

A case of secondary ectopic pregnancy and *Schistosoma reflexum* in a cat

Fatma Köse¹, Mehmet Fatih Özbezek¹, Zeynep Günay Uçmak²

Case Report

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¹Istanbul University-Cerrahpasa, Institute of Graduate Programs, Istanbul, TÜRKİYE. ² Istanbul University-Cerrahpasa Faculty of Veterinary Medicine Department of Obstetrics and Gynecology, Istanbul, TÜRKİYE. Köse, F. ORCID: 0000-0003-3238-8065; Özbezek, M. F. ORCID: 0009-0003-5375-8130; Günay Uçmak, Z. ORCID: 0000-0003-2530-1291

ABSTRACT

This report describes a case of ectopic fetus and *Schistosoma reflexum* encountered in a 3-year-old, 4 kg tabby cat brought to our clinic for routine neutering. Gingivitis and multiple intraabdominal masses were detected in the clinical examination of the cat. Leukocytosis and anemia were determined in the haemogram. Ovariohysterectomy was performed to remove two ectopic fetuses covered with fibrous capsules beyond the ovaries. *Schistosoma reflexum* was detected in one of the ectopic fetuses. The cat received postoperative care for one week and recovered without any problems. In conclusion, it was observed that ectopic fetus cases in cats can be associated with *Schistosoma reflexum*. These cases can be diagnosed using imaging methods, and surgical intervention can provide treatment.

Keywords: cat, ectopic pregnancy, *Schistosoma reflexum*

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Introduction

The gestation period in cats is 61-72 days from the first day of mating, with an average of 65 days (Kustritz et al., 1995). Ultrasonography and hormone measurements are the most commonly used and highly accurate methods for early pregnancy diagnosis in domestic animals (Alaçam, 2010). Ultrasonography is preferred in pregnancy diagnosis and detection of ovarian and uterine pathologies because it provides accurate and rapid results and has no harmful effects on the operator or the patient (Rendano, 1983; Atmaca, 1985; Biller and Haibel, 1987; Barr, 1988). Diagnostic imaging methods such as radiography, ultrasonography, diagnostic laparoscopy, computed tomography and magnetic resonance imaging are used in veterinary gynecology (Thrall, 1994; Kao et al., 2014). Pathological conditions such as subinvolution of placental regions, postpartum metritis, pyometra, cystic endometrial hyperplasia, uterine rupture or tumours can also be determined by ultrasonography

(Barr, 1992; Kahn, 1994; Alaçam, 1998; England, 1998a and 1998b; Wright and Watt, 1998; Luvoni and Grioni, 2000; Son et al., 2001; Kutzler et al., 2003; Eker and Salmanoğlu, 2005b). Radiography should not be used during pregnancy unless necessary to avoid the side effects of X-rays on developing fetuses (Burke, 1986). Mineralization can be observed from the 35th day of pregnancy (Dennis et al., 2010). Lateral radiographs can be taken 5-10 days before parturition to determine the number and location of offspring (Simpson et al., 2004; Peterson and Kutzler, 2011). Extrauterine pregnancy refers to a condition in which pregnancy develops outside the uterus (Corpa, 2006). Primary abdominal extrauterine pregnancy occurs when the fertilized oocyte cannot be transferred to the uterus due to oviductal obstructions or oviductal contraction waves, causing it to fall into the abdominal cavity (Corpa, 2006; Curtseit et al., 2016; Hughes, 2019; Bhatta et al., 2020). Abdominal ectopic

*Corresponding Author: Fatma Köse
E mail: fatmatemizzz@gmail.com

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pregnancy develops as a result of the implantation of the fetus in the abdominal cavity and is classified as primary or secondary (Corpa, 2006). Primary ectopic pregnancy can be encountered in rodents and lagomorphs because they possess a discoid, hemomonochorial placenta, similar to humans (Dzięcioł et al., 2008). Secondary ectopic pregnancy occurs when the oocyte develops into a fetus within the uterus but falls into the abdominal cavity as a result of a rupture in the uterine wall. Secondary ectopic pregnancy can occur due to trauma, uterine rupture, uterine anomalies, increased uterine pressure, or the administration of high doses of oxytocin (Jerome and Hendrickx, 1982; Corpa, 2006; Sagar et al., 2017). In veterinary literature, long-standing mineralized abdominal ectopic fetuses have been described in monkeys, rabbits, dogs, and cats (Carrig et al., 1972; Segura et al., 2004; Corpa, 2006). The primary treatment principle is often the surgical removal of the mummified ectopic fetus (Johnson, 1986).

Schistosoma reflexum is a congenital anomaly which have been rarely described in cats (Kawata and Tiba, 1961). The etiology of various congenital anomalies, including *Schistosoma reflexum*, remains unknown. However, genetic mutations, chromosomal anomalies, environmental factors, infectious agents, or combinations of these factors are thought to contribute to the formation of ventral body wall defects and associated internal organ anomalies (Timurkan and Mert, 1987; Özsoy et al., 2009).

This case report aims to describe the diagnosis and treatment approaches of an extrauterine pregnancy in a cat, which may be accompanied by a pregnancy pathology such as *Schistosoma reflexum*.

Case History

A three-year-old domestic cat weighing 4 kg was brought to our clinic for routine neutering. The mucous membranes were rosy pink, respiration was 20/min, heart rate was 120/min, body temperature was 38.7 °C, and infection was found in the gums and right upper molar tooth. Haematological examination revealed anaemia and leukocytosis (Figure 1). Abdominal palpation revealed two hard, movable masses approximately 6-7 cm in diameter. Palpation of the mass did not cause pain. Abdominal radiography was taken in the laterolateral position (BMI, Vet System + Plus Digital X-Ray Device, Italy) and mineralised structures measuring 5.5x5 cm and 2.5x3 cm were visualized (Figure 2). The head and spine of the fetus, which was curled up on the radiograph, were identified. B-mode abdominal ultrasonography (SIUI, Apogee 2100V, People's Republic of China) was performed to determine fetal viability and no fetal

heartbeat was detected. According to the transversal body diameter, the fetus was 44 days old. Laparotomy was applied to remove the dead fetuses and a standard ovariohysterectomy under general anaesthesia was performed (Rosset et al., 2011).

Fetuses encapsulated in a fibrous capsule surrounded by the mesentery were removed from the right ovary, approximately 3 cm ahead, and from the left abdomen (Figure 3). Following the incision of the capsule of the larger fetus, schistosoma reflexum was diagnosed in the cat (Figure 4). Absorbable suture material was used for all sutures. To prevent postoperative pain and infections, meloxicam hydrochloride (0.2 mg/kg, subcutaneous, SID, Meloxicam, Bavet®, Turkey) and amoxicillin-clavulanic acid (20 mg/kg, subcutaneous, SID, Synulox, Zoetis, USA) were administered for seven days. On the 10th day postoperatively, the skin sutures were removed, and the cats general condition was observed to be satisfactory.

TEST	RESULT	REFERENCE VALUE	
RBC	3.67	6.54 - 12.20 M/μL	L
Haematocrit	12.6	30.3 - 52.3 %	L
Haemoglobin	5.0	9.8 - 16.2 g/dL	L
MCV	34.3	35.9 - 53.1 fL	L
MCH	13.6	11.8 - 17.3 pg	
MCHC	39.7	28.1 - 35.8 g/dL	H
RDW	23.6	15.0 - 27.0 %	
% Reticulocyte	1.0	%	
Reticulocytes	38.2	3.0 - 50.0 K/μL	
Reticulocyte Haemoglobin	15.3	13.2 - 20.8 pg	
WBC	48.51	2.87 - 17.02 K/μL	H
% Neutrophils	*47.8	%	
% Lymphocytes	*49.5	%	
% Monocytes	*2.1	%	
% Eosinophils	0.4	%	
% Basophils	0.2	%	
Neutrophils	*23.22	2.30 - 10.29 K/μL	H
Bands	* Suspected		
Lymphocytes	*24.00	0.92 - 6.88 K/μL	H
Monocytes	*1.01	0.05 - 0.67 K/μL	H
Eosinophils	0.20	0.17 - 1.57 K/μL	
Basophils	0.08	0.01 - 0.26 K/μL	
Platelets	380	151 - 600 K/μL	
MPV	17.0	11.4 - 21.6 fL	
Plateletcrit	0.65	0.17 - 0.86 %	

Figure 1. Hematological parameters of the cat.

Discussion and Conclusion

Although ectopic pregnancy is a well-known pathology in humans due to regular gynecological examinations, it is rarely diagnosed in animals because routine examinations are not conducted. Detailed epidemiological studies on ectopic pregnancy in animals have not been carried out (Hong and Armstrong, 1978; Van Den Eeden et al., 2005). According to the literature, ectopic pregnancy is rare in

animals and is mostly reported in cats (Bodle, 1979; Corpa, 2006; Çetin et al., 2014; Rosset et al., 2011). Since the placenta of cats cannot support the growth and development of a fetus outside the uterus, there have been no reports of an ectopic fetus reaching maturity in the abdominal cavity of felines (Bodle, 1979). In our case, the exact time when the fetus fell into the abdominal cavity is unknown, but the fact that the fetuses were dead indicates that the ectopic fetus could not survive in the abdominal cavity.



Figure 2. Abdominal radiograph of the cat taken in a ventrodorsal position (Red arrows indicate the fetuses).

Most cats with ectopic pregnancy do not show clinical signs, and some may even remain fertile. An ectopic fetus may remain in the abdominal cavity for several months or even years. A systemic inflammatory response can result from necrotic ectopic tissues or mechanical stimulation of the ectopic fetus, leading to clinical symptoms. Some cases may result in pyometra (De Nooy, 1979; Botcherby, 1980; Nack, 2000; Corpa, 2006; Tu et al., 2016). Some cats may exhibit symptoms such as fever, anorexia, vomiting, lethargy, depression, hematuria, pollakiuria, or urinating outside the litter box (Johnston et al., 2013). In the presented case, no clinical signs or pyometra were observed in the cat. The lack of clinical signs may be due to the fibrous capsule surrounding the ectopic fetus not adhering to vital organs.

Since ectopic fetuses usually do not cause noticeable symptoms, they are often diagnosed

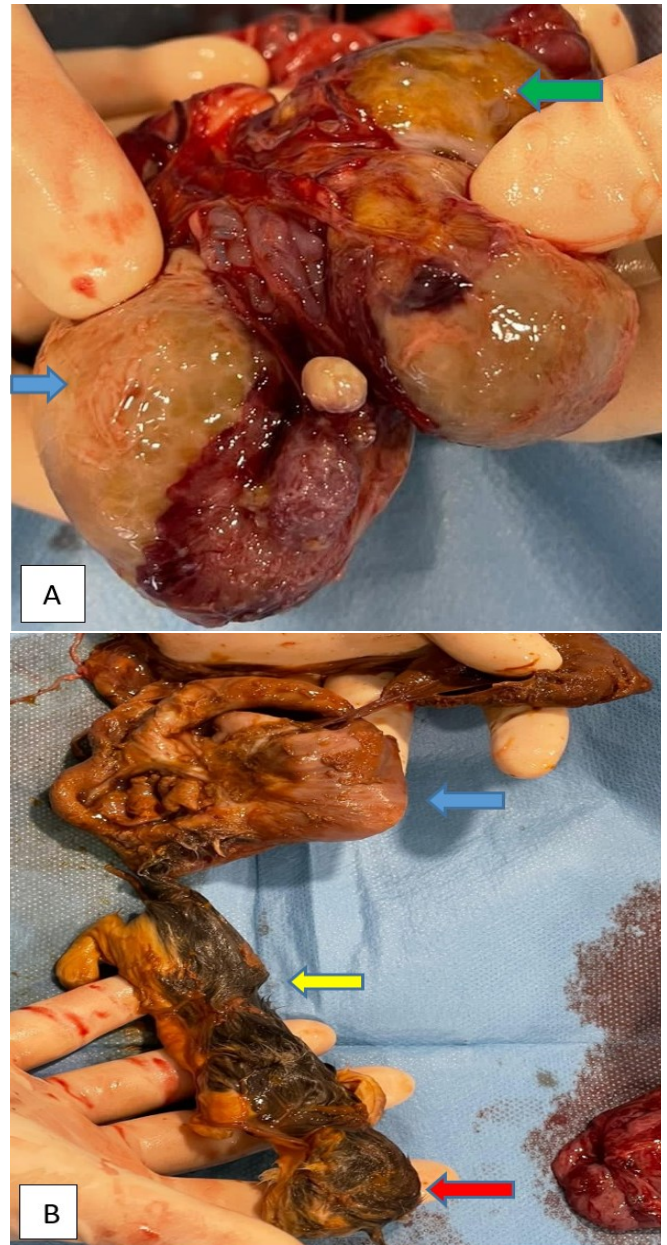


Figure 3. Ectopik fetuses. A: Extrauterine fetus within a fibrous capsule (body of the ectopic fetus; blue arrow, head of the ectopic fetus; green arrow). B: Fetus removed from fibrous capsule (head of the ectopic fetus; red arrow, body of the ectopic fetus; yellow arrow, the fibrous capsule; blue arrow).

incidentally (Rosset et al., 2011). The diagnosis of ectopic pregnancy can be made using imaging methods such as radiography, ultrasonography, diagnostic laparoscopy, or computed tomography. Although ultrasonography is the most preferred imaging method for pregnancy examinations, computed tomography and magnetic resonance imaging techniques provide more useful information for determining the exact location of an extrauterine fetus (Kao et al., 2014). In this case, the ectopic fetuses were diagnosed through abdominal radiography. Radiographic findings of an



Figure 4. Fetus with *Schistosoma reflexum* anomaly removed from the fibrous capsule (the fibrous capsule; blue arrow, head of the ectopic fetus; green arrow, exposure of the abdominal organs of the fetus; yellow arrow).

abdominal ectopic fetus include a round, curled fetal outline, bones that are more radio-opaque than usual, a more contrasted image due to the lack of fluid in the fetal sac, and the fetus being located in a site unrelated to the uterus (Thrall, 1994). In agreement with other researchers, the lack of fluid in the fetal sacs and the fetus being located outside the uterus were detected on a lateral abdominal radiograph.

Mateo and Camon (2008) reported clinical approaches to a cat carrying a fetus with multiple congenital malformations that met the criteria for true *Schistosoma reflexum*. Similarly, abdominoschisis and exposure of the abdominal organs were identified in the fetus with *Schistosoma reflexum* in this case.

In conclusion, this study highlights the association between ectopic fetus cases and schistosoma reflexum in cats. Advanced imaging techniques play a crucial role in diagnosis, and surgical intervention remains the primary treatment option.

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