RESEARCH ARTICLE

Canine Pyometra: Clinico-diagnostic, Microbial, Gross and Histopathological Evaluation

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Abstract

The study aimed to categorize clinical signs, diagnostic efficacy of different techniques, and microbiological and pathological findings of canine pyometra. The study covered total 18 bitches; ten with pyometra and eight healthy ones presented for spaying. All the bitches with pyometra were found lethargic, dull, and depressed. The general condition of bitches with closed pyometra (n=2) was poor, whereas it was fair in cases of open pyometra (n=8). The mean rectal temperature of bitches with pyometra was 102.67±0.18 ºF. Vomition, polyuria, polydipsia, and diarrhea were recorded in 40, 40, 60 and 10 % pyometra cases, respectively. The age of affected bitches was 4 to 12 years with a mean of 8.8±0.71 years. The prevalence of pyometra was higher in nulliparous animals (5 cases) followed by multiparous (4 cases) and primiparous (1 case) bitches. The abdominal palpation was clear for pyometra in only 20% of cases. Radiography was clear in 40% of cases, whereas ultrasonography was clear and confirmatory in 100 % of cases. Uterine content of all ten cases of pyometra was positive for bacterial isolates; mostly Gram-negative bacilli (50%) followed by gram-positive cocci (30%) and mixed isolates (20%) as against sterile contents of healthy bitches. Amoxycillin was the most effective antibiotic (60.00 %) against bacterial isolates followed by amikacin and gentamicin (50.00 % each). Grossly, the mean weight of intact reproductive organs of bitches with pyometra was 987.5±317.61 g as against 77.50±23.83 g in normal healthy bitches. The mean length of right and left uterine horns was almost double than in healthy bitches, and it varied from 10 to 53 cm in pyometra cases. The colour of uterine content was found variable in cases of pyometra from greyish to dark brownish with watery to thick consistency. There were presence of CLs, cysts or follicles on either of the ovaries in majority of bitches with pyometra. The histopathological changes of uterine tissues after ovario-hysterectomy indicated classical pyometra.

Keywords: Canine pyometra, Predisposing factors, Clinico-pathology, Diagnosis, Histopathology.

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Introduction

Pyometra (chronic purulent endometritis) is a common, metestrual disease affecting mainly the middle-aged and older bitches (Egenvall *et al.,* 2000). Clinical signs are classical, and ultrasound is particularly valuable for detecting the uterus that is filled with fluid or fetus. Baithalu *et al*. (2010) reported that the diagnosis of pyometra is best made with the aid of ultrasonography. An exaggerated response of the uterine mucosa to chronic progestational stimulation during the prolonged luteal phase caused by altered estrogen-progesterone receptors leads to cystic endometrial hyperplasia with excess secretions in the uterine lumen and secondary bacterial invasion particularly of *E. coli* from vagina that liberate endotoxin leading to gross and microscopic uterine and other vital organs damage (Hagman, 2004; Dabhi *et al.,* 2008). Earlier we have reported haemato-biochemical alterations in bitches affected with pyometra (Hadiya *et al.,* 2020) and also the retrospective study of prevalence of pyometra and its predisposing factors in canines of middle Gujarat (Hadiya *et al.,* 2021). This communication reports on clinical, ultrasonographic, gross, histopathological and microbiological evaluation of uterii of bitches affected with pyometra.

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Materials and Methods

The study was conducted during 2019-20 on total 18 bitches with a history of pyometra (n = 10) and normal healthy

bitches (n = 8), presented at Clinical Complex of Veterinary College, Anand. Detailed history regarding the age, breed, body weight, parity, nature of estrous cycle, and date of last estrus/mating, if any, was recorded for each case. General health status, duration of illness, clinical symptoms, and its progression etc. were also recorded. Other observations included heart rate, respiratory rate, rectal temperature and abdominal palpation. Ultrasonographic evaluation of bitches was done in dorsal recumbency using "Titan Sonosite M-Turbo Ultrasound Machine" using sector probe (2.5-7.5 MHz). The radiographic examination was done using digital radiography after over-night fasting.

After ovario-hysterectomy or spaying using standard mid-line approach under general anaesthesia, uterine content (pus or mucus) was collected aseptically by aspiration for physical and cultural examinations. Following streaking of uterine contents on blood agar/ BHI agar and MacConkey agar medium and incubation, smears were prepared from the descriptive colonies and subjected to gram's staining as well as antibiotic sensitivity of the bacterial isolates. After recording gross observations of intact uterii and biometry of uterine horns, the volume and colour of the uterine content was recorded. The uterine tissues were collected in 10% formalin for histopathological evaluation using standard technique and H&E staining. The findings on various aspects were interpreted appropriately.

Results and Discussion

Predisposing Factors

The bitches (n = 10) presented with pyometra were categorized into five age groups, *viz*., 0-3, 4-6, 7-9, 10-12 and >12 years of age. The occurrence of pyometra was greater in 7-9 years age group (5 cases) followed by 10-12 years (4 cases) and in 4-6 years age group (1 case). The age of affected bitches was 4 to 12 years with a mean of 8.8±0.71 years. Two bitches presented with closed pyometra were 10 years of age. The mean age of bitches presented for spaying/neutering was 4.5 ± 0.65 years. These findings were in agreement with the reports of various researchers (Dabhi and Dhami, 2007; Pretzer, 2008; Baithalu *et al*., 2010; Hagman *et al*., 2011; Contri *et al*., 2015; Gupta *et al*., 2020; Hadiya *et al.,* 2021), who observed the age of bitches with pyometra to vary from 2 to 16 years. It is suggested that in old age, with increasing endometrial alterations the functionality of endocrine glands and their inter-relationship usually slow down; hence, the incidence of pyometra increases with advancing age. The greater prevalence of pyometra recorded in bitches older than 9 years of age supported the earlier consensus of several authors that pyometra is primarily a disorder of middle to older age group and was found to be resulted from alterations in internal homeostasis.

Out of 10 cases of pyometra, the highest prevalence was in Labrador (5 cases) followed by Doberman (2 cases) and other breeds, *viz*., Pug, Pomeranian and Mongrel (1 case each), while bitches presented for normal spaying/neutering were all Mongrel (8 cases). Dabhi and Dhami (2007), Gupta *et al*. (2020) and Hadiya *et al.* (2021) reported the greatest prevalence of pyometra in Pomeranian breed. Hagman *et al*. (2011) and Younis *et al*. (2014) reported the highest incidence of pyometra in German Shepherd and Griffon breeds, respectively. The higher prevalence of pyometra in Labrador and Doberman in the present study might be due to more population of these breeds of dogs in the region.

The prevalence of pyometra was higher in nulliparous animals (5 cases) followed by multiparous (4 cases) and primiparous (1 case) bitches. Many of the earlier researchers also reported higher risk of pyometra in nulliparous bitches than other categories (Dabhi and Dhami, 2007; Hagman *et al*., 2011; Gupta *et al*., 2013, 2020). Fifty per cent of affected bitches had history of irregular estrous cycle.

Gynaeco-Clinical Signs of Canine Pyometra

The bitches presented at clinics were found lethargic, dull and depressed. The general condition of bitches with closed pyometra (n = 2) was poor, whereas it was fair in cases with open pyometra (n = 8). Vaginal discharge sticking to hair of tail and perineum was present in all the 8 cases of open pyometra, and its colour varied from greyish to creamy yellow with foul smell in some of the cases. The enlargement of abdomen was seen in 5 cases and on palpation, uterus was found to be enlarged. Majority of cases had anorexia (90 %). The mean rectal temperature of bitches with pyometra was 102.67 ± 0.18°F (101.7°F to 103.5°F). Vomition, polyuria, polydipsia and diarrhoea was recorded in 4, 4, 6 and 1 case, respectively. The clinical manifestations exhibited by majority of bitches with pyometra were in accordance with many previous reports (Dabhi and Dhami, 2007; Hagman *et al*., 2011; Gupta *et al*., 2013; Patil *et al*., 2013; Jitpean *et al*., 2014).

Efficacy of Dignostic Techniques

The abdominal palpation was clear for pyometra only in 2 (20.00 %) cases. The radiography was clear in 4 (40.00 %), while the USG was clear in all 10 (100.00 %) cases of pyometra. Ultrasonographic evaluation of bitches with pyometra revealed enlarged uterus with sacculations filled with anechoic to hypoechoic fluid with thickened uterine wall. Baithalu *et al.* (2010) reported that the uterus with pyometra may be difficult to palpate, especially if it was draining much of its contents or if it was enlarged but flaccid. Other authors (Dabhi and Dhami, 2007; Singh *et al*., 2010; Gupta *et al*., 2013; Younis *et al*., 2014; Agrawal *et al*., 2015; Dar *et al*., 2015; Raja *et al*., 2017) suspected pyometra by abdominal palpation and found abdominal distension and pain as common clinical sign of pyometra in bitches. Hernandez *et al.* (2003) reported that pyometra can be recorded radiographically, with presence of distended sacculated or confluent tubular structure

particularly in closed pyometra causing marked displacement of digestive viscera. Bigliardi *et al*. (2004) reported that radiography could be used as an aid in diagnosing pyometra in bitches. Singh *et al*. (2010), Agrawal *et al*. (2015) and Dar *et al*. (2015) reported apparent uterine radiography as fluid dense tubular structure in the ventral and caudal abdomen.

Gross Findings of Uterus and Ovaries

The findings on gross observations of uterus and ovaries of bitches with pyometra are presented in Table 1 and illustrated in Plate 1 to 5. The mean size of right and left uterine horns in bitches with pyometra were almost double than in normal bitches presented for spaying. The length of uterine horns in cases with pyometra varied from 12 to 53 cm. The mean weight of intact reproductive tract of bitches with pyometra on ovario-hysterectomy was 987.5 ± 317.61 g and in normal healthy bitches it was 77.50 ± 23.83 g. It varied from 250 to 2675 g in cases of pyometra (Table 1). The colour of uterine contents was found to vary in cases of pyometra from greyish to dark brownish with watery to thick consistency. Moreover, during ovario-hysterectomy, *in situ* examination of ovaries

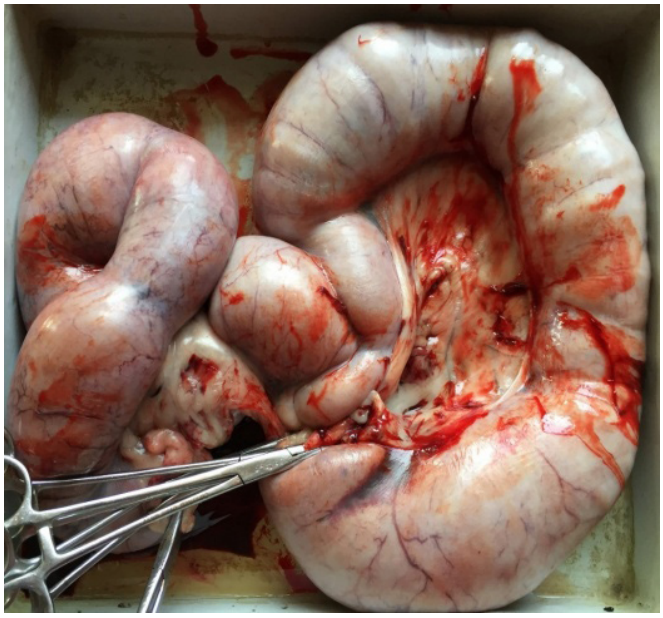

Plate 1: Photographic image showing pus filled uterus with congestion.

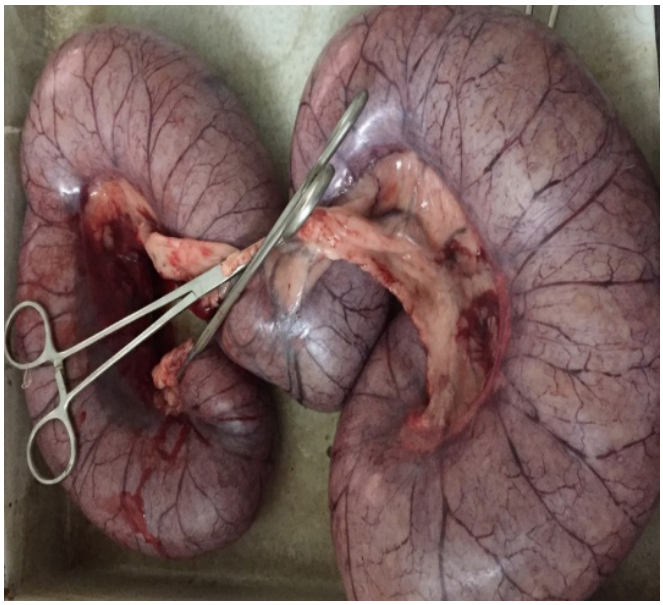

Plate 2: Photographic image showing thick pus filled cyanotic uterine horns.

Plate 3: Photographic image showing thick cyanotic pus filled uterine horns and congested blood vessels on uterine wall.

Plate 4: Photographic image showing pus filled uterus with slight torsion of uterine horns.

Table 1: Gross observations of uteri, uterine horns and ovaries in bitches with pyometra and normal healthy bitches

	Size of uterine horns (cm)		*Wt of intact reproductive organs(g)*	*Size of uterine body(cm)*	*Colour of uterine content*	*Consistency of uterine content*	*Ovarian structures*	
Case no.	*Right*	*Left*					*Right*	*Left*
1	12	14	350	4.5	Creamy yellow	Thick creamy	2 CL + 1 Cyst	1 CL
2	38	53	2675	6.5	Yellowish red	Semisolid	1 CL + 2 Cysts	2 CL
3	25	22.5	400	4.5	Brownish red	Watery	2 CL	1 CL
4	17	16	500	6.5	Reddish	Watery	1 CL	-
5	18	19.5	550	4.5	Yellowish	Thick creamy	-	1 CL
6	46	50	2450	5	Brownish red	Semisolid	1 CL + 2 Cysts	3 CL
7	20	21	300	3.5	Dark brownish	Thick	-	1 CL
8	12.5	11	250	4	Grayish Yellow	Semisolid	1 CL + 1 F	-
9	10	12	250	3.5	Dark reddish	Thick	1 CL	1 F
10	38	32	2150	6	Grayish yellow	Thick creamy	2 Cysts	3 CL
Overall	23.6 ± 4.01	25.1 ± 4.80	987.5 ± 317.61	4.85 ± 0.36	Variable	Variable	-	-
Normal	14.25 ± 1.19	14.10 ±1.15	77.50 ± 23.83	3.95 ± 0.28	Uterine mucous	Sticky	-	-

Plate 5: Photographic image showing normal uterus of a bitch.

revealed presence of variable numbers of corpora lutea, cysts or follicles, but not the tumours on either of the ovaries in majority of bitches with pyometra (Table 1). These findings concurred well with those of Dabhi *et al.* (2008) and Gupta *et al.* (2013).

Microbiology and Histopathological Changes in the Uterus

The cultural examination of uterine content of bitches with pyometra revealed Gram-negative bacilli in 5 cases, Gram-positive cocci in 3 cases and mixed isolates in 2 bitches, whereas the uterine swabs of normal healthy bitches were all negative or sterile. The antibiotic sensitivity testing revealed amoxycillin to be the most effective antibiotic (60.00 %) followed by amikacin and gentamicin (50.00 % each), ceftriaxone and tetracycline (30.00 % each), chloramphenicol and enrofloxacin (20.00 % each). Similar were the findings of Dabhi *et al.* (2008) and Gupta *et al.* (2013).

The findings of histopathological examinations of sections of uterine tissues from bitches with pyometra are depicted in Plates 6 and 7. There were mild to heavy infiltration of polymorphonuclear cells in glandular lumen of

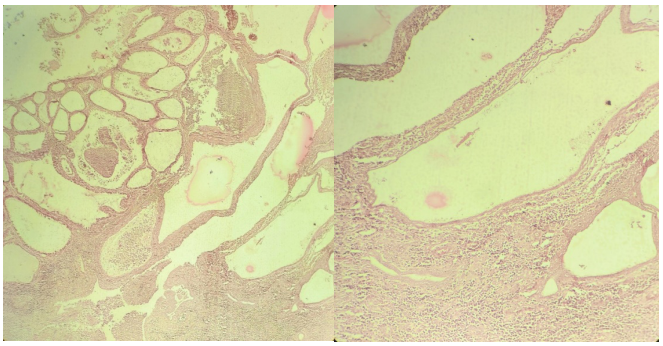

Plate 6: Section of uterus with pyometra showing a typical cystic dilatation of endometrial glands: (a) H&E, 120x, (b) H&E, 480x.

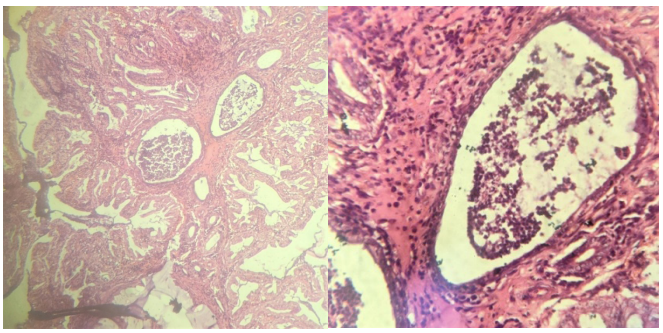

Plate 7: Section of pyometric uterus showing heavy infiltration of polymorphonuclear cells in glandular lumen: (a) H&E, 120x, (b) H&E, 480x.

endometrium in most of the cases. Marked cystic dilatation of endometrial gland was noted in some cases. Other lesions like haemorrhage, focal oedema of endometrium with necrotic debris filled in the lumen were also observed. There was hypertrophy and hyperplasia of endometrium and cystic dilatation of endometrial glands in chronic cases of pyometra. The changes were classical of cystic endometrial hyperplasia pyometra complex (CEHPC) recorded by earlier workers (Fransson *et al.,* 2004; Arora *et al.,* 2006; Dabhi *et al.,* 2008; Gupta *et al.,* 2015).

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