Applied Biological Research 20(2): 215-217; (2018) **SHORT NOTE**
DOI: 10.5958/0974-4517.2018.00028.9

A REPORT ON CLINICAL MASTITIS ASSOCIATED WITH PSEUDOPREGNANCY IN A GREAT DANE BITCH

Alok Kumar Chaudhary[1], Vinod Kumar Singh[2*], Mukesh Kumar Srivastava[1], Amangeet Parashar[1], Ankur Upadhyay[1] and Sujeet Kumar Chaudhary[1]

[1]Department of Veterinary Medicine, [2]Department of Veterinary Microbiology, College of Veterinary Science and Animal Husbandry, DUVASU, Mathura – 281 001, Uttar Pradesh (India)
*e- mail:*vet.vinodsingh@gmail.com*

(Received 27 January, 2018; accepted 14 April, 2018)

Mastitis is an infrequent condition in canines relative to the scenario of this disease in farm animals (Schlafer and Miller, 2007). Canine mastitis usually occurs in postpartum period but may also occur in later stages of pregnancy and pseudopregnancy (Wiebe and Howard, 2009). Usually mastitis is a disease of bacterial etiology (Orfanou *et al*., 2008), but parasitic etiology has also been reported (Park *et al*., 2007). The main bacterial agents involved are coliforms, *Staphylococcus* sp. and *Streptococcus* sp. (Wiebe and Howard, 2009). Affected animal usually displays general symptoms of fever, vomiting, dehydration, anorexia, trembling and decreased mothering behaviour. Canine mastitis has favourable prognosis when there is early diagnosis and appropriate treatment is provided. The laboratory diagnosis usually includes pH test, cytology and microbiology of milk. There are meagre reports wherein hematology and biochemistry assays have also been taken into consideration for mastitis diagnosis (Ververidis *et al*., 2007; Vasiu *et al*., 2016). This report describes a case of pseudopregnancy associated mastitis caused by *Klebsiella pneumoniae* (*K. pneumoniae*) in a Great Dane bitch and its successful therapeutic management.

A 3-year old Great Dane bitch was presented with the complaint of sudden swelling of last two pair of posterior teats from the past 10 days. On the day of presentation, the general clinical examination revealed pyrexia (39.7ºC), increased respiration rate (64 min^{-1}), tachycardia (135 beats min^{-1}) and congested mucus membranes. Physical examination of affected mammary glands showed warm, erythematic, edematous and painful condition with palpable soft mass (Fig. 1). When squeezed with fingers, purulent exudate from teats was observed, which was subjected to white-side test resulting in the formation of thick gel, indicative of severe mastitis. As there was no history about the mating status, the clinical findings were suggestive of pseudopregnancy associated mastitis, so to confirm the diagnosis, ultrasonography was performed which revealed the absence of fetus and no abnormal growth in affected mammary glands. Further examination included hematology, serum biochemistry analysis and pH determination, cytology and microbiology of milk followed by antimicrobial susceptibility test of bacterial isolate.

The hematological values were normal, except a slight neutrophilia, while most serum biochemistry parameters were within the normal range (Table 1). The pH of milk was alkaline as determined by using pH strips. Cytology examination revealed degenerated neutrophils, foam cells and plenty of rod shaped bacteria. Primary culture revealed white, mucoid, non-hemolytic medium-sized colonies on blood agar and pink mucoid colonies on MacConkey lactose agar (MLA) media plates (Fig. 2). Gram staining showed similar Gram -ve rods from both the plates while biochemical tests indicated catalase (+), coagulase (+), indole (-), MR (-), VP (+) citrate (+), nitrate reduction (+), lactose (+), glucose (+) and mannitol (+). Based on these characteristics, the cultured agent was identified as *K. pneumoniae*. In disc diffusion antimicrobial susceptibility test, the isolate was found sensitive to amikacin, gentamicin, kanamycin, ofloxacin, gemifloxacin, morbifloxcacin, cefoperazone/sulbactam and resistant to amoxyclav, ampicillin/sulbactam, tetracycline, cefotaxime, ceftizoxime, ceftriaxone, cefepieme/tazobactam, ceftazidime and ceftazidime/tazobactam. The therapeutic plan in present case

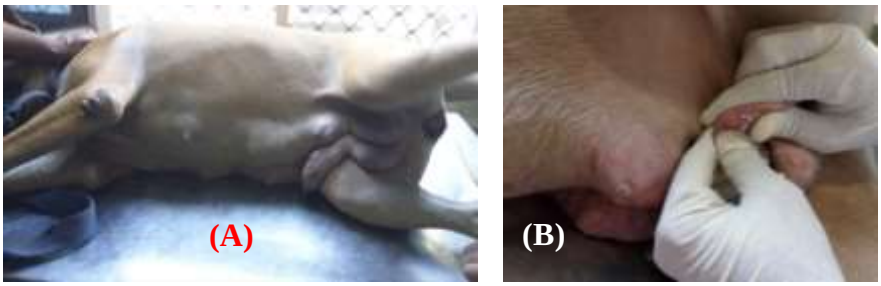

Fig. 1: A) Swelling in the posterior last two pair of mammary glands on the day of presentation B) Purulent exudates observed on squeezing the teats

Fig. 2: Culture growth on (A) Blood agar and (B) MLA media plates

Table 1: Hematological and serum biochemical analysis of Great Dane bitch

Parameters	On day of presentation	3-days after treatment
Hematological parameters		
RBC (μL^{-1})	6.3 x 10^6	6.6 x 10^6
WBC (μL^{-1})	10.6 x 10^3	12.9 x 10^3
Hb (%)	12.8	13.6
HCT (fL)	41	43
MCV (pg)	30	31
MCHC (gd L^{-1})	30.4	30.7
RDW (%)	18	18
PLT (μL^{-1})	287 x 10^3	297 x 10^3
Neutrophils (%)	85	79
Lymphocyte (%)	10	16
Monocyte (%)	3	3
Esinophils (%)	1	1
Basophils (%)	1	1
Serum biochemical parameters		
BUN (mg dL^{-1})	20	15
Serum creatinine (mg dL^{-1})	0.2	0.3
ALT (u L^{-1})	26	32
AST (u L^{-1})	28	29
ALP (u L^{-1})	135	156
Blood glucose (mg dL^{-1})	75	128
Albumin (mg dL^{-1})	3.8	5.3
Globulin (mg dL^{-1})	2	3
Calcium (mg dL^{-1})	6.8	9.6
Phosphorus (mg dL^{-1})	1.9	3.5
Sodium (mEq L^{-1})	134	135
Potassium (mEq L^{-1})	3.6	3.8

was aimed at resolving the pseudo-pregnancy to achieve the MIC level of drugs in affected mammary tissue selected on the basis of the *in vitro* susceptibility test. For this purpose, cabergoline suspension was prescribed to correct the pseudo-pregnancy at a dose of 0.1 mL kg^{-1} bw corresponding to 5 µg kg^{-1} bw given orally once daily for 5 to 10 days, along with systemic antibiotic therapy by intravenous infusion of morbifloxacin @ 4 mg kg^{-1} bw and intra-mammary infusion of a combination of cephalexin and kanamycin having a synergistic effect for the effective control of the bacteria. Supportive therapy includes anti-inflammatory carprofen @ 1.2 mg kg^{-1} body weight subcutaneous injection and two teaspoon multivitamin-multimineral syrup once a day to help the dog recover faster. The animal responded well to the treatment and gradually recovered to normal. The case was followed for a month; the bitch remains healthy and active with no clinical or subclinical mastitis.

The bitch revealed pseudopregnancy associated mastitis of posterior last two pair of mammary glands. The clinical picture of the affected glands presented warm, erythematic, edematous and painful condition similar to the findings of Vasiu *et al*. (2015). The alkaline pH and cytological finding of milk supported the clinical diagnosis and were in agreement with the findings of Hasegawa *et al*. (1993) and Vasiu *et al*. (2016). Sangha *et al*. (2011) proved that milk cell counts increase in bitch mastitis episodes by comparing cytological findings with histological diagnosis. In present case, most hematological and biochemical parameters showed no significant change which may be attributed to the time lapse between sample collection and the onset of infection as also observed by Ververidis *et al*. (2007) from samples collected in later days from the onset of infection in their

study. Microbiology of the milk revealed pure growth of *K. pneumoniae*, rare in occurrence. So far, *Staphylococcus* spp., *Streptococcus* spp., *E. coli*, *Proteus miriabilis*, *Pseudomonas aeruginosa*, *Citrobacter freundii* have been identified from bitches with mastitis (Schafer-Somi, 2003; Araujo *et al*., 2011; Toydemir *et al*., 2015). The involvement of the posterior last two pair of mammary gland in the present case indicates the possible inoculation of the *K. pneumoniae* by urine and fecal contamination. Mammary infections in canines are generally overlooked and require extra care while evaluating the etiopathology. The correct and early diagnosis of mammary gland infections in dams is the necessity to save the bitch and the pups. Further, bacteriological studies on this subject will be helpful for the veterinarians working with pet animals. It shall be of interest to practice judicious use of antibiotics by regular antimicrobial susceptibility testing to avoid the emergence of multidrug-resistant pathogens and their zoonotic transmissibility from dogs to humans or vice versa.

Ethical statement: The case study protocol was performed in compliance with institutional ethical guidelines. The owner of the animal under study gave consent for clinical procedures.

CLSI. 2006. *Performance Standards for Antimicrobial Susceptibility Testing: 16th Informational Supplement (M100-S16).* Clinical and Laboratory Standards Institute, Pennsylvania, USA.

Hasegawa, T., Fuji, M., Fukada, T., Tduji, C., Fujita, T., Goto, Y., Shinjo, T. and Ogawa, H. 1993. Platelet abnormalities in a dog suffering from gangrenous mastitis by *Staphylococcus aureus* infection. *Journal of Veterinary Medical Science*, **55**: 169-171.

Marina, A.R., Preis, I.S., Franca, S.A., Paniago, J.G., Costa, M.C., Oliveira, S., Juliana, V. and Roselene, E. 2011. Mastitis accompanied by lymphadenitis in a dog caused by *Staphylococcus hyicus*. *Brazilian Journal of Veterinary Pathology*, **4**: 52-57.

Munnich, A. and Lubke-Becker, A. 2004. *Escherichia coli* infections in newborn puppies - Clinical and epidemiological investigations. *Theriogenology*, **62**: 562-575.

Orfanou, D.C., Ververidis, H.N., Boscos, C.M. and Fthenakis, G.C. 2008. Post-partum pathological conditions in the bitch - Part I. *Journal of the Hellenic Veterinary Medical Society*, **59**: 126-138.

Park, C.H., Ikadai, H., Yoshida, E., Isomura, H., Inukai, H. and Oyamada, T. 2007. Cutaneous Toxoplasmosis in a female Japanese cat. *Veterinary Pathology*, **44**: 683-687.

Sangha, S., Singh, A., Sood, N.K. and Gupta, K. 2010. Specificity and sensitivity of cytological techniques for rapid diagnosis of neoplastic and non-neoplastic lesions of canine mammary gland. *Brazilian Journal of Veterinary Pathology*, **4**: 13-22.

Schafer-Somi, S., Spergser, J., Breitenfellner, J. and Aurich, J.E. 2003. Bacteriological status of canine milk and septicaemia in neonatal puppies – A retrospective study. *Journal of Veterinary Medicine B, Infectious Diseases and Veterinary Public Health*, **50**(7): 343-346.

Schlafer, D.H. and Miller, R.B. 2007. Female genital system. pp. 429-564. **In**: *Pathology of Domestic Animals* (eds. K.V.F. Jubb, P.C. Kennedy and N.C. Palmers), Elsevier, Philadelphia, USA.

Toydemir, T.S.F., Bagcigil, A.F., Ozgur, N.Y. and Kirsan, I. 2015. Examination of aerobic bacteria from milk samples of bitches with clinical mastitis. *Journal of Faculty of Veterinary Medicine, Istanbul University*, **41**: 227-231.

Vasiu, I., Sarpataki, O., Bedecean, I., Pop, A.R. and Brudasca, G.F. 2016. Haematologic and biochemical changes in bitches with clinical and subclinical mastitis. *Bulletin UASVM Veterinary Medicine*, **73**: 248-252.

Vasiu, I., Spinu, M., Pop, A.R., Bedecean, I., Sarpataky, O. and Brudasca, G.F. 2015. Mastitis acuta in a Hungarian Viszla bitch, caused by a *Staphylococcus intermedius* infection. *The Romanian Review of Veterinary Medicine*, **25**(2): 51-54.

Ververidis, H.N., Mavrogianni, V.S., Fragkou, I.A., Orfanou, D.C., Gougoulis, D.A., Tzivara, A., Gouletsou, P.G., Athanasiou, L., Boscos, C.M. and Fthenakis, G.C. 2007. Experimental staphylococcal mastitis in bitches: Clinical, bacteriological, cytological, haematological and pathological features. *Veterinary Microbiology*, **124:** 95-106.

Wiebe, V.J. and Howard, J.P. 2009. Pharmacologic advances in canine and feline reproduction. *Topics in Companion Animal Medicine*, **24**: 71-99.