

## Pyometra in Cats: Medical Versus Surgical Treatment

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### ABSTRACT

Pyometra is not a common disease in cats however in Egyptian veterinary clinics where owners do not usually go for elective neutering become a more common affection. It is an acute or chronic purulent endometritis, a sequel to progesterone stimulation. The traditional therapy for pyometra is ovariohysterectomy however medical treatment may be requested by owners or cat condition may not permit surgical treatment. The aim of the present study is to characterize the pyometra in cats and compare between ovariohysterectomy and medical treatment using PGF2 $\alpha$  alone or PGF2 $\alpha$  in combination with dopamine agonist. 45 cats were diagnosed with pyometra. Cats divided into 3 groups. Group 1 (n= 23): animals received PGF2 $\alpha$ , Group 2 (n= 15): cats received PGF2 $\alpha$  plus oral administration of Bromocriptine. Group 3 (n=7): went for ovariohysterectomy. Survival analysis of cats was performed in this study for 2 years after diagnosis. In G1 we censored 14 animals, eight of them returned with recurrent pyometra. The first recurrent case was recorded 3 months post-treatment. In G2 we censored 12 cats, four of them were returned with recurrent pyometra, the first recurrent case was met 8 months post-treatment. After 24 months, both G1 and G2 have no difference in the survival rate which reach for both treatment about 60% success in both groups. However, G3 survival rate was 100% success. Using dopamine agonist in medical treatment may delay the recurrences of pyometra for a short term however ovariohysterectomy whenever possible may be the best choice for treatment of pyometra.

**Keywords:** *Pyometra, Cat, PGF2 $\alpha$ , Dopamine agonist, Ovariohysterectomy.*

### INTRODUCTION

Pyometra is a common disease in Egyptian veterinary clinics and countries where cat owners do not usually go for elective neutering (Hagman, 2018). It is an acute or chronic purulent endometritis, a sequel to progesterone stimulation. Progesterone stimulates the endometrial gland secretions and decreases the myometrial contractions which lead to fluid accumulation, followed by ascending uterine infection from vaginal bacteria (Hagman *et al.*, 2014). In cats, it is more likely to occur after sterile mating (Nelson and Feldman, 1986; Kenney *et al.*, 1987). The disease is most often observed in diestrus or as pseudopregnancy, during progesterone dominance that lasts

approximately 40 days (Hollinshead and Krekeler, 2016).

In open pyometras, vaginal discharge may be noticed with mild, nonspecific clinical signs. However, in closed pyometra, sepsis, peritonitis, and even animal death may occur (Hagman, 2018).

The traditional, safest and most efficient therapy for pyometra is surgical removal of the genitalia (ovariohysterectomy) (Hollinshead and Krekeler, 2016). The advantage of ovariohysterectomy over medical treatment is that it is curative and preventive for recurrence of pyometra. However, surgery

may associate with the risk of anesthesia specially in senile bad health cats.

During the last decade, numerous medical treatments have been attempted to treat both open and closed pyometra (Arnbjerg and Flagstad, 1985; Davidson *et al.*, 1992a; Fransson and Ragle, 2003; García Mitacek *et al.*, 2014). PGF2 $\alpha$  has a major effect on the reproductive tract leads to myometrial contraction resulting in progressive expulsion of the uterine contents over a period of days. Uterine evacuation with PGF2 $\alpha$  may be used only in open cervix pyometra (Amano, 1980; Arnbjerg and Flagstad, 1985; Davidson *et al.*, 1992a). Treated cats should be hospitalized during the day for observation following prostaglandin administration. Systemic infection and peritonitis can develop therefore ovariohysterectomy may be needed. In addition, many side effects are usually observed after the injection of PGF2 $\alpha$ .

Dopamine agonists can be used for the treatment of pyometra in cats either alone or in combination with PGF2 $\alpha$  (Hollinshead and Krekeler, 2016). Dopamine agonists are ergot-derived alkaloid compounds that act as prolactin antagonists and thus have anti-luteotrophic activity. They are effective from approximately 15–20 days after ovulation when prolactin is present (erstegen and Onclin, 2006). Therefore, if a queen presents with pyometra soon after oestrus, anti-prolactinic agents are preferred over PGF2 $\alpha$  as they are very effective at inducing luteal arrest and luteolysis in early diestrus (erstegen and Onclin, 2006). However, if a queen presents more than 4 weeks after estrus or mating, use of a dopamine agonist in combination with PGF2 $\alpha$  potentiates the luteolytic effect, causing more rapid luteolysis and leading to cervical opening within 24–48 hrs.

There are two commonly used dopamine agonists: cabergoline and bromocriptine. Cabergoline is associated with few or no side effects and involves only once daily administration, whereas bromocriptine has several side effects including vomiting, anorexia, depression, and some behavioral changes, and also requires administration two to three times a day. The recommended dose of cabergoline is 5  $\mu$ g/kg orally every 24hrs however, the dose of bromocriptine is 10–25  $\mu$ g/kg orally every 8hrs. Both drugs are commonly used in combination with PGF2 $\alpha$ , with the duration of treatment usually being 7

days ( Nak *et al.*, 2009; Hollinshead and Krekeler, 2016).

The aim of the present study is to characterize the pyometra in cats and compare between surgical ovariohysterectomy and medical treatment using PGF2 $\alpha$  alone or PGF2 $\alpha$  in combination with dopamine agonist (bromocriptine).

## MATERIALS AND METHODS

### *Animals and methods of diagnosis:*

In the present study, 45 cats were diagnosed clinically with pyometra. Seven of these were cross-breed cats and 38 were Persian. The study was performed through the period of 2015–2019. Cases were collected from two private clinics in Assiut and Giza governorate and at Assiut veterinary teaching hospital.

Diagnosis of pyometra was confirmed based on the presence of clinical signs (anorexia, lethargy, vomiting, abdominal distention, and vulvar discharge) and ultrasonographical findings. Trans-abdominal ultrasonography was performed using a B-mode real-time ultrasound scanner. A 7.5 MHz linear array transducer (Mindray 2200, china) & multifrequency micro convex transducer probe (Sonoscepe V5, China) were used to confirm the diagnosis, as well as to monitor possible recurrence of pyometra from two weeks after the completion of treatment up to two years later.

### *The treatment groups:*

The animals were divided into three groups according to the method of treatment. **Group 1** (n= 23): cats received 0.2 mg of PGF2 $\alpha$  (Dinaprost, inj. Lutalyse, Pfizer) I/M with dexamethasone 0.5 ml I/M and Cefotaxime (as sodium salt) 250 mg I/M (EIPICO pharmaceutical, Egypt) for 4 days. **Group 2** (n= 15): the same treatment of group1 plus oral administration of Bromocriptine 0.63 mg (Dopagone, 2.5 mg/tab, Memphis Co for pharm, Egypt) for 7 days. **Group 3** (n=7) Ovariohysterectomy with resection of the entire cervix was performed through a midline abdominal incision from pubis to midway between the umbilicus and xyphoid. The uterus and ovaries were identified, carefully isolated and excised. The abdominal wall was sutured routinely using 2/0 absorbable suture material (Unicryl; Bradid Coated Glycolide Homopolymer) while skin was sutured using cross mattress technique with 2/0 polypropylene (Demophoriud Ltd)

(Hollinshead and Krekeler, 2016). Fluid therapy was administered despite of the general health of the patient. Antibiotics were given for 6 days minimum after sensitivity test and uterine culture. Neck Collars were applied for at least 7 days after surgery to prevent self-mutilation. Stitches were removed from twelve to fourteen days postoperatively.

#### ***Survival analysis***

Survival analysis of cats was performed through periodical phone calls every 3 months for two years after first intervention for any recurrences. Owners of G1 or G2 who came back complaining from the retained or recurrent pyometra, their cats were evaluated again, diagnosed then subjected to the same line of treatment. On the other hand, owners that did not report any recurrences during periodical calls considered cured while unreached clients were considered lost data.

#### ***Statistical analysis***

The size of the uterus monitored by ultrasonography were compared by one-way ANOVA while each point was compared using T-test. The data were represented in mean  $\pm$  SEM. Surviving time was considered the period from the definite diagnosis to the time of complete recovery or for 24 months post intervention. Survival rate was analyzed using Kaplan-Meier curves. All data gathered and analyzed by using prism 5 software (version 5.01).

## **RESULTS**

The mean age of the cats was  $8.20 \pm 1.06$  years (range 2-13 years).

#### ***Clinical signs:***

Cat showed signs of anorexia, lethargy, vomiting and abdominal distention. Vulvar discharge was obvious in 36 cases while 9 cases were suffering from closed pyometra. The duration of signs was between 4 days and 3 weeks. History revealed that two cats were administered progestins as contraceptive for heat suppression. Clinically, a distinctive increase of vulvar discharge was detected in all cats within the first 24 hrs after application of treatment in both G1 and G2. All cats were diagnosed as completely recovered according to clinic and ultrasonographic findings at 14

days. In all cases, general condition and feed consumption improved rapidly and were normal within 7 days of intervention. Vulvar discharge totally ceased by day 14.

The side effects were found to be rapid respiration, vocalization with open mouth and tremor after the PGF2 $\alpha$  in G1. While the same signs in G2 but with vomiting for the first 2 days associated with the oral administration of Bromocriptine. In G3 there were no signs as in G1 &G2. Cats regain normal appetite in the 24 hrs following recovery from anesthesia.

#### ***Ultrasonography:***

During the first ultrasonographic examination of the cats with pyometra, distended and fluid-filled uteri were identified cranial and dorsal to the bladder. Uteri with pyometra appeared as enlarged with convoluted, tubular horns filled with anechoic to hypoechoic fluid. The maximum lumens diameter of the filled uterine horns was between 0.7 and 5.7 cm at first examination (figure 1). Then, there is gradual decrease of pus amount after first PGF2 $\alpha$  administration (figure 2). The results showed that G2 had a significant decrease in the uterine amount on day 4 ( $P < 0.05$ ). Uteri could not be imaged at day 14 in all cats.

#### ***Surgical outcomes:***

All cats underwent ovariohysterectomy had an uneventful recovery. In 2 cases, excised ovaries were associated with follicular cyst and persistence CL (figure 3) however, excised distended uterine horns showed yellowish exudate of pus (figure 4).

#### ***Survival rate and recurrences:***

Regardless to a short-term success rate of 90%, the general and reproduction health of cats followed for 2 years. In G1 (n=23 cats) we censored 14 animals eight of them returned with recurrent pyometra. The first recurrent case occurred 3 months after treatment. In G2 (n=15 cats) we censored 12 cats, four of them returned with recurrent pyometra (figure 5). The first recurrent case occurred 8 months after treatment. After 24 months, both G1 and G2 has no difference in the survival rate which reach for both treatment about 60% success of both groups. However, G3 survival rate was 100% success.

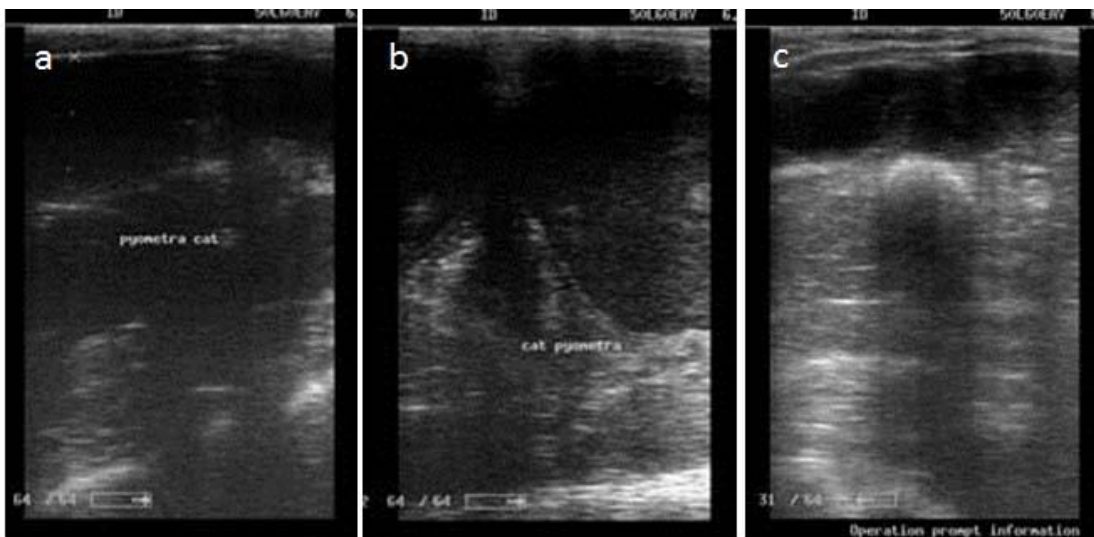


Fig. (1): Sonogram showing uteruses with different amount of pus in different cases (a, b and c).

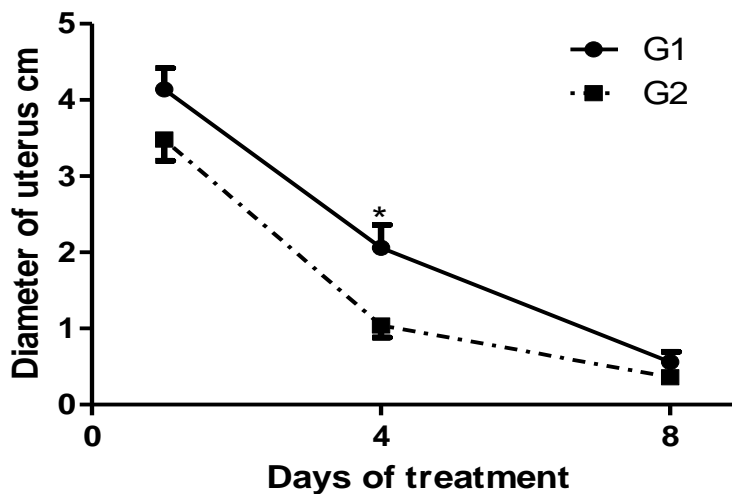


Fig. (2): Showing the decrease in the diameter of the uterus after evacuation of pus in Group 1 &2. Data represented in mean± SEM.

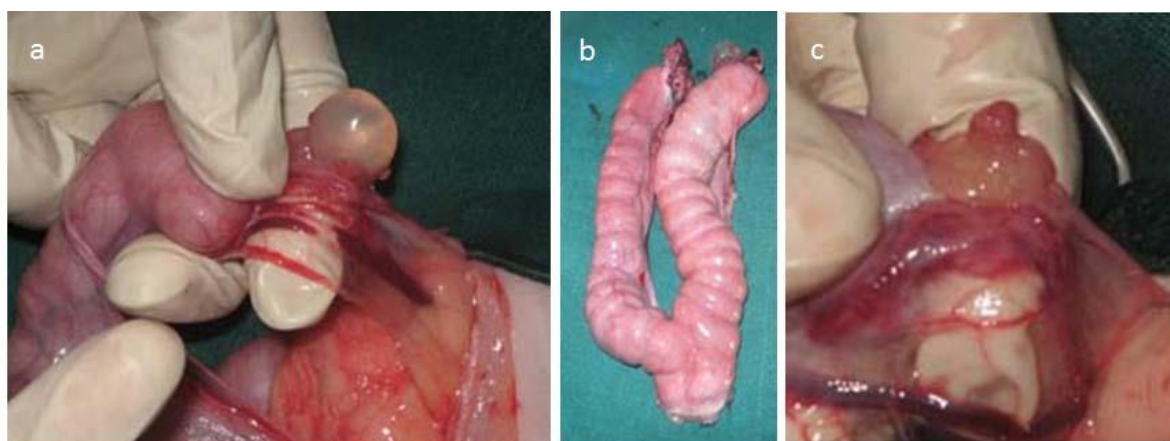
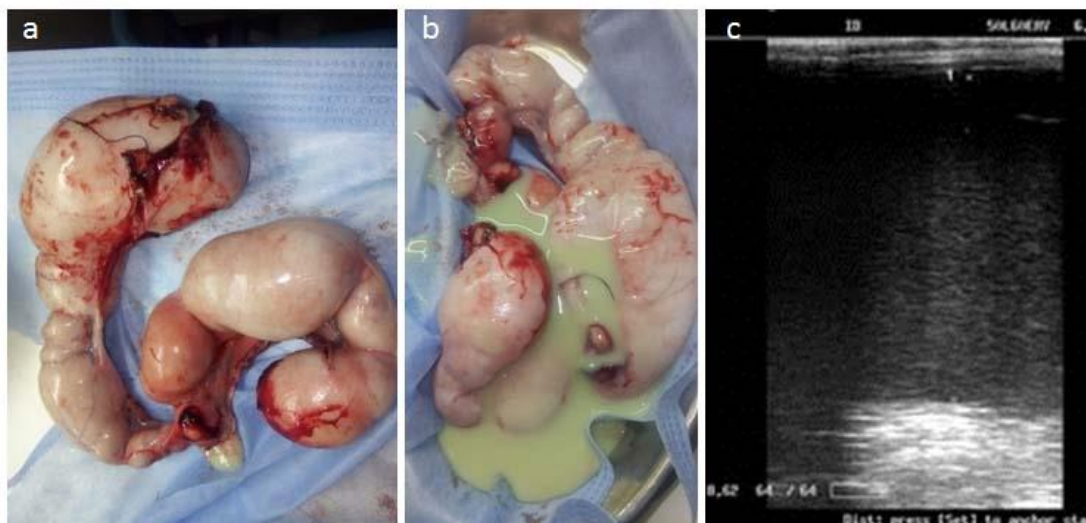
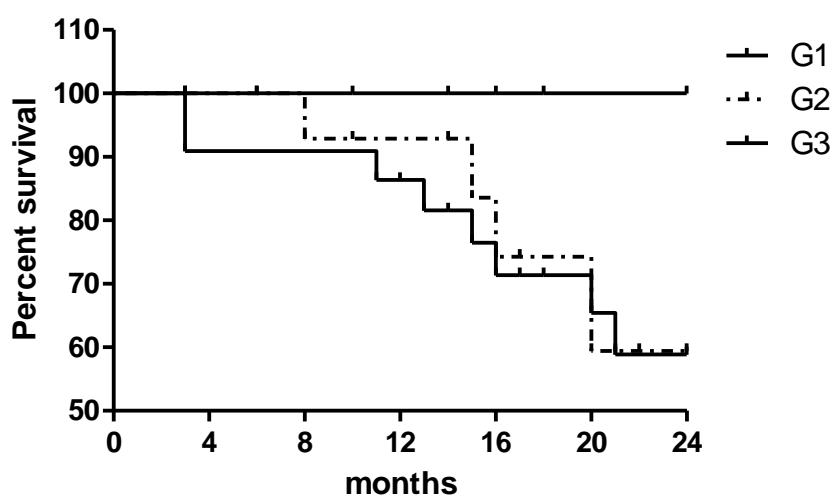


Fig. (3): Pyometra after ovariectomy a) Ovarian cyst in an ovary in a cat with pyometra, b) Uterus after ovariectomy, c) Ovary showing corpus luteum.



**Fig. (4):** a) distended uterus filled with pus after ovariectomy of a case suffered from closed pyometra. b) dissecting of uterus contain pus. c) sonogram showing the anechoic secretion of the pus inside the uterus in a cat with closed pyometra.



**Fig. (5):** Showing the survival rate of the three groups.

## DISCUSSION

The pyometra can be diagnosed at any age. The disorder has been described as being prevalent in cats over 5 years of age that have never had kittens, as well as being most common in cats that have had one or more litters (Hagman, 2018; Hagman *et al.*, 2014). In our study, the average age was 8.42 years. Typical clinical signs are depression, dehydration, lethargy, pyrexia, anorexia or inappetence, vomiting, diarrhea, listlessness, abdominal distention, polyuria and polydipsia and weight loss were recorded. Only the cats with open pyometra have an obvious watery or thick and viscous vulvar discharge. The discharge is often creamy and light tan-pink to dark brown in color (Hagman, 2018).

Our results showing that  $\text{PGF}_{2\alpha}$  in combination with dexamethasone convert close to open pyometra and induce uterine contraction. It was

reported that  $\text{PGF}_{2\alpha}$  induced luteolysis of feline CL (Hollinshead and Krekeler, 2016) and used to induce parturition in dogs and cats (Briles and Evans, 1982). More over  $\text{PGF}$  also has ecbolic activity that facilitates drainage of purulent material from the uterus (Hollinshead and Krekeler, 2016). Dexamethasone induce ischemic necrosis of luteal endothelial cells which lead to ischemic necrosis of luteal tissue in rats (Gaytán *et al.*, 2002). Both drugs induced luteolysis and so decrease Progesterone level which induce cervical relaxation and increase uterine contractility (Hollinshead and Krekeler, 2016). In contrary to our results, it was reported that  $\text{PGF}_{2\alpha}$  should be restricted to the open pyometra because of its smooth muscle contracting effect (Davidson *et al.*, 1992b).

Many side effects have been observed after injection of  $\text{PGF}_{2\alpha}$  within 30 minutes. Cats begin vocalizing, panting, become restless,

have tenesmus, salivation, vomiting, diarrhea, mydriasis, urination, defecation, tail flagging, and exhibit a lordosis posture. In addition to intense grooming behavior at the flanks and vulva.

There are two forms of PGF<sub>2</sub> (natural forms which used in this study; dinaprost and synthetic form; cloprostenol). It was reported that Dinaprost has more side effects than Cloprostenol due to its powerful myometrial contraction and shorter half-life leading to faster evacuation of purulent material from the uterus compared with synthetic prostaglandins (Verstegen *et al.*, 2008). PGF<sub>2</sub> $\alpha$  used in conjunction with antibiotic therapy (Amano, 1980; Hagman *et al.*, 2014; Hagman, 2018;). Either trimethoprim / sulphadiazine or amoxicillin trihydrate / clavulanate potassium is the initial antibiotic of choice (Hollinshead and Krekeler, 2016).

Cats in G2 showed significant decrease in diameter of uterus and the amount of pus by day 4 of treatment when compared to G1. It was reported that dopamine agonists act as prolactin antagonists has anti-luteotrophic activity results in rapid reduction in the level of blood progesterone (Antonov *et al.*, 2015). Dopamine agonists such as Bromocriptine are substantially used for the treatment of pyometra either alone or in combination with PG (Rautela and Katiyar, 2019). However, bromocriptine has a number of side effects including vomiting, anorexia, depression and some behavioral changes which is recorded in our results (Hollinshead and Krekeler, 2016).

The results showed that using broad spectrum antibiotics is effective for reducing the pyometra in cat. It was recommended that Antimicrobial therapy should be initiated immediately with a broad spectrum antibiotic (Hollinshead and Krekeler, 2016). In our study, good results obtained with Cefotaxime injection. It was observed that excellent results have been achieved with amoxicillin/clavulanic acid or cephalosporins (Hollinshead and Krekeler, 2016).

The survival rate showed that the first recovered case for G1 was 4 months after treatment while for G2 was 8 months after treatment. The recovery rate of each group was the same within 24 months. It was recommended that all queens intended for breeding are mated or inseminated on the first estrus following treatment for pyometra, as a

pregnant queen is significantly less likely to develop recurrence of pyometra (Hollinshead and Krekeler, 2016). In our research most cases were aged and so old aged cats may be susceptible to return back again.

Surgical treatment for pyometra in cat through ovariohysterectomy, was a permanent elimination of the site of infection (Feldman *et al.*, 2004; Fieni, 2006). If the cat is young or the owners have the desire to breed from her, or if she is old and in poor condition for surgical risk, medical treatment may be attempted (Nak *et al.*, 2009) otherwise surgical treatment may be a treatment of choice.

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