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Comparative efficacy of different diagnostic methods to evaluate pyometra in bitches

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Abstract
The present research was to comparative efficacy of different diagnostic methods to evaluate pyometra in bitches. All the pyometra suspected bitches (n=18) were subjected to diagnostic methods like abdominal palpation, haematological examination, radiography and ultrasonography. In abdominal palpation the uterine enlargement was observed. The lateral abdominal radiograph of bitches observed fluid filled with larger diameter dense tubular structure. The ultrasonography examination of bitches affected with closed and open cervix pyometra revealed an enlargement of uterus with convoluted, tubular horns filled with anechoic to hypoechoic fluid. The pyometra affected bitches was observed most common finding leukocytosis with absolute neutrophilia. It is concluded that canine pyometra diagnosis, qualitative and quantitative evaluation is an effective diagnostic method is ultrasonography examination.

Keywords: Pyometra, diagnosis, abdominal palpation, hematology, radiography, ultrasonography

Introduction
Pyometra is one of the most common diseases in bitches characterized by accumulation of purulent pus discharges within the uterus, leading to clinical and pathological findings (Johnston *et al.,* 2001) [16]. It is assumed that successive uterine exposure to progesterone causes an exaggerated response of the endometrium such as endometrial proliferation and increased uterine glandular secretion, decrease in myometrial contractions and cellular immune defences (Feldman and Nelson 1996; Noakes *et al.,* 2009) [9, 27]. Canine pyometra diagnosis was based on case history, physical examination, laboratory analyses and best diagnostic method is when radiography and ultrasonography are combined (Bigliardi *et al.,* 2004) [4]. The canine pyometra diagnosis can be made by a combination of different diagnostic methods like abdominal palpation; hematology, radiography and ultrasonography these are correlated thoroughly with the history and clinical examination (Singh *et al.,* 2010) [32]. The canine pyometra diagnosis was based on clinical signs (including purulent vaginal discharge, depression, anorexia, polyuria, polydipsia and vomiting), leukocytosis, cytological examination of vaginal discharge (presence of a large number of neutrophils) and ultrasonography (Kida *et al.* 2010) [18].

Materials and Methods
The research was studied at the Department of Veterinary Gynaecology & Obstetrics, C.V.Sc, Rajendranagar and Hyderabad. 18 clinical cases of different breeds of bitches age group of 2 to 12 years that were brought to the Veterinary Clinical Complex, Bhoiguda and Campus Hospital, College of Veterinary Science, Rnagar, Hyd during the period of January 2017 to November 2017 with known history and clinical symptoms indicative of canine pyometra. The canine pyometra was confirmed using diagnostic methods like abdominal palpation, hematology, radiography and ultrasonography.

Result and Discussion
Abdominal palpation act as diagnose to closed and open cervix pyometra bitches having uterine enlargement in 83.33 and 50% respectively. The uterine enlargement was observed unclear in 16.66% of bitches in both pyometra due to obesity and tensed abdomen which observes with similar findings of Jena *et al.,* (2013) [14]: Singh *et al.,* (2010) [32]; Baithalu *et al.,* (2010) [2]; Gupta *et al.,* (2013) [10]; Younis *et al.,* (2014) [36] and Agarwal *et al.,* (2016) [1]. The diagnostic method was found difficulty in palpation might be due to the weight and size of

bitches to determine the ease of palpating the uterine enlargement (Nelson and Feldman 1986) [26]. The bitches were observed filled with fluid tubular dense structure larger diameter in lateral abdominal radiograph than caudal area of abdomen and small intestinal loops in cranially in closed pyometra 66.66% and open pyometra 58.33% bitches observes with similar reports of Nelson *et al.,* (1982) [27]; Bhadwal (2004) [3]; Smith (2006) [34]; Singh *et al.,* (2010) [32]; Jena *et al.,* (2013) [14]; Dar *et al.,* (2015) [6] and Agarwal *et al.,* (2016) [1]. In abdominal radiography 33.33% of bitches did not show any uterine involvement which might be due to uterine drainage leading to empty of uterus. Shukla (2012) [31] discussed that tubular fluid dense structure in ventral and caudal abdomen displacing loops of intestine dorsally and cranially.

In ultrasonography examination affected pyometra bitches observed enlarged convoluted uterus and uterus tubular horns filled with anechoic to hypoechoic fluid in 83.33% of the cases observed as reported similar findings with Bhadwal (2004) [3]; Smith (2006) [34]; Pretzer (2008) [29]; Singh *et al.,* (2010) [32]; Jurka *et al.,* (2010) [17]; Baithalu *et al.,* (2010) [2] and Gupta *et al.,* (2013) [10]. Jena *et al.,* (2013) [14] who reported ultrasonography to be conclusive for both closed and open pyometra in 89.29% animals. However, England *et al.,* (2003) [7] observed in some cases where the uterine lumen was distended with a significant volume of pus, the uterine wall might be compressed or reduced by pressure atrophy. Baithalu *et al.,* (2010) [2] observed that ultrasonography diagnostic method is an accurate procedure for the qualitative and quantitative examination of canine pyometra. The efficacy of ultrasonography examination in diagnosis of closed and open pyometra was written in Table 1 and 2.

The present study, leukocytosis parameter was most consistent finding among the bitches affected with pyometra before treatment which was in similar with the previous authors of Singh *et al.* (2006) [6]; Verstegen *et al.,* (2008) [35]; Kuplulu *et al.,* (2009) [19]; Dabhi *et al.,* (2009) [5]; Nath *et al.,* (2009a) [24]; Mudasir *et al.,* (2011) [22]; Yu *et al.,* (2012) [37]; Murthy *et al.,* (2013) [23]; Jena *et al.,* (2013) [14] and Mohan *et al.,* (2014) [21]. Leukocytosis might be due to increased stress on the body defense mechanism which in turn produced and increased leucocytes to the infection as reported by Nath *et al.,* (2009a) [24] and Mudasir *et al.,* (2011) [22]. Leukocytosis was present in 90% of open cervix pyometra (Renton *et al.,* 1971) [30].

The present study showed that Total leukocyte count was 33.33% in pyometra affected bitches were found to be within normal range (< 17,000 cells). The normal leucograms with mild to moderate normocytic, normochromic anaemia might be due to the chronic nature of the disease and toxic suppression of the bone marrow (Verstegen *et al.,* 2008) [35]. The different degree of leucocytosis was observed in bitches affected with pyometra it might be due to severity of the inflammation as reported by Dabhi *et al.,* (2009) [5]. The leukocytosis was present in affected bitches is 57.1% due to the systemic character of the disease that overcomes uterine walls and reaches other organs (Hagman 2012; Jitpean *et al.,* 2014) [13, 15].

In the present study, the most consistent finding the bitches affected with pyometra was lymphopenia, absolute neutrophilia with shift to left and monocytosis with normal eosinophil count. Singh *et al.,* (2006) [33]; Kuplulu *et al.,* (2009) [19]; Nath *et al.,* (2009a) [24]; Dabhi *et al.,* (2009) [5]; Mudasir *et al.,* (2011) [22]; Yu *et al.,* (2012) [37]; Murthy *et al.,* (2013) [23]; Jena *et al.,* (2013) [14] and Mohan *et al.,* (2014) [21] reported that absolute neutrophilia with regenerative shift to left might be due to retention of purulent exudates in the uterus which exerts a chemotactic effect on neutrophils resulting into accelerated granulopoiesis and lymphopenia.

In closed pyometra neutrophil count was 16.66% and open pyometra the neutrophil count was 25% found to be within normal range (≤ 77%). However, Nelson and Feldman (1986) [25] described neutrophilia as a typical feature in haematology of bitches affected with pyometra. It might be due to influence of toxins in pyometra as reported by Hagman *et al.,* (2006b) [11] and England *et al.,* (2007) [8].

The present case was exhibited anaemia with marked leukocytosis, regenerative left shift; neutrophilia and monocytosis was reported as characteristic features of pyometra (Mahesh *et al.,* (2014) [20]. Leukocytosis with neutrophilia was a consistent predominant finding in the study is due to neutrophilia exhibited by > 90% of the animals (Patil *et al.,* 2013 and Murthy *et al.,* 2013) [28, 23].

Table 1: Efficacy of different diagnostic methods for open pyometra

Diagnostic methods		Description	No. of animals	Percentage (n=12)
Abdominal palpation		Normal	4	33.33
		Enlarged	6	50.00
		Unclear	2	16.66
Radiography		Inconclusive	4	33.33
		Conclusive	7	58.33
		Not done	1	8.33
Ultrasonography		Inconclusive	2	16.66
		Conclusive	10	83.33
Haematology	TLC	< 17000 cells/mm^3	4	33.33
		>17000 cells/mm^3	8	66.66
	Neutrophilic count	≤ 77 per cent	3	25.00
		>77 per cent	9	75.00

Table 2: Efficacy of different diagnostic methods for closed pyometra

Diagnostic methods		Description	No. of animals	Percentage (n=6)
Abdominal palpation		Normal	1	16.66
		Enlarged	5	83.33
Radiography		Inconclusive	1	16.66
		Conclusive	4	66.66
		Not done	1	16.66
Ultrasonography		Inconclusive	1	16.66
		Conclusive	5	83.33
Haematology	TLC	< 17000 cells/mm^3	2	33.33
		>17000 cells/mm^3	4	66.66
	Neutrophilic count	≤ 77 per cent	1	16.66
		>77 per cent	5	83.33

A. Lateral Abdominal Radiograph of a Seven Year Old Pomeranian Bitch Affected With Pyometra

B. Ultrasonographic Image of Five Year Old Pug Bitch Showing Accumulation of PUS and Thickening of the Wall of Uterus

Conclusion

The open and closed cervix pyometra diagnosis was made by previous history, clinical signs, radiography, abdominal palpation, ultrasonography and elevated levels in physiological, haematological and biochemical parameters. Above the different diagnostic techniques of pyometra, ultrasonography method was found to be the most efficient method. Leucocytosis with neutrophilia, monocytosis and lymphopenia were consistently found in canine pyometra.

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