology tools are the valid methods for pyometra diagnosis (Fayrer-Hosken *et al*., 1991; Feldman *et al*., 2004). They correlated thoroughly with the history and clinical examination and a single test may not be conclusive (Fransson *et al*., 2004; Gurbulak *et al.,* 2005; Singh *et al.,* 2010; Kumari *et al.,* 2012; Hagman, 2012, Sumathi *et al.,* 2015). 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).

Case History

A three-year old intact Labrador bitch of body weight of 26 kg was admitted on 12th September 2023 to the Teaching Veterinary Clinical Complex, OUAT-CVSc & AH, Bhubaneswar, Odisha. The bitch was presented with a clinical history of dullness, inactive, brownish coloured purulent discharge from genitalia since a week, restlessness with frequent licking around the perianal region, vomition and reduced appetite since the last morning (Hardy and Osborne, 1974). The pulse rate (84 beats/min), temperature (101.8ºF), heart rate (88 bpm) and respiration rate (24 breath/min) were recorded to be normal. Pro-estrual bleeding was observed three months ago with no history of mating. On abdominal palpation, bulged tube like structure was felt. Physical examination of vagina revealed that no growth but vulval swelling was noticed. Ventral abdominal hair was clipped from xiphoid to pubic region (6-8 cm wide) and the animal positioned in dorsal recumbency, coupling gel was applied to skin before scanning; ultrasonographic examination revealed anechoic pus filled sacculations of 24×22 mm diameter (Figure 1 and 2). Based on history, clinical symptoms and ultrasonography examination, the condition was diagnosed as open pyometra.

Clinical intervention

Symptomatic treatment

Haematological values reported were haemoglobin (Hb) 15.3 gm/dL, total leucocyte count (TLC) 31800/µL with Neutrophils 86%, platelets 1.36 lakhs/µL. Following administration of injection of dextrose normal saline (DNS)-150 mL, Metronidazole-30 mL, Montaz-500 mg, RL-150 mL I/V and Ranitidine-1.5 mL, I/M for 5 days, the animal was found active with reduced vulval discharge. On ultrasonographic examination, the uterus (Figure 3) dimension was found to be 19 mm ×16 mm. Haematological parameters were recorded to be Hb-15.9 gm/dL, TLC-23300/µL, Neutrophils-83% and Platelets-2.42 lakhs/µL. Following administration of tablet Enrofloxicin-150 mg/day and multivitamin syrup (Multistar Pet®) 10 mL/day orally for 7 days, the animal was found active with the following blood profile, Hb-15.4 gm/dL, TLC-11400/µL, Neutrophils -72% and platelets-3.06 lakhs/µL, kidney function test revealed that creatinine- 0.73 mg/dL and BUN- 6.5 mg/dL. Following the symptomatic treatment with antibiotic until animal is stable, surgical intervention for ovariohysterectomy was recommended for treating the open-pyometra (Sridevi, 2015).

Preparation of the animal

A routine thorough examination of the dog was done before the surgery. The bitch was off-fed for 12 h and off water for 6 h before the operation performed. The surgical

site (mid- ventral) from umbilicus to pubis with 5-10 cm width was shaved with a blade and then shaven area was disinfected with 70% ethyl alcohol.

Surgical Technique

The animal was premedicated with atropine sulphate @ 0.02-0.04 mg/kg body weight at s/c (Tropine – Neon Laboratories Ltd., Mumbai) and anaesthetized using a combination of xylazine hydrochloride @ 1-2 mg/ kg body weight i/m (Xylaxin - Indian Immunologicals Ltd., Hyderabad) and ketamine hydrochloride @ 5-10 mg/ kg body weight i/m (Ketmin - Themis Medicare Ltd., Haridwar). A venous port was fixed and maintained with 5% DNS and incremental doses of ketamine hydrochloride was administered to maintain the anaesthesia. Animal was placed dorsal recumbency. The surgical site was cleaned with ethyl alcohol and was rubbed with povidone iodine scrub before the incision was given. A continuous skin incision was begun 1-2 fingers caudal to the umbilicus upto around 5-7 cm (2-3 inches) at mid-ventral region. The subcutaneous tissue was dissected to expose the linea alba, a fibrous white line/band running along the midline from which abdominal muscles attached on either side. The linea alba was incised by elevating abdominal muscle with rat-toothed forceps so that the linea alba is held between the teeth of the forceps (to prevent injury from blade to underlying abdominal contents), scalpel held with sharp-side facing upwards, making a small stab incision through linea alba into the abdominal cavity. The linea alba incision was extended using mayo scissors. After exposing the abdomen by laparotomy, the uterine horns were palpated and traced out by fingers. A horn was differentiated from the intestinal part by its consistency and colour (uterine horn is more consistent and pink than intestinal parts). After finding the uterine horns, both of them were exteriorized to the outside. Both the ovaries were also exteriorized. Stretching of suspensory ligament (taut, fibrous band at the proximal edge of ovarian pedicle) for greater exposure to ovarian pedicle broad ligament / bluntly broken down by fingers and then the ovarian broad ligament (below the ovarian bursa) was clamped with two artery forceps and ligated with a suture while holding strongly under the forceps and one artery forceps placed at proper ligament above the ovarian bursa. Below the two artery forceps through window created on broad ligament, ovarian pedicle was ligated with catgut No. 1-0 (Ethicon, Johnson and Johnson Ltd., Baddi, H.P. 173-206, India), the ovarian pedicle was transligated with same catgut and then one more ligation was given on the crush made by the artery forceps. Some artery forceps were placed above and transect in between two artery forceps over the suture (ligation) with the scalpel blade. The ovarian pedicle was inspected for bleeding and released. The same procedure was repeated for the other ovary. Then the uterine body was exteriorized and the area between the cervix and the uterine body clamped with two forceps. Ligation was done with same catgut suture material below the lower forceps followed by transfixation. Same ligation process was followed on crush made by the lower forceps, the uterine body was cut between the ligated area and the holding area with a scalpel blade. The uterine and ovarian blood vessels were properly secured (clamped and ligated with catgut) and the ovaries, uterine horns and the uterus along with the ovaries were completely removed (Figure 5). Final inspection of abdominal cavity was done to check for bleeding with a sterile gauze. The abdominal wall was closed as per standard procedure with 2-0 vicryl (polyglactin-910) simple continuous suture pattern. Antibiotic powder was sprinkled over the abdominal suture area. Subcutaneous tissue closure and standard intra-dermal suture (Figure 8-12) was done with same polyglactin-910 suture material. Finally, antiseptic solution was applied over the suture area, followed by bandage (Hedlund, 2002).

Postoperative care and management

The bitch was kept in a clean and dry place after the operation. An Elizabethan collar was put on to avoid licking. The following medicines were applied: Injection Intacef Tazo-500 mg I/M (4 days) for preventing secondary bacterial infection, Injection Cadistin 0.5 mL (2 days) for preventing histamine release, Injection Melonex-0.7 mL i/m (2 days) for preventing inflammation and fever and topical use of ointment betadine-5% to prevent external infection. The outcome of the operation and post-operative treatment was followed up. Post-operative ultrasonographic examination (7 days after surgery) revealed absence of hypo to anechoic pus filled

sacculations beside and beneath the Urinary Bladder (Figure 6). The bitch eventually recovered day 14 post operation.

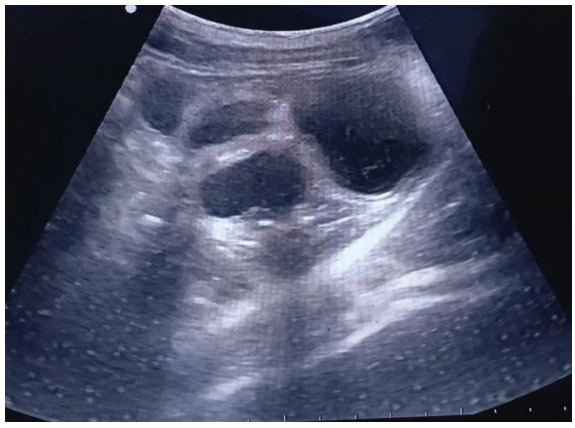

Figure 1. Ultrasound image of open-pyometra dog

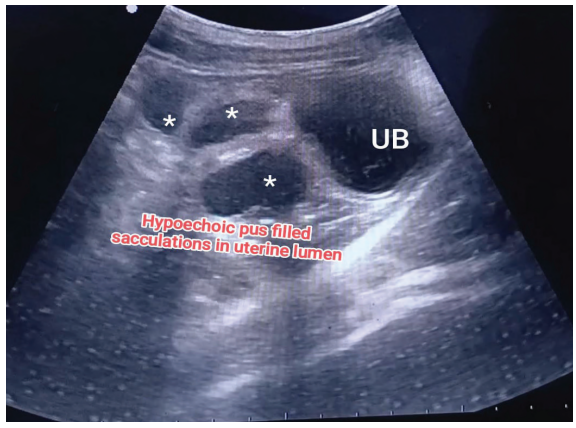

Figure 2. Ultrasound image of open-pyometra dog (presence of hypo to anechoic pus filled sacculations beside urinary bladder)

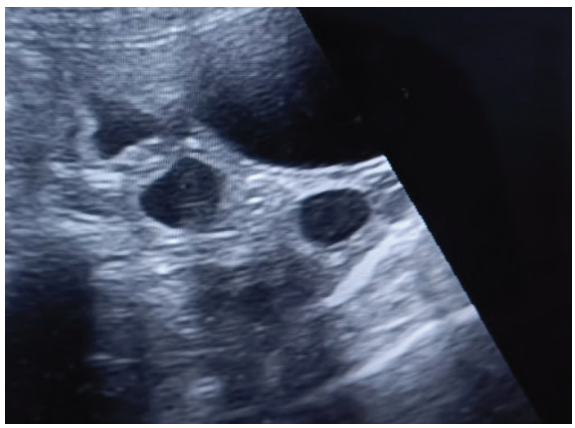

Figure 3. Ultrasound image of pyometra dog (5 days after antibiotic administration)

Figure 4. Performing Ovariohysterectomy surgery in dog

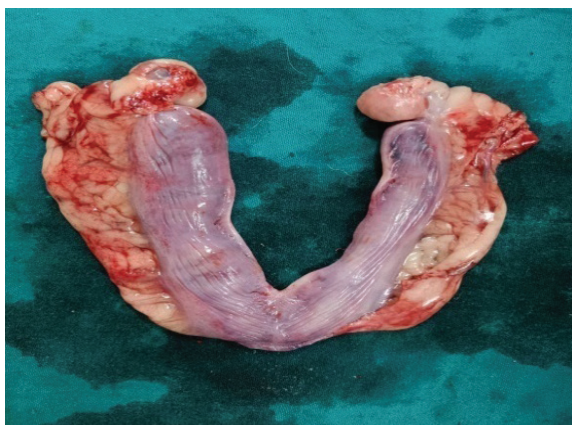

Figure 5. Exteriorized uterus having pyometra including ovarian bursa along with ovary

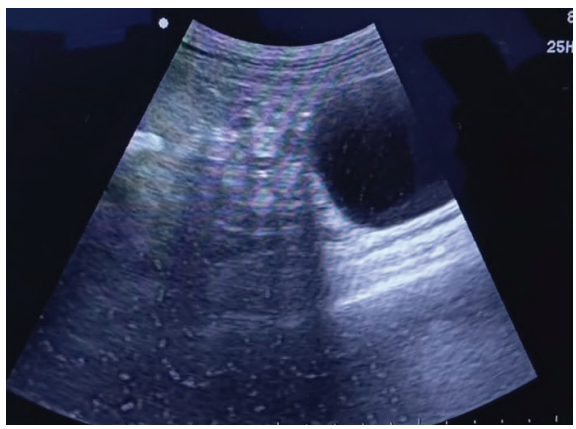

Figure 6. Post-operative ultrasound image in dog (No fluid filled sacs beside U. Bladder)

Figure 7. Pyometric ovaries with CL

Figure 8. intradermal suture (on the day of surgery)

Figure 9. Intradermal suture healing (on 3rd day of surgery)

Figure 10. Intradermal suture healing (on 6th day of surgery)

Figure 11. Intradermal suture healing (on 9th day of surgery)

Figure 12. Intradermal suture healing (on 14th day of surgery)

Conclusion

The bitch diagnosed with pyometra was successfully treated by ovariohysterectomy and the results showed that it recovered fully within a week following the operation. Effective antibiotic along with anti-inflammatory and an antihistaminic drugs speeds up the recovery.

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