



UNRAVELLING FELINE HYDROMETRA, DIAGNOSTIC APPROACHES AND SURGICAL MANAGEMENT IN A CAT

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Summary

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Hydrometra is the accumulation of fluid in the uterine lumen. It is an uncommon condition in the queens, associated with pseudopregnancy and persistent corpus luteum. This report describes a case of hydrometra in a 2-year-old queen presented for pregnancy diagnosis two months after mating. Ultrasonography showed anechoic fluid in the uterus but no foetal structures. On ovariohysterectomy, distended uterine horns measuring 16.2 and 14.3 cm in length and 4.6 cm in diameter containing 610 mL of fluid and follicular cysts were present on the ovaries. Pre-surgical serum progesterone (P4) was 2.11 ng/mL, while post-surgical level declined to 1.42 ng/mL. Microbiological culture yielded *Escherichia coli* and *Streptobacillus* spp. The haemogram parameters were within physiologic limits. This case highlights the importance of hormonal assays and diagnostic imaging in differentiating hydrometra from pregnancy and other pseudopregnancies. Progesterone role in hydrometra is established but that of *Streptobacillus* spp. requires further investigation. This report contributes to the limited literature on hydrometra in queens, emphasising the need for increased awareness and research among veterinary practitioners. Further studies on the interplay of prostaglandin, relaxin, oxytocin and the unusual microbiological finding is recommended. Timely intervention is necessary in hydrometra to avoid complications.

Key words: ovariohysterectomy, queen, uterine disease, vaginal flora

Hydrometra is the accumulation of non-inflammatory, clear and watery to viscid fluid in the uterine lumen (Payan-Carreira *et al.*, 2006; Çiplak, 2023). Hydrometra is also a condition of pseudopregnancy, a uterine pathology that occurs with serous

fluid accumulation (Pretzer, 2008) in the uterus as a result of persistence of corpus luteum (CL) that happens during dioestrus with increased progesterone hormone secretion in the endometrial glands, thickening the endometrium and decreasing myo-

metrial contractility and causing the uterine cervix to remain closed (Ali, 2023; Çiplak, 2023) contrary to mucometra characterised with mucoid fluid, open cervix and vaginal discharge (Johnston *et al.*, 2001; Pretzer, 2008). It is a major cause of fertility concerns (Ahmed *et al.*, 2010). Factors associated with high risk for hydrometra in humans include advanced age, long postmenopausal time (Wu *et al.*, 2023), obstruction of the cervix due to infection, inflammation or malignancies (Vasudeva & Abraham, 2020). Hydrometra cases may occur during the estrous cycle in the diestrous phase resulting in increased progesterone level, genital neoplasms and during clinical reproductive procedures such as palpations, surgery etc. leading to scar tissues in the reproductive system (Macun & Özyurtlu, 2004; Davidson & Baker, 2009; Çiplak, 2023) or due to reproductive system anomaly as absence of cervical canal (Battista-Arteaga *et al.*, 2012).

As far as our literature searches, there is paucity of information on hydrometra case reports in queens (Verhage *et al.*, 1976; Wildt *et al.*, 1981; Abel, 1990; Bülent & Salmanoğlu, 2007; Çiplak, 2023). Hydrometra is an uncommon condition in the queen (Macun & Özyurtlu, 2004), it is mostly documented in women (Vasudeva & Abraham, 2020; Wu *et al.*, 2023), bitches (Fransson *et al.*, 1997; Payan-Carreira *et al.*, 2006; Rodrigues *et al.*, 2024), and in does (Ahmed *et al.*, 2010; Balamurugan *et al.*, 2018; Maia *et al.*, 2018; Ali, 2023). Therefore, our aim was to report a case of hydrometra in a queen cat and create awareness about the condition in this small animal species.

Case presentation

The patient was a 2-years old primiparous female Persian queen, weighing 3.8 kg,

presented to the small animal unit of the Veterinary Teaching Hospital of the University of Ilorin for pregnancy diagnosis as mating was two months ago and abdominal distension started three weeks after mating. The patient had no previous history of medication, the abdominal region was vividly distended, without vaginal discharge. Ultrasonography was carried out and the uterus demonstrated anechoic areas, but no signs of any pregnancy were detected (Fig. 1).

Routine clinical examination and laboratory test were done to evaluate the general condition of the queen; rectal temperature, pulse and respiratory rates were 39.1 °C, 121 beats/min and 28 cycles/min. Four mL blood was sampled through the cephalic vein; 2 mL was dispensed into an EDTA sample bottle while the remaining amount was put in a plain sample bottle to harvest serum for hormonal analysis. The presurgical haemogram was within the physiological reference values; serum progesterone, oestradiol and prolactin were 2.11 ng/mL, 57.06 ng/mL and 0.61 ng/mL respectively. As a result of the good physiological vital parameters of the patient, the client was advised appropriately and consented to exploratory celiotomy.

The queen was premedicated with atropine sulphate 0.02 mg/kg IM and xylazine hydrochloride 1 mg/kg IM, while ketamine hydrochloride 12 mg/kg IM was used to induce anaesthesia. Ventral midline was prepared aseptically with scrub solutions, celiotomy and ovariohysterectomy (OHE) was performed according to standard procedure (Fossum, 2019), both left and right uterine horns were visibly distended. After OHE, a sterile needle and syringe was used to aspirate serous fluid from the ovariohysterectomised tissue (Fig. 2), in line with data that hydrometra, mucometra, and pyometra contain serous,

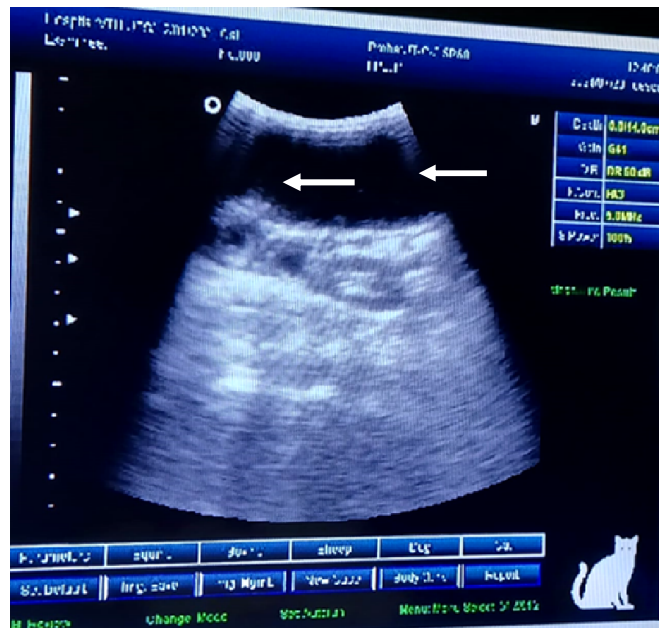


Fig. 1. Sonogram of the uterus showing anechoic area (white arrow).

seromucoid and purulent fluid respectively (Pretzer, 2008).

There were cysts within the ovaries, assumed to be the follicular cysts. These ovarian cysts are hormonally functional and the patient have persistent oestrus but do not ovulate, whereas paraovarian cysts are hormonally non-functional and are found adjacent to the ovary (Johnson, 2022). After the ovariectomy was completed, it weighed 630 g with fluid volume of 610 mL (Fig. 3). Penstrep[®] (procaine penicillin G 200.000 I.U & dihydrostreptomycin sulfate 200 mg) 20 mg/kg IM, piroxicam at 0.3 mg/kg IM, vitamin B complex 0.2 mL IM & ascorbic acid 0.2 mL IM were administered as post-surgery treatments. Another serum sample was collected 30 minutes after OHE for assay of 3 hormones to assess the success of the intervention because the ovarian remnant syndrome is a potential complication of OHE in cats (Rodrigues,

2022). Progesterone and oestrogen were analysed using an enzyme-linked immunosorbent assay (ELISA) while the prolactin was analysed via radioimmunoassay (RIA) following the standard procedures of the manufacturers.



Fig. 2. Clear watery serous fluid aspirated from the uterus.



Fig. 3. Ovariohysterectomised tissue (on a weighing scale).

A hydrometra fluid swab was also sent to the microbiology laboratory unit of the veterinary teaching hospital for microbial culture and sensitivity. The skin sutures were removed on day 10 and patient's recovery was uneventful.

Diagnosis of hydrometra is often based on history and clinical signs, physical examination, hormonal assays, haemograms, abdominal radiography, and ultrasonography. Some pregnancy diagnostic modalities to assess foetal structures include radiography, ultrasonography. Radiography has limitations in assessing foetal viability and differentiation of hydrometra, mucometra and pyometra, while ultrasonography can assess foetal viability, the uterine fluid and irregularities (Fossum, 2019; Bynum *et al.*, 2024). Ultrasonographically, mucometra and hydrometra appear as anechoic fluid within the uterine lumen while pyometra is typically echogenic. In this case, the uterus appeared thin-walled and had an anechoic area without any signs of foetus detected,

normal pregnancy may be distinguished from pseudopregnancy by monitoring the presence of a fluid-filled uterus without any foetus detected (Macun & Özyurtlu, 2004).

Hydrometra in women and female animals may be managed either medically or surgically. Medical treatment includes but is not limited to use of anti-inflammatory drugs as also reported in women (Wu *et al.*, 2023), hormone replacement therapy (Bar-Hava *et al.*, 1998), use of antibiotics with prostaglandin-F₂ α (PGF₂ α) and aglepristone (an antiprogesterin) with cloprostenol (synthetic prostaglandin). Since the use of some of these medications in dogs and cats is not approved, pet owners must be informed and may not approve the medical therapy. Some possible complications associated with medical therapies are panting, salivation, vomiting, urination, tenesmus, lordosis, vocalisation, ataxia, respiratory distress, infertility or even death (Fossum, 2019). Surgery is the most ideal management and the prognosis is good once abdominal contamination is avoided or controlled. Surgical removal of the uterus is advocated in hydrometra and mucometra cases, as they can progress to pyometra if not managed (Park & Minamoto, 2025). Therefore, surgical management prevents recurrence of the condition and the associated risk factors (Wu *et al.*, 2023), sub-fertility and infertility (Ahmed *et al.*, 2010) and complications of medical therapies.

Queens are generally known to be polyestrous by nature as they often undergo estrus at intervals of 14–21 days unless there is an interruption either by pregnancy, pseudopregnancy or other illness (Johnson, 2022; Rodrigues *et al.*, 2022). The follicular cyst seen in both ovaries of this present case contained

clear watery fluid, appeared thin-walled as stated by Arlt & Haimerl (2016) and had a well-defined disrupting the ovarian architecture in line with Duncan *et al.* (2018), suggesting a progestative phase of sexual cycle which may have played a role in the development of the hydrometra, similar to other reports on progesterone's major role in the aetiology of hydrometra in various species (Payan-Carreira *et al.*, 2006; Çiplak, 2023). Findings of high serum oestrogen concentration suggested that it presumably led to fluid accumulation in the uterus (Bülent & Salmanoğlu, 2007; Arlt & Haimerl, 2016).

It is fascinating that the left and right uterine horns measured 16.2 and 14.3 cm respectively in length and the diameter of both horns was 4.6 cm. Uterine horn diameter in this present case is more than 4.5 cm reported in the queen (Abel, 1990), bilateral 11.5 cm in length and 2 cm in diameter reported in the bitch (Payan-Carreira *et al.*, 2006). However, the dimensions were almost similar to another report with 17.0 and 13.0 cm length in a queen (Bülent & Salmanoğlu, 2007). The removed ovariohysterectomy tissue weighed 630 g with serous fluid volume of 610 mL, another report showed a volume of 500 mL (Smith, 1986). High fluid volume in this present case is an anomaly as it agrees with that higher hydrometra fluid volume is not only a pathological condition of the uterus but also an important prediction of reproductive diseases or anomalies (Wu *et al.*, 2023).

The haematological results from the laboratory were within physiological limits. Maternal immunoassayable progesterone during estrus is 1 ng/mL, is reported to range between 2 and 10 ng/mL in healthy pregnancy and undergoes a continuous slow decline thereafter (Ousey, 2004; Verstegen-Onclin & Verstegen,

2008). As for the oestrogen, serum concentration fluctuates with a significant rise especially in late gestation (Kustritz, 2006; Johnson, 2022). The pre-surgical serum results were progesterone 2.11 ng/mL, oestradiol 57.06 ng/mL and prolactin 0.61 ng/mL while the post-surgical serum progesterone was 1.42 ng/mL, oestradiol – 44.12 ng/mL and prolactin – 0.47 ng/mL respectively. The results in this present case are suggestive of a positive feedback mechanism as the hormones are returning to basal values to restore the body physiology in agreement with other studies confirming these parameters returned to basal values 7 days after OHE (Rubina *et al.*, 2010; Verstegen-Onclin & Verstegen, 2008).

Microbiological culture yielded *Escherichia coli* and *Streptobacillus* species. Bacterial invasion of the uterus is said to be opportunistic because the most commonly isolated organisms are also part of the normal vaginal flora (Fossum, 2019; Rodríguez-Alarcón *et al.*, 2019). The most commonly identified pathogen in uterine disease is *Escherichia coli*, which has an affinity for the endometrium and myometrium (Fossum, 2019), although it is also found with other infectious agents (Fransson *et al.*, 1997; Lansubakul *et al.*, 2022) as in the present case.

Continuous ovarian production of progesterone or exogenously administered progesterone in pseudopregnancy bring about absence of uterine contractility, resulting in fluid accumulation in the uterine lumen, thereby creating a suitable environment that allows bacterial colonisation (Fransson *et al.*, 1997; Pretzer, 2008; Fossum, 2019). Ascension of faecal and urinary tract microflora during coitus and transient bacteremia are usually the routes of these organisms into the uterus (Fossum, 2019), this might have caused incipi-

ent contamination of the serous uterine fluid in this present case and may progress to other pathological condition such as pyometra had the patient not been presented.

It was therefore concluded that this was a case of hydrometra, an uncommon condition in the queen. This case resulted from continuous progestative phase of the sexual cycle although our study's limitation was failure to perform histopathology, cytology, to assay prostaglandin, relaxin, oxytocin and uterine protein concentrations to reveal their interplay in this case. We therefore recommend hormonal assay to monitor progesterone decline and acute prolactin surge in queens with an apparently prolonged gestation as an important tool, especially where the day of ovulation is known or accurately estimated so as to have a timely elective Caesarian section. Due to paucity of information on hydrometra in cats, it is very pertinent to sprout the veterinary practitioners' awareness that it is one of the many reproductive conditions requiring emergency intervention when diagnosing patients with fluid-filled tubular structures on abdominal ultrasonographs and radiographs especially during diestrus, to increase case reporting and research to broaden knowledge and awareness.

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