Chronic atrophic endometritis and pyometra in a ferret: A case report
Anton Lazarinov Antonov1,2, Radostin Stefanov Simeonov2, Koycho Petkov Koev3

1Department of Obstetrics, Reproduction and Reproductive Disorders, Faculty of Veterinary Medicine, Trakia University, Stara Zagora, 6000, Bulgaria
2Department of General and Clinical Pathology, Faculty of Veterinary Medicine, Trakia University, Stara Zagora, 6000, Bulgaria
3Department of Veterinary Microbiology, Infectious and Parasitic Diseases, Faculty of Veterinary Medicine, Trakia University, Stara Zagora, 6000, Bulgaria

ARTICLE INFO
Article history:
Received 12 December 2018
Revision 20 December 2018
Accepted 30 December 2018
Available online 25 January 2019

Keywords:
Ferret
Uterus
Endometritis
Pyometra

ABSTRACT
The aim of this report was to describe a clinical case of chronic atrophic endometritis as a complication of cystic endometrial hyperplasia-pyometra complex in a non-spayed ferret. The ferret was presented with a slight abdominal distension and odorless purulent vulvar discharge after unsuccessful medical treatment with enrofloxacine and aglepristone 2 months ago in another clinic. Ultrasonography revealed enlarged uterine horns filled with fluid and blood laboratory analysis showed anaemia and leukocytosis, so diagnosis of pyometra was made. Laparotomy and ovariohysterectomy were performed. Histopathological and microbiological examination of the uterus revealed the presence of purulent atrophic endometritis caused by Staphylococcus spp. In conclusion, this is a very rare case of endometrial atrophia after chronic uterine inflammation in a ferret.

1. Introduction

Pyometra in ferrets (Mustela putorius furo) has been previously reported as a complex with cystic endometrial hyperplasia (CEH) [1,2]. The uterine inflammation is a result of invasion most often by Escherichia coli entering through the vagina[3]. CEH is suspected to be one of the predisposing factors for the development of infection because of the cystic distention of uterine glands, fibrosis, accumulation of intraluminal fluids, development of crypts and cysts where bacteria can proliferate[4].

CEH-pyometra complex is associated with increased levels or imbalance of ovarian steroids[3]. Progesterone stimulates endometrial gland secretion, suppresses the immune responses, diminishes myometrial activity, causes functional closure of the cervix which inhibits the drainage of uterine fluids and provides a suitable environment for bacterial growth[5]. Estrogen increases the number of progesterone receptors and persistently high levels may lead to inappropriate proliferation of the endometrium[6]. The repeated and prolonged response to steroids may lead to endometrial changes like hydrometra, mucometra and if bacterial invasion occurs to pyometra[7,8].

In ferrets, CEH-pyometra complex is associated with the presence of adrenal gland disease, remnant ovarian tissue and ovarian cancer[2,3].

In our opinion, it is a very rare report of a case of chronic atrophic endometritis as a complication of pyometra in a ferret.

This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.
For reprints contact: reprints@medknow.com
©2019 Asian Pacific Journal of Reproduction Produced by Wolters Kluwer-Medknow
How to cite this article: Antonov AL, Simeonov RS, Koev KP. Chronic atrophic endometritis and pyometra in a ferret: A case report. Asian Pac J Reprod 2019; 8(1): 39-42.
2. Case description

A 5-year-old multiparous ferret, weighting 0.81 kg, was presented to the Small Animal Clinic of the Faculty of Veterinary Medicine, Trakia University in Stara Zagora, Bulgaria, with signs of slight abdominal distension and odorless purulent vulvar discharge. The owner reported that these signs spontaneously started 2 months ago and the ferret was brought to another clinic where the veterinarian prescribed medical treatment with enrofloxacine and aglepristone for 5 consecutive days.

On physical examination, there were no changes in the general condition of the animal. Rectal body temperature was 38.8 °C, heart rate was 200/min, and respiratory rate was 39/min. The colour of visible mucosa coats was rose-red.

At the inspection of the external genitalia it was found that the vulva was oedematous and with odorless purulent discharge (Figure 1). Radiographically a soft tissue mass was found into the abdomen (Figure 2). Transabdominal ultrasonography (Mindray DC-6 Vet, China, 6.5 MHz convex transducer) revealed fluid-filled uterine horns (Figure 3). The urinary bladder was found in its normal anatomic location.

To determine complete blood cell counts and biochemical parameters, blood samples (about 1 mL) were collected by venipuncture of the cephalic vein. Complete blood cell counts were assayed using an automated haematological analyser BC-2800 Vet (Mindray, China), and blood biochemical parameters were tested using an automated biochemical analyser BS 120 (Mindray, China). Blood laboratory analysis showed the presence of anaemia and leukocytosis (Table 1).
Table 1

Hematological and blood biochemistry analysis results.

| Indexes | Result | Reference values |
|---------|--------|------------------|
| Hematology | | |
| HGB (g/L) | 123 | 125-182<sup>[9]</sup> |
| HCT (%) | 38.4 | 37.5-59.0<sup>[9]</sup> |
| RBC (×10<sup>12</sup>/L) | 4.17 | 6.60-12.18<sup>[9]</sup> |
| WBC (×10<sup>9</sup>/L) | 19.5 | 2.5-15.8<sup>[9]</sup> |
| PLT (×10<sup>9</sup>/L) | 242 | 238-910<sup>[9]</sup> |
| MCV (fl) | 46.4 | 43.6-61.2<sup>[9]</sup> |
| Biochemistry | | |
| AP (U/L) | 96 | 30-120<sup>[9]</sup> |
| Glucose (mmol/L) | 5.60 | 4.44-6.49<sup>[9]</sup> |
| AST (U/L) | 214 | 50-280<sup>[9]</sup> |
| ALT (U/L) | 113 | 82-289<sup>[9]</sup> |
| Urea (mmol/L) | 2.70 | 1.99-7.16<sup>[9]</sup> |
| Creatinine (µmol/L) | 43.8 | 23.0-76.7<sup>[9]</sup> |

HGB-hemoglobin; RBC-red blood cells; WBC-white blood cells; PLT-platelets; MCV-mean corpuscular volume; AP-alkaline phosphatase; AST-aspartate aminotransferase; ALT-alanine aminotransferase.

The ferret was diagnosed with pyometra, so a decision for laparotomy was taken. After aseptic preparation of the abdominal region, the ferret was premedicated intramuscularly with 0.5 mg/kg butorphanol (Butomidor; Richter pharma; Austria). Anaesthesia was induced by mask and after endotracheal intubation maintained with isoflurane (TerrellTM; Minrad Inc.; USA). The ferret was placed in a dorsal recumbency and a caudal median laparotomy was performed. Gross examination of the reproductive tract revealed enlarged uterine horns (Figure 4). An ovariohysterectomy was performed. The abdominal cavity was closed with cross stitch pattern using USP 3/0 polyglycolic acid absorbable sutures (Marlin; Catgut GmbH; Markneukirchen), and the skin was sutured with simple interrupted non-absorbable sutures USP 2/0 (Vitalon; Dr Hammer & Co. GmbH; Hamburg). After the operation, incisions of the uterine horns were made and macroscopically there was a significant thickening of the uterine wall and the lumen of the uterus was filled with small amount of greenish substance (Figure 5). Postoperative treatment included antibiotic – 15 mg/kg amoxicillin-clavulanic acid (Synulox RTU; Zoetis; Belgium), subcutaneously for 5 d.

Microbiological evaluation of the uterine fluid detected the presence of *Staphylococcus* spp. sensitive to amoxicillin-clavulanic acid, ceftiraxone, cefalexin and sulphonamides and resistant to enrofloxacin, penicillin, ampicillin and lincomycin.

The excised uterus was submitted for histopathology. The specimens were fixed in 10% neutral formalin and processed routinely. The 4 µm cross sections were stained with haematoxylin-eosin. Multiple uterine thickenings were detected (Figure 6). The cluster of fibroblasts and fibrocytes was observed in the lamina propria, leading to fibrosis and sclerosis of the endometrium (Figure 7). Due to compression from the connective tissue, the uterine glands were atrophied (chronic atrophic endometritis). The epithelial cells of the remaining single glands were pyknotic, and the cytoplasm was grainy and enlightened. Surface epithelial cells were desquamated. Skin sutures were removed after 10 d. The post-operative examination showed that the ferret was in a good condition.

Figure 4. Intraoperative appearance of uterus of ferret.

Figure 5. Internal genitalia of ferret after ovariohysterectomy and incision of uterine horns.

Figure 6. Uterus with multiple thickening of wall. Haematoxylin-eosin staining, magnification ×4 objective.
Cluster of fibroblasts and fibrocytes was observed in the lamina propria, resulting to endometrial fibrosis and sclerosis (chronic atrophic endometritis) - (arrows).

Haematoxylin-eosin staining, magnification ×10 objective.

3. Discussion

The prevalence of CEH-pyometra complex in ferrets has not yet been determined[2]. Desexing in this species is performed routinely between the age of 6 weeks in the USA and several months in Europe[7,11]. The previously reported cases described CEH-pyometra complex after ovariectomy or ovariohysterectomy associated with ovarian remnant, ovarian cancer and adrenal disease[2]. Our case was an intact female which had one litter of 4 three years before the occurrence of uterine inflammation. Probably the prolonged estrus season may be the reason for the disease of uterus. The inflammation was long lasting (2 months) and after unsuccessful conservative therapy, so a decision for surgical treatment was done. The reason for this could be found in the microbial resistance of the isolated culture of Staphylococcus spp. from the uterine content to enrofloxacine.

The most interesting and unique fact was that histopathologically the atrophied uterine glands were found, so the ferret was diagnosed with chronic atrophic endometritis. In previously described cases, the animals had cystic endometrial hyperplasia with increased number of endometrial glands because of the estradiol stimulation[1,2,7,11]. The reason for the local degenerative changes within uterine tissues in our case could be found in the prolonged inflammation process. This is a very rare report of such a degenerative inflammation uterine process in ferrets. In cases of prolongation and absence of success of the medical treatment, we recommend a complete ovariohysterectomy. Early age desexing of the female ferrets may be used in order to prevent the diseases of the reproductive organs.

Conflict of interest statement

All the authors declare that there is no conflict of interest.

References

[1] Fisher PG. Stump pyometra in a female ferret. Exotic Pet Pract 1996; 1: 7.
[2] Martinez-Jimenez D, Chary P, Barron H, Hernandez-Divers S, Basseches J. Cystic endometrial hyperplasia-pyometra complex in two female ferrets (Mustela putorius furo). J Exotic Pet Med 2009; 18(1): 62-70.
[3] De Bosshere H, Ducatelle R, Tshamala M. Is mechanically induced cystic endometrial hyperplasia (CEH) a suitable model for study of spontaneously occurring CEH in the uterus of the bitch? Reprod Domest Anim 2002; 37: 152-157.
[4] Kohutova S, Paminarova M, Skoric M, Jekl V, Knotek Z, Hauptman K. Cystic endometrial hyperplasia and bacterial endometritis associated with an intrauterine foreign body in a guinea pig with ovarian cystic disease. J Exotic Pet Med. In press 2018.
[5] Chaffaux S, Thibier M. Peripheral plasma concentrations of progesterone in the bitch with pyometra. Ann Rech Vet 1978; 9: 587-592.
[6] De Bosshere H, Ducatelle R, Vermeirsch H, Van Den Broeck W, Coryn M. Cystic endometrial hyperplasia pyometra complex in the bitch: Should the two entities be disconnected? Theriogenology 2001; 55: 1509-1519.
[7] Jekl V, Hauptman K, Jeklova E, Dorrestein G, Knotek Z. Hydrometra in a ferret-case report. Vet Clin Exot Anim 2006; 9: 695-700.
[8] Li X, Fox JG, Erdman SE, Lipman NS, Murphy JC. Cystic urogenital anomalies in ferret (Mustela putorius furo). Vet Pathol 1996; 33: 150-158.
[9] Weiss D, Wardrop K. Schalm’s veterinary hematology. 6th ed. Iowa: Blackwell Publishing; 2010.
[10] Kaneko J, Harvey J, Bruss M. Clinical biochemistry of domestic animals, 6th ed. Philadelphia: Saunders; 2008.
[11] Jekl V, Hauptman K. Reproductive medicine in ferrets. Vet Clin Exot Anim 2017; 20: 629-663.