Case Report

JOURNAL OF VETERINARY CASE REPORTS

2022; 2(1-2): 1-5

A Case of Cystic Endometrial Hyperplasia and Open Cervix Pyometra Due to *Mannheimia haemolytica* in a Queen

Vefa TOHUMCU[1a]✉, Cihan ÖZ[2b], Şifanur AYDIN[1c], Alper Yasin ÇİPLAK[1d]

1. Atatürk University, Faculty of Veterinary Medicine, Department of Obstetrics and Gynecology, Erzurum, TURKEY.
2. Atatürk University, Faculty of Veterinary Medicine, Department of Microbiology, Erzurum, TURKEY.

ORCID: 0000-0003-4062-7513[a], 0000-0003-35475965[b], 0000-0002-8332-0514[c], 0000-0002-7912-7703[d]

Published
30.12.2022

To cite this article:
Tohumcu V, Öz C, AYDIN Ş, ÇİPLAK AY: A Case of Cystic Endometrial Hyperplasia and Open Cervix Pyometra Due to *Mannheimia haemolytica* in a Queen. Atatürk University J. Vet. Sci., 2(12: 1-5, 2022.

Abstract: This case report investigated a case of cystic endometrial hyperplasia and open cervix pyometra (CEH+P) in a 5-year-old, unspayed, nulliparous tabby cat complaining of vaginal discharge, anorexia, and high fever. According to the patient's owner's anamnesis, it was reported that the cat had no appetite, was stagnant, and had purulent discharge from the vagina. On ultrasound examination, the cat was diagnosed with cystic endometrial hyperplasia. Because the recurrence rate was high despite treatment of the disease, an ovariohysterectomy was performed with the owner's consent. After surgery, samples were collected from the uterus under sterile conditions for microbiological examination. In the microbiological examination, *Mannheimia haemolytica* (*M. haemolytica*) was isolated and the conventional bacteriological diagnosis was confirmed by molecular examination. In conclusion, *M. haemolytica* may be the etiologic cause of cases of cystic endometrial hyperplasia and open cervix pyometra (OCP) in tabby cats.

Keywords: Cystic endometrial hyperplasia pyometra complex, *Mannheimia haemolytica,* Ovariohysterectomy, Progesterone.

INTRODUCTION

Progesterone is a steroid hormone that causes increased secretion in the endometrial glands. This secretion from the endometrial glands creates a suitable environment for bacterial growth in the uterus. Although progesterone is the most important hormone in the pathogenesis of the cystic endometrial hyperplasia and pyometra (CEH+P) complex (1), it is thought to play an important role in estrogen formation (2,3). Estrogen hormone causes dilation of the cervix during the estrous cycle, and the resulting opening predisposes bacteria found in the normal flora of the vagina to colonize the uterus (1). Purulent inflammation occurs as a result of increased bacterial contamination and colonization (1,4). Number of births, age, estrus, and controlled of ovulation (suppression or delay) have been found to predispose to CEH+P. The incidence of cases is particularly high in queens that have never given birth and older than 5 years (1).

Acinetobacter spp., *Actinomyces* spp., *Corynebacterium* spp., *Escherichia coli (E. coli), Haemophilus* spp, *Klebsiella* spp, *Lactobacillus* spp, *Staphylococcus* spp, and *Streptococcus* spp constitute the vaginal flora of healthy queens. The

✉Vefa TOHUMCU
Atatürk University, Faculty of Veterinary Medicine, Department of Obstetrics and Gynecology, Erzurum, TURKEY.
e-mail: vefa.tohumcu@atauni.edu.tr

most commonly isolated bacterial species are Coagulase-Negative *Staphylococci* (CNS)*, Streptococcus canis (S. canis), and E. coli* (5). *M. haemolytica*, which causes some respiratory diseases in cattle (6) and mastitis in sheep (7), is also one of the reported pyometra agents. *M. haemolytica*, an opportunistic pathogen found in the flora of the oral cavity, nasopharynx, and tonsils of cats and dogs, was isolated from a queen with closed cervix pyometra (CCP) (8).

Surgical and medical treatment are the two main therapeutic options in the treatment of CEH+P. In medical treatment, prostaglandin F2α (PGF2α) and/or aglepristone (9) can be administered to queens with overt cervix pyometra (OCP) (1). However, there is a possibility of disease recurrence with medical treatment. Because of this possibility, the surgical procedures of endometrial curettage or OHE (1) are preferred. In addition, treatment should be supplemented with fluid therapy because of the possibility of developing endotoxemia (10).

The purpose of the presented case is to identify the bacterium that causes CEH+P, as well as the clinical course of these cases and the points to consider in treatment.

CASE REPORT

A 5-year-old queen, which had not previously delivery, showed regular estrus, and was not taking exogenous hormone, was brought to the emergency clinic of the Faculty of Veterinary Medicine, Atatürk University, complaining of a disturbance in general condition. Preliminary examination revealed that the body temperature was high (39.6°C), moderate dehydration was present, and the response to stimuli decreased. The queen's owner stated that the animal showed signs of anorexia and apathy. It was also learned that the sick queen had been found with a neutered male cat and had mated with the male cat 4 days ago. During the first intervention at the emergency clinic and fluid therapy (0.9% isotonic sodium chloride in the form of a 150-mL i.v. infusion) was started to correct dehydration. On the second day after the first procedure, the queen's owner contacted us again complaining of abnormal vaginal discharge (dark green color).

After a preliminary diagnosis of pyometra was made, an ultrasound examination was performed transabdominal with a convex probe (7.5-mHz). The examination performed revealed a folded, echogenic, and enlarged endometrium in addition to mild fluid accumulation in the uterus (Figure 1A). To substantiate the diagnosis, a smear sample was taken for cytological examination. The collected smear sample was evaluated at the Diagnostic and Analysis Laboratories of Ataturk University, Faculty of Veterinary Medicine. Intense neutrophilic infiltration was present on cytological examination and bacteria were seen in the microscopic scan area.

Fluid therapy (0.9% isotonic sodium chloride in the form of an infusion of 150 mL + 50 mL of Ringer's lactate) was continued because the dehydration symptoms noted the previous day continued to worsen. An antibiotic containing 35 mg clavulanic acid and 140 mg amoxicillin trihydrate was administered subcutaneously at a dose of 8.75 mg/kg. Anesthesia was induced with 5 mg/kg propofol 40 minutes after preanesthesia with 0.03 mg/kg medetomidine intramuscularly. Continuity of anesthesia was provided with 6% sevoflurane and 1 L/min oxygen. After a median laparotomy, the pathologically enlarged uterus was reached and removed along with the ovaries (Figure 1B). An antibiotic solution containing 5 mg metronidazole per milliliter was administered i.v. as an infusion in a total dose of 125 mg (25 mL). The surgical line was closed with absorbable 2/0 surgical suture material from the inside to the outside.

An incision was made in the removed uterus under sterile conditions, which included all layers. A sterile swap was inserted through the incision line and a bacteriological culture sample was collected and sent to the laboratory. The collected swap sample was inoculated onto 7% sheep blood agar and Mac Conkey agar. As a result of incubation, S-type and hemolyzed colonies were obtained on blood agar under microaerophilic conditions, whereas no

growth occurred on Mac ConkeyAgar (Figure 2A). Gram-negative rods were detected as a result of Gram staining from pure culture (Figure 2B).

Catalase and oxidase assays were performed from the colonies. Then, biochemical tests and sugar tests were performed and incubated at 37 ℃ for 24 hours. As a result of incubation, the test results were evaluated and the pathogen was found to be *M. haemolytica*. To determine the antibiotic susceptibility of the pathogen, the Kirby-Bauer disk diffusion method was used according to the Clinical Laboratory Standards Institute (CLSI) standards (CLSI 2006). The antibiogram revealed that the bacterium is sensitive to the antibiotics amoxicillin+clavulanic acid, marbofloxacin, ceftiofur, tetracycline, cefovesin, cefoxitin and gentamicin (Figure 2C).

DNA extraction from *Mannheimia haemolytica* culture was performed, followed by Polymerase Chain Reaction (PCR) and gel electrophoresis to confirm that the isolate was *M. haemolytica* (Figure 2D).

After the surgery, feeding with wet food was recommended, and the general condition (body temperature, appetite, interest in the environment) was observed for 72 hours. Within a week after treatment, the symptoms of the disease returned to normal.

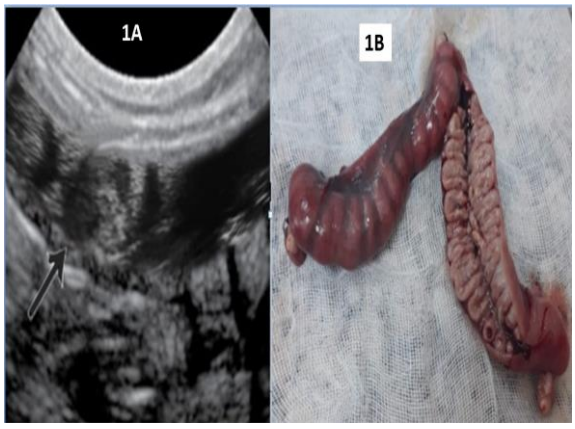

Figure 1A: Ex- vivo view of the folded, echogenic, and thickened endometrium **1B:** Hyperplasic uterus on transabdominal ultrasound

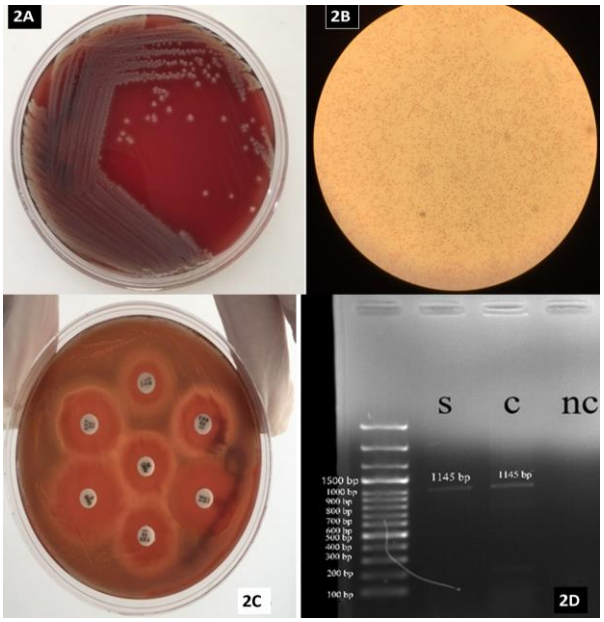

Figure 2A: Growth image of *M. haemolytica* on blood agar **2B:** Gram stain image of *M. haemolytica,* **2C:** Antibiogram image made by Disk Diffusion Method, **2D:** *M. haemolytica* gel electrophoresis image; S: Sample, C: Control, n.c: Negative Control

DISCUSSION

Although common in bitches, this disease, which is rare in queens, has a high mortality rate (11). In this case, a 5-year-old queen was found to have CEH+P. CEH+P complex usually occurs in nulliparous queens older than 3 years of age (1). In the case report presented, the fact that the sick queen is 5 years old and has never given birth confirms this feature of the disease. Lethargy, anorexia, vomiting, dehydration, abdominal distension, cervical dilation, vaginal discharge, polyuria, polydipsia, and high fever are the symptoms observed in patients with CEH+P complex (1,10). On the other hand, polyuria and polydipsia have been reported to be more common in bitches than in queens (1). In this case, all symptoms except polyuria and polydipsia were observed. Transabdominal ultrasonography is the preferred diagnostic method in the diagnosis of CEH+P complex in queens and bitches (12).

Clinical signs in queens can occur within 4 weeks of ovulation stimulation by mechanical, spontaneous, or mating (13). Mating with a neutered male cat at home in the case resulted in an increase in

progesterone following provoked ovulation and subsequent formation of CEH (14). An increase in estrogen during estrus causes the opening of the cervix and the migration of bacteria to the uterus (1). On the other hand, the dilation of the endometrial glands and the accumulated secretions in the uterus create a suitable environment for bacterial growth (12).

Various bacteria have been isolated in CEH+P cases (5). *M. haemolytica*, an opportunistic pathogen found in the flora of the oral cavity, nasopharynx, and tonsils of cats and dogs, causes inflammatory changes in the respiratory tract, urogenital system, and mammary gland. *M. haemolytica*, previously isolated from a queen with CCP (8), was detected by PCR after a pure culture was established in a queen with OCP in the present case. Moreover, the antibiotic susceptibility of *M. haemolytica* was determined by antibiogram. Since the results of PCR and antibiogram, which are among the definitive diagnostic methods for the etiologic agent, take time, antibiotics may be preferred for prophylaxis, and for this purpose a combination of amoxicillin+clavulanic acid may be preferred (15). In this case, the combination of amoxicillin + clavulanic acid was preferred and was found to be sufficient for postoperative recovery.

Bacterial toxins and inflammatory products that are absorbed from the uterus and enter the bloodstream are known to cause sepsis, endotoxemia, and shock (10). Considering that the general condition may deteriorate after surgery, fluid therapy was administered for 5 days postoperatively. Consequently, *M. haemolytica* may predispose to the development of the CEH+P (OCP). In addition, the symptoms present in the case report, the diagnosis and the treatment methods used were explained in detail

Conflict of Interest

The authors declare that they have no conflict of interest.

REFERENCES

1. Agudelo CF., 2005. Cystic endometrial hyperplasia-pyometra complex in cats. A review. Veterinary quarterly,27, 173-182. DOI: https://doi.org/10.1080/01652176.2002.9695198
2. Potter K., Hancock DH., Gallina AM., 1991. Clinical and pathologic features of endometrial hyperplasia, pyometra, and endometritis in cats: 79 cases (1980-1985). Journal of the American Veterinary Medical Association, 198, 1427-31.
3. Axnér E., 2010. Clinical approach to conditions of the non-pregnant and neutered queen. In: "Manual of Canine and Feline Reproduction and Neonatology", Ed, England G., and von Heimendahl A., 2nd edn, 185-190, British Small Animal Veterinary Association, Gloucester
4. Feldman EC., Nelson RW., 2004. Feline reproduction. In: Canine and Feline Endocrinology and Reproduction, 3rd Ed, Feldman EC., Nelson RW., 1016-1045, Elsevier Saunders, Missouri
5. Clemetson LL., Ward AC., 1990. Bacterial flora of the vagina and uterus of healthy cats. Journal of the American Veterinary Medical Association, 196, 902-906.
6. Mason C., Errington J., Foster G., Thacker J., Grace O., Baxter-Smith K. 2022. Mannheimia haemolytica serovars associated with respiratory disease in cattle in Great Britain. BMC veterinary research,18, 1-4. DOI: https://doi.org/10.11186/s12917.021.03121.3
7. Rasheed TJ., Jwher DM., 2022. Isolation, identification and genetic analysis of Mannheimia haemolytica in ovine clinical mastitis in Mosul city. Iraqi Journal of Veterinary Sciences,36, 381-386. DOI: https://doi.org/10.33899/ijvs.2021.130347.1805
8. Uçmak ZG., Sığırcı BD., Uçmak M., Çetin AC., Metiner K., Halaç B., 2018. Mannheimia haemolytica İzole Edilen Pyometralı Bir Kedi Uterusunun Anormal Genişlemesi. Harran Üniversitesi Veteriner Fakültesi Dergisi, 7, 233-

9. 236. DOI: https://doi.org/10.31196/huvfd.509002
10. Attard S., Bucci R., Parrillo S., Pisu MC., 2022. Effectiveness of a Modified Administration Protocol for the Medical Treatment of Feline Pyometra. Veterinary Sciences, 9, 517. DOI: https://doi.org/10.3390/vetsci9100517
11. Hagman R., Kındahl H., Lagerstedt AS., 2006b. Pyometra in bitches induces elevated plasma endotoxin and prostaglandin F2 alpha metabolite levels. Acta Vet Scand, 47, 55-67.
12. dos Anjos Pires M., Vilhena H., Miranda S., Pereira MT., Seixas F., Saraiva AL., 2016. Proliferative endometrial lesions hidden behind the feline pyometra. Insights from Animal Reproduction, 227. DOI: https://dx.doi.org/10.5772/62788
13. Hagman R., 2018. Pyometra in Small Animals. Veterinary Clinics of North America Small Animal Practice, 48:639-661. DOI: https://doi.org/ 10.1016/j.cvsm.2018.03.001
14. Ferré-Dolcet L., Frumento P., Abramo F., Romagnoli S., 2021. Disappearance of signs of heat and induction of ovulation in oestrous queens with gonadorelin: a clinical study. Journal of Feline Medicine and Surgery,23, 344-350.
15. Johnston SD., Kustritz MVR., Olson PNS., 2001. Canine and Feline Theriogenology. 1st Eds., 463-471, W.B. Saunders Company, Philadelphia.
16. Bagri HK., Sharma M., Sethi M., Shah N., Baishya A., Kumar P., Bhakat M., Mohanty TK., 2022. An overview on etiopathogenesis of canine pyometra and its management. The Pharma Innovation Journal, SP-11, 1184-1188. DOI: https://doi.org/10.1177/1098612X209512