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CASE REPORT
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Pyometra in a Tiger (*Panthera tigris*)

Eduardo Burgarelli Mayrink Cardoso[1], Sheila Canevese Rahal[1], Jeana Pereira da Silva[1], Luciane dos Reis Mesquita[1], Renan Denadai[1], Maria Jaqueline Mamprim[1], Isadora Fernanda Pelaquim[2] & Priscila Emiko Kobayashi[2]

ABSTRACT

***Background*:** Captive tigers can live a long life, around 26 years. Among the diseases described some of non-infectious origin are quite common, such as chronic kidney disease, spondylosis, and biliary cysts or tumors. On the other hand, pyometra has been frequently reported in lions, who have a higher risk of developing the disease than tigers and leopards. Pyometra is a disease with few descriptions in tigers and it may be related to the physiological features of the species. The animal is listed as Endangered on the International Union for the Conservation of Nature Red List of Threatened. The present report aims to describe the diagnosis and treatment of pyometra in a captive tigress.

***Case*:** A 7-year-old entire female tiger (*Panthera tigris*) weighing 140 kg was presented with a 3-day history of anorexia and prostration. For clinical examinations, collection of laboratory and imaging tests, the patient initially underwent dissociative anesthesia to allow catheterization of the cephalic vein and intravenous general anesthesia for orotracheal intubation followed by anesthetic maintenance in isoflurane. On general physical examination, the animal had normal colored mucosa, vital parameters within normal limits, and a body condition score of 6 on a scale of 9. There was no presence of vulvar secretion. The blood count and the biochemical exams showed values within the normal range for the species. The chest X-ray in the right and left views did not demonstrate pulmonary abnormalities. Ultrasonographic examination of the abdomen showed distension of the uterine body and horns, which have intraluminal hyperechoic fluid content without flocculation. Based on the imaging exam, the diagnosis was suggestive of pyometra. Exploratory celiotomy was performed via ventral midline, confirming the condition, which was treated by ovariohysterectomy. The surgical technique was performed as described for therapeutic ovariohysterectomy in dogs and cats. Culture of uterine content identified *Escherichia coli*. The histological analysis identified diffuse endometritis associated with follicular cysts. The tiger had complete recovery without any complications. The patient was releasing 13 days after the surgical procedure and in the last contact four months after the surgery, it was in perfect health conditions.

***Discussion*:** Pyometra in large exotic felids has been occasionally reported, mainly in animals more than 10 years of age. Although the tigress in the report is estimated to be seven years old. The patient in question started with anorexia and prostration and as there was already a history of cystic endometrial hyperplasia, a possible pyometra was suspected, despite being uncommon in the species. There was not vaginal discharge. The definitive diagnosis was by means of ultrasound examination and ovariohysterectomy was performed. Abdominal surgery for these large felids is complex, due to the intra-abdominal volume the flank approach or by laparoscopic is suggested, however in this case a ventral midline incision was performed without intercurrences and complications in the post-operative period. The surgical technique like that used in small animals was effective for the treatment of pyometra in the tigress with the use of ovariohysterectomy. Culture of uterine content identified *Escherichia coli*, which has been the most commonly isolated pathogen in pyometra of large felids. It was concluded that, as in bitches with pyometra, early diagnosis and surgical treatment is ideal for the patient's recovery.

Keywords: ovariohysterectomy, treatment, bacteria, infection.

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[1]Department of Veterinary Surgery and Animal Reproduction & [2]Department of Veterinary Clinic, School of Veterinary Medicine and Animal Science, São Paulo State University (UNESP), Botucatu, SP, Brazil. CORRESPONDENCE: L.R. Mesquita [lr.mesquita@unesp.br] & S.C. Rahal [sheila.canevese-rahal@unesp.br]. School of Veterinary Medicine and Animal Science, São Paulo State University (UNESP). Rua Dr. Walter Maurício Corrêa s/n. CEP 18618-681 Botucatu, SP, Brazil.

INTRODUCTION

The tigers have variations in body size, coloration, and marking, probably related to the variety of habitats occupied [15]. The lifespan of a tiger (*Panthera tigris*) in captivity is around 26 years [8]. The animal is listed as Endangered on the International Union for the Conservation of Nature (IUCN) Red List of Threatened [5].

The most common noninfectious diseases in tigers are chronic kidney disease, spondylosis, and biliary cysts or tumors [8]. On the other hand, pyometra has been frequently reported in lions, who have a higher risk of developing the disease than tigers and leopards [8,11]; attributed to differences in ovulation induction [11].

Pyometra is a disease with few descriptions in tigers [7,11,12] and it may be related to the physiological features of the species. In a study with 47 tigers, the histologic examination of the ovaries showed strong evidence of spontaneous ovulation in the species [3]. However, fecal hormone analysis of 17 female tigers indicated that they are primarily induced ovulators with an 18-day anovulatory cycle [6]. In addition, female tigers in captivity presented declined reproductive parameters after 7-9 years of age, more pronounced than males [14]. In turn, reproduction in free-ranging tigers depends on acquiring a territory [15], and the estrous cycle appears to be moderately affected by the photoperiod [8]. This report describes the diagnosis, treatment, and evolution of a tiger with a closed pyometra.

CASE

A 7-year-old, 140-kg entire female tiger (*Panthera tigris*) was presented with a 3-day history of anorexia and prostration. No treatment had been carried out. According to the professional responsible for the animal, there were some suspicions about the condition, including renal failure due to the indiscriminate use of meloxicam[1] [Maxicam®] and nitenpyram[2] [Capstar™] for the treatment of myiasis; pyometra, due to a year ago uterine cystic endometrial hyperplasia was detected by ultrasound examination; respiratory disease, since a year and a half ago the property had the death of two lions presenting a respiratory condition; or even a tumoral process. The animal belonged to a private foundation and shared an enclosure area (1971 m^2) with another adult female tiger. The farm where the animal resided had seven other tigers.

To perform the examination, the tiger was premedicated with ketamine hidrochloride[3] [Cetamin® - 2.5 mg/kg] and dexmedetomidine[4] [Dexmedetomidine Chloryde® - 7.5 mcg/kg] by darting using a blowgun. After 15 min, venous catheterization was performed to administer ketamine hidrochloride[3] [Cetamin® - 1 mg/kg] and propofol[5] [Provive® - 15 mg/kg]. Then, the animal was transported to the surgical room, where it was intubated. General anesthesia was maintained with isoflurane[6] [Isoforine®] under spontaneous ventilation. Ringer lactate solution was provided during the procedure. Blood pressure was monitored and remained within normal limits. On general physical examination, the animal had normal colored mucosa, vital parameters within normal limits, and a body condition score of 6 on a scale of 9. There was no presence of vulvar secretion. The complete blood count and the biochemical exam (urea, creatinine, aspartate aminotransferase, alanine aminotransferase, glucose, alkaline phosphatase, gamma-glutamyl transpeptidase, lactate dehydrogenase, total protein, albumin, globulin, bilirubin, triglycerides, cholesterol, amylase, lipase, creatine kinase, and fructosamine), and serum electrolytes (calcium, phosphorus, magnesium, sodium, potassium, chloride) showed values within the normal range for the species according to ISIS [13].

The chest X-ray[7] [SIUI SR-8100] in the right and left views did not demonstrate pulmonary abnormalities. Ultrasonographic[8] examination [LOGIQ-e] of the abdomen was performed on dorsal, right lateral, and left lateral recumbency. The ventral abdomen was clipped, followed by the application of isopropyl alcohol and acoustic gel. The uterine body and horns were distended with hyperechoic fluid content without flocculation (Figure 1 A & B). The uterine wall was thickened. Based on the imaging exam, the diagnosis was suggestive of pyometra.

Exploratory celiotomy was performed via ventral midline. Methadone[6] [Mytedon® - 0.1 mg/kg] and meloxicam[1] [Maxicam® - 0.1 mg/kg] were administered intravenously to provide analgesia during the surgery procedure. Methadone[6] [Mytedon® - 0.05 mg/kg, IV] was repeated after the surgery procedure. The animal was placed in dorsal recumbency and the surgical site was scrubbed with chlorhexidine. After placement of the sterile surgical drapes, an incision was made in the ventral midline through the skin, subcutaneous tissue, and linea alba, beginning cranial to the

umbilicus and extending caudally towards the pubis. The uterus was distended (Figure 1 C & D), but there was no evidence of the presence of fluid in the abdominal cavity. The uterus was exteriorized and celiotomy sponges were placed to prevent contamination of the abdominal cavity. After the left ovary was grasped, the suspensory ligament was ruptured, a window was performed in the mesovarium caudal to the ovarian arteriovenous complex and three Rochester clamps were placed on the ovarian pedicle. Double transfixation ligations were done under the third Rochester clamp. The third clamp was removed and the ovarian arteriovenous complex was transected between the first and second clamps. The second clamp was released and the pedicle was replaced into the abdominal cavity. The same procedure was done on the right ovarian pedicle. The large vessels of the broad ligament, as well as the uterine artery and vein on both sides were ligated. Two clamps were placed on the uterine body cranial to the cervix. Transfixation ligation was done under the second clamp. The uterine body was transected between the first and second clamps, whereas a Parker-Kerr suture pattern was done using the second clamp. The polyglactin[9] no. 2 [Vicryl®] was the suture used. The abdominal incision was closed with 2 layers of Sultan suture (polyglactin 910[9] no. 6) [Vicryl®]. The subcutaneous tissue was closed with 2 layers of Ford interlocking pattern and intradermal tissue was closed with a simple continuous pattern (polyglactin 910[9] no. 2) [Vicryl®]. The skin incision was closed by an interrupted horizontal mattress (mononylon[9] no. 2-0) [Ethilon®].

Uterine content was collected for microbiological culture and *in vitro* antimicrobial susceptibility profile. The intraluminal fluid had a purulent appearance and pinkish-red color. The pathogen isolated was *Escherichia coli* sensitive to norfloxacin, ciprofloxacin, levofloxacin, amoxicillin, and sulfamethoxazole. The uterus and both ovaries were fixed in 10% formaldehyde for 24 h, embedded in paraffin, cut in 4 μm sections, and stained with Hematoxylin and Eosin (HE). Histopathological examination of the uterus showed a lumen filled with cellular debris and degenerated neutrophils. The endometrium was thickened with intraluminal gland accumulation of intact and degenerated neutrophils associated with marked lymphoplasmacytic and neutrophilic interstitial inflammation (Figure 2). The inflammatory process extended multifocally to the myometrium, with hemorrhage and necrosis. In addition, the ovaries had cystic enlargements surrounded by degenerated granulosa cells and connective tissue capsule. Ovarian follicles at different stages of development were peripherally displaced. Based on the histological findings, the diagnosis of pyometra with accentuated diffuse endometritis and polycystic ovary with follicular cysts was established.

Benzathine penicillin[4] [Benzetacil® - 40,000 IU/kg, IM)] was administered on the day and after 72 h of surgery. Based on culture, the antibiotic was substituted for sulfamethoxazole and trimethoprim[1] [Trissulfin® - 30 mg/kg, p.o., SID, for 8 days]. Meloxicam[1] [Maxicam® - 0.05 mg/kg, IM, SID, for 2 days] and methadone[6] [Mytedon® - 0.15 mg/kg, IM, BID, for 3 days] were also administered.

The tiger presented good clinical evolution and no complications were detected. Oral feeding was started 48 h after surgery. Under dissociative anesthesia, skin stitches were removed 13 days postoperatively. Therefore, the animal was discharged from the hospital. Four months after surgery, the tiger was reported to be in excellent general health, according to the local veterinarian of the foundation.

DISCUSSION

Pyometra in large exotic felids has been occasionally reported, mainly in animals more than 10 years of age [1,4,7,10-12]. However, the disease has already been diagnosed in large felids for at least 4.5-year-old [2,12,16]. The tiger's age in the present report is in the time interval of 4.5-10 years of age.

Since the tiger in the present report already had a history of possible endometrial hyperplasia, the anorexia and prostration were clinical signs that helped to investigate the underlying disease. In addition to lethargy and anorexia or decreased appetite [1,11,12], there are also some reports of vomiting in large felids with pyometra [11,16].

Some animals have a vaginal discharge that can be malodorous, thick, and varied in color [1,2,4,10-12]. Nevertheless, the vaginal discharge may be absent [16] when the cervix is closed, as in the current case, which makes the diagnosis more challenging. The laboratory test results were within the normal reference range, probably due to the stage of the disease. Leukocytosis with neutrophilia has been the most frequent finding in a complete blood count of large felids with

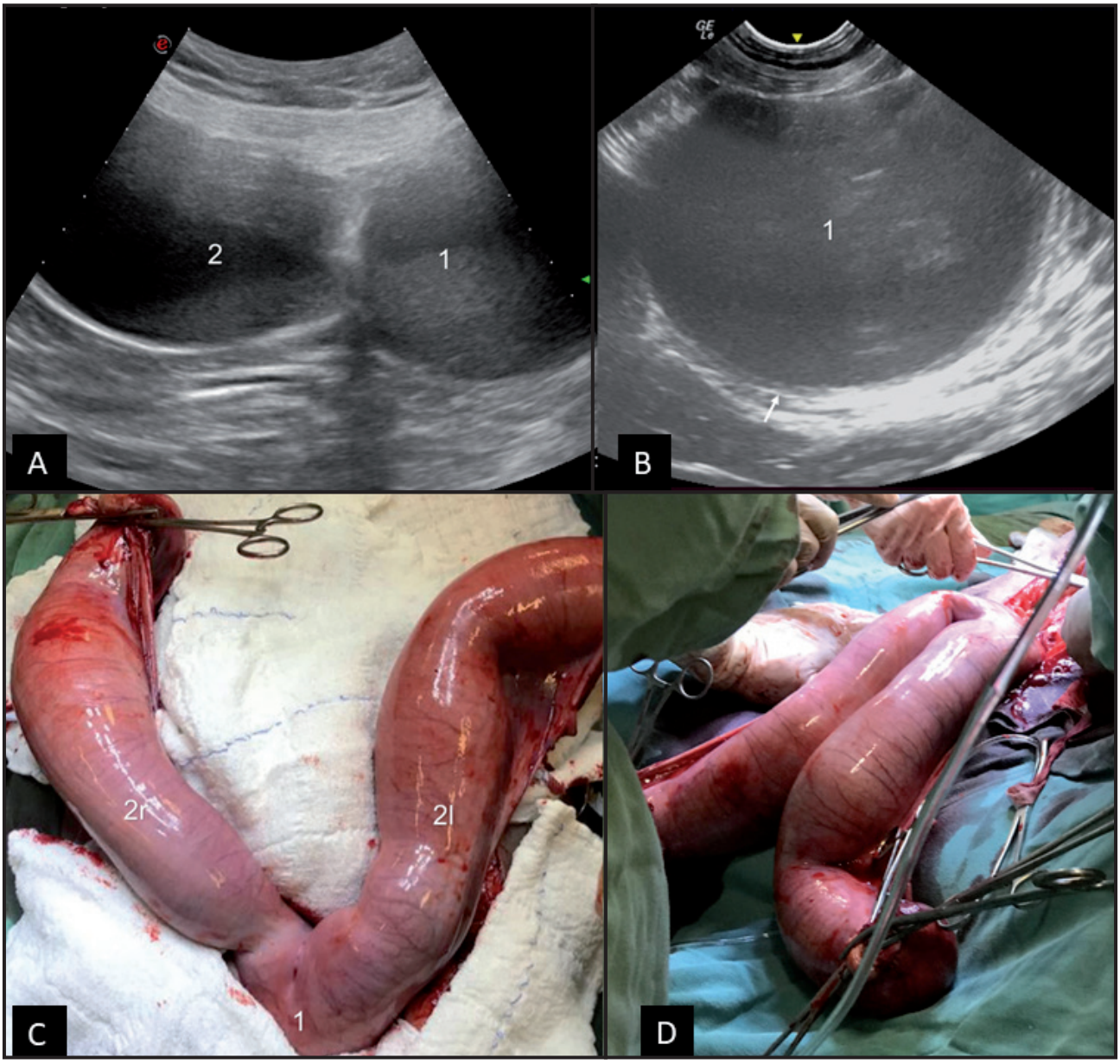

Figure 1. A & B- Ultrasound images of the uterus in a female tiger with pyometra. Observe the enlargement of both uterine body (1) and horn (2), with hyperechoic fluid content without flocculation, and the thickened uterine wall (arrow). C & D- Macroscopic images of the uterine body (1), and right (2r) and left (2l) uterine horns increased

pyometra [1,2,11,12,16], although some animals may have leukocyte count within the reference interval [11]. In addition, a study with 11 large felids verified biochemistry parameter abnormalities, including hyperproteinemia, hypokalemia, hypophosphatemia, and hypocholesterolemia [11].

Radiographic examination and ultrasound are the most common imaging tests for the pyometra diagnosis in large felids [1,2,4,11,16]. In the current report, the thoracic radiographic examination was used to discard pulmonary lesions because of the death of 2 lions on the farm with respiratory disease. Abdominal ultrasound was used to assess the organs in the abdominal cavity, once it is considered more accurate than radiographs in the diagnosis of pyometra in large felids [11]. Ultrasonographic findings showed uterine changes that were confirmed in exploratory celiotomy.

The abdominal approaches described for uterine ovariohysterectomy in cases of pyometra in large felids include ventral midline celiotomy [2,4,11], as used in the current report; lateral flank [16]; and the laparoscopic-assisted technique [12]. The major complication of ventral midline celiotomy is the occurrence of incisional hernia [4,11] that theoretically could be avoided by flank access [16] and laparoscopy [12]. In

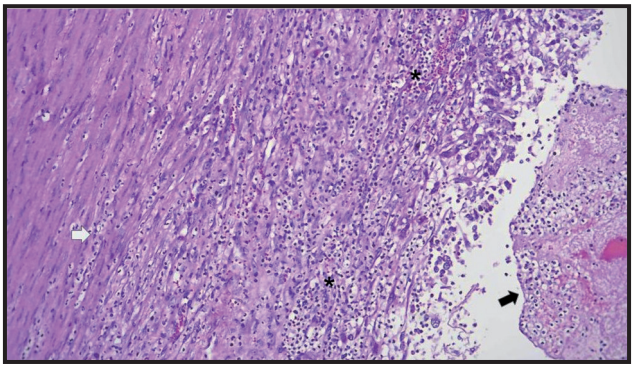

Figure 2. Photomicrograph showing the thickness of the endometrium with intraluminal gland accumulation of neutrophils (black arrow), associated with marked lymphoplasmacytic and neutrophilic interstitial inflammation (asterisk). The inflammatory process extended multifocally to the myometrium (white arrow) [HE; 20x].

the present case, complications related to the access were not detected.

The pathogenesis of pyometra in large felids cats has not been fully elucidated. A study of the genital tract of zoo felids found that endometrial lesions are frequent, but the use of melengesterol acetate contraceptives increased the risk of developing hyperplastic and inflammatory diseases [9]. This cause was excluded in the present report since the animal had never received contraceptives.

In a study of 11 captive large felids with pyometra, 5 of the 7 cases that had histopathological examination were found cystic endometrial hyperplasia [11]. In the present case, endometrial hyperplasia had been detected by previous ultrasound examination, but the histological analysis of the uterus showed diffuse endometritis. In a report of a 16-year-old *Panthera leo*, histological examination detected chronic endometritis and the presence of corpora lutea in the ovaries [1]. The presence of corpora lutea was also verified in 6 animals in a study with captive large felids, indicating the occurrence of ovulation before the presentation [11]. In the present case, the histological examination identified polycystic ovaries that have been associated with underlying endocrine disease.

Culture of uterine content identified *Escherichia coli*, which has been the most commonly isolated pathogen in pyometra of large felids [1,2,4,10,11]. Other bacteria isolated less frequently were *Pseudomonas aeruginosa* [11], and mixed infection with *Streptococcus* sp. and *Escherichia coli* [10].

In conclusion, although less frequent in tigers, the pyometra can still occur in this animal in captivity. Thus, the abdominal ultrasound should be performed in tigers with nonspecific signs such as anorexia, lethargy, and absence of vaginal discharge. The treatment is based on surgical removal of the uterus and ovaries, as well as appropriate antimicrobial therapy.

MANUFACTURERS

[1]Ouro Fino Saúde Animal. Cravinhos, SP, Brazil.
[2]Fundação Elanco. São Paulo, SP, Brazil.
[3]Syntec do Brasil. Barueri, SP, Brazil.
[4]Eurofarma Laboratórios. São Paulo, SP, Brazil.
[5]União Química Farmacêutica Nacional S.A. São Paulo, SP, Brazil
[6]Cristália Indústria Farmacêutica. Itapira, SP, Brazil.
[7]Shantou Institute of Ultrasonic Instruments Co. Ltd. Shantou, China.
[8]GE Healthcare, General Eletric Company. Chicago, IL, USA.
[9]Ethicon Inc. Marketing Contacts. Somerville, NJ, USA.

Ethical approval. Since the surgery was performed in the local hospital, informed consent has been obtained from the owner instead of ethical approval from the institution.

***Declaration of interest*.** The author reports no conflicts of interest. The authors are responsible for the content and writing of paper.

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