

## Microbiological Analysis of Acute Mastitis in a Van Cat

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### Abstract

In this case report, a 7-year-old female Van cat of 2.3 kg weight, bred and given birth in the *Van Cat Research Center*, is presented. There was a two day history of inappetence and fatigue, along with lying without movement for long. Our physical examination showed an acute inflammation accompanied by swelling, severe pain and hardness in the left caudal thoracic mamma, in addition to a bruise starting from the nipple and extending to the rest of the tissue. The cat was diagnosed with mastitis. *Escherichia coli* and *Staphylococcus simulans* were identified after the microbiological analysis of the milk from the affected breast.

**Keywords:** *Van cat, Acute mastitis, Microbiology, mecA*

## Bir Van Kedisinde Görülen Akut Mastitisin Mikrobiyolojik Analizi

### Özet

Bu olgunun materyalini Van Kedisi Araştırma Merkezi'nde yetiştirilen 7 yaşında 2.3 kg ağırlığında yeni doğum yapmış bir Van kedisi oluşturmuştur. Kedinin son iki gün içerisinde iştahsız olduğu, keyifsiz ve halsiz bir şekilde uzun süre yattığı bilgisi ile birlikte yapılan muayenede sol ikinci memede akut seyirli bir yangının olduğu memenin şiştiği, serleştiği, şiddetli ağrı ve meme ucundan başlayarak dokuya doğru yayılmış tarzda morarmanın olduğu izlendi. Hastaya akut mastitis tanısı konuldu. Sütte yapılan mikrobiyolojik muayene sonucunda *Escherichia coli* ve *Staphylococcus simulans* izole ve tanıya edildi.

**Anahtar sözcükler:** *Van kedisi, Akut mastitis, Mikrobiyoloji, mecA*

### INTRODUCTION

Mastitis is an uncommon reproductive disease in cats and dogs. Although it is encountered less frequently in carnivores, since it causes mortality of the offspring, it is considered as an important condition <sup>[1]</sup>. The disease may develop due to direct infection, trauma or presence in a contaminated environment <sup>[2]</sup>. The most common causative agents of mastitis in cats are *Escherichia coli*, *Staphylococcus* spp. and *Streptococcus* spp. <sup>[3]</sup>. These species can normally live in the cutaneous and mucosal floras of cats and dogs. *Staphylococcus* spp. are primarily found in the anterior nasal cavity and skin <sup>[4,5]</sup>. Nonetheless, it can also be isolated from the oral cavities <sup>[6,7]</sup>. In one study, authors isolated coagulase-positive *Staphylococcus intermedius* and *Staphylococcus aureus* from the skin of healthy cats <sup>[8]</sup>. However, the most commonly isolated coagulase-negative species in healthy cats is *Staphylococcus simulans* <sup>[6]</sup>.

To our knowledge, there is not much information about feline mastitis in the literature. Feline mastitis occurs

in the peracute, acute and mild chronic forms <sup>[9]</sup>. The most common symptoms of mastitis in cats are tissue hardness, redness, and swelling, as well as colorless mammary lobe and changes in milk secretion. Affected cats may exhibit unwillingness to breastfeed, fatigue, depression, fever and inappetence. The mammary tissue may develop abscess or gangrene <sup>[10]</sup>.

The diagnosis of mastitis is reached based on the history, clinical and microbiological findings, as well as changes in the milk <sup>[11]</sup>. Many of the mastitis cases can be treated on an outpatient basis <sup>[12]</sup>. The efficacy of the selected antibiotic agent depends on factors such as susceptibility, transition to the mammary tissue, and milk concentration. Moreover, these antibiotics should not be harmful to the infants via breastfeeding <sup>[1]</sup>. In cases with necrotic mammary tissue, the infants should be distanced from the mother and fed elsewhere <sup>[9,12]</sup>.

In this case report, it is aimed to contribute to the literature by providing information on clinical signs, microbiological analysis and treatment of mastitis in Van cats.



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## CASE HISTORY

In this case report, a 7-year-old female Van cat of 2.3 kg weight, bred and given birth in the Van Cat Research Center, is presented. She gave birth to 4 kittens 10 days ago and has a 2-day history of inappetence and fatigue, along with lying without movement and showing reluctance to breastfeed her kittens. The first physical examination revealed mild depression and significant indifference to surroundings. There was an inflammation with acute course accompanied by severe pain in the left caudal thoracic mamma. The mamma was swelled, hardened, and having a bruise starting from the nipple and extending to the mammary tissue (Fig. 1). The milk was not easily coming out and it was of yellowish color with purulent character. In the light of these findings, the Van cat was diagnosed with acute mastitis. The mammary tissue was cleaned with 70% alcohol for the microbiological assessment and the purulent content sampled by 2 sterile swabs was sent to

the Veterinary Microbiology Department under cold chain. Isolation and identification were carried out by culturing in 5% sheep blood agar (Salubris), MacConkey agar (Salubris), and eosin methylene blue agar (Salubris). The suspected colonies were tested for Gram staining, catalase and oxidase reactions.

The identification and antibiotic susceptibility testing were evaluated by the BD Phoenix automated Microbiology systems (Becton Dickinson, US), using Gram-positive and negative panels. *E. coli* and *S. simulans* were identified from the milk sample. The antibiotic susceptibility test results for these two bacteria are shown in Table 1.

The application of polymerase chain reaction (PCR) method using oligonucleotide primer series (F-5'-AAAATCG ATGGTAAAGGTTGGC-3'; R-5'-AGTTCTGCAGTACCGG

ATTTGC-3') revealed that *S. simulans* carried *mecA* gene. DNA extraction was performed with a colon-based ready-



Fig 1. Acute mastitis in a Van cat

Şekil 1. Akut mastitis görülen Van Kedisi

Table 1. Antibiotic susceptibility test results

Tablo 1. Antibiyotik duyarlılık testi sonuçları

Agent	Antibiotics	ESCCOL MIC/Conc	SIR	Agent	Antibiotics	ESCCOL MIC/Conc	SIR
<i>E. coli</i>	Amikacin	≤ 8	S	<i>S. simulans</i>	Ampicillin		R
	Ampicillin-Sulbactam	≤ 4/2	S		Cefazolin	≤ 2	S
	Cefazolin	≤ 2	S		Clindamycin	≤ 0.25	S
	Cefepime	≤ 1	S		Daptomycin	≤ 0.5	S
	Cefoperazone-Sulbactam	≤ 0.5/8	S		Erythromycin	≤ 0.25	S
	Cefoxitin	≤ 4	S		Linezolid	≤ 1	S
	Ciprofloxacin	≤ 1	S		Oxacillin	≤ 0.25	S
	Ceftriaxone	≤ 1	S		Penicillin G		R
	Ertapenem	≤ 0.25	S		Rifampin	≤ 0.5	S
	Gentamisin	≤ 2	S		Teicoplanin	≤ 1	S
	Imipenem	≤ 0.5	S		Tetracycline	≤ 0.5	S
	Levofloxacin	≤ 1	S		Trimethoprim-Sulfamethoxazole	≤ 1/19	S
	Meropenem	≤ 0.5	S		Vancomycin	≤ 1	S
	Piperacillin-Tazobactam	≤ 4/4	S				
	Ticarcillin-Clavulanate	≤ 8/2	S				
Trimethoprim-Sulfamethoxazole	≤ 1/19	S					

to-use kit (DNA mini kit, Qiagen, Hilden, Germany) for DNA extraction from the isolates growing from the tryptic soy agar (TSA, Plasmatec). Ready-to-use amplification mixture was employed in the PCR analysis and the primer binding temperature was kept at 55°C during the amplification process. The amplification products were subjected to gel electrophoresis, stained in 1xTBE buffer containing 0.5 µg/ml ethidium bromide, and the bands were viewed by UV transilluminator. As a result of PCR analysis, *S. simulans* was demonstrated not contain *mecA* gene.

The cat was put on intramuscular cefazolin therapy at 15 mg/kg dose for 5 days, to which *E. coli* and *S. simulans* are known to be highly susceptible. Sefapir® (Cephapirin sodium 200 mg, trypsin 10 mg, chymotrypsin 10 mg) was applied at 11 mg/kg dose twice every other day via intramammary route after squeezing the milk out of the related mammary tissue.

## DISCUSSION

Van cats are acknowledged as a protected cat species. The university that this study accomplished has been carrying out protective projects for the Van cats in a research center. To protect them, we aim to perform a successful genetic breeding, as well as producing healthy generations. Therefore, it is important to both conserve the genetic material and fight with possible diseases of Van cats. In this regard, there are several studies on Van cats in the literature [13,14]. However, our patient is the first mastitis case in a Van cat. To our knowledge, the literature on feline mastitis cases is very scarce. Mastitis can be diagnosed by evaluating several clinical, bacteriological, cytological, hematological, and pathological parameters together [10]. It has been reported that feline mastitis may have an acute or chronic course, and that mortality can be seen in acute mastitis [9,10].

Moreover, despite being uncommonly seen, mastitis should be deemed as an important disease because the kittens may die eventually due to loss of the mother. Similar to the studies in the literature, we determined symptoms of mastitis such as hardness, swelling, and redness of the mammary tissue, as well as local pain [10,15]. Moreover, we observed behavioral symptoms such as inappetence, depression, and fatigue which are known to be common features encountered in feline mastitis cases. In addition, in a case report, Wilson (10) noted bruises turning into necrosis, as well. Similarly, Ververidis et al (3) induced experimental mastitis in female dogs and reported the same clinical symptoms along with a purulent milk secretion. This report stated that the pathogenesis of mastitis can be agreeable with the findings of previous reports.

The microbiological analyses showed that the causative pathogens of the acute mastitis in this Van cat were *E. coli*

and *S. simulans*. In his study, Wilson (10) isolated *E. coli* and *S. aureus* in a cat with gangrenous mastitis. Lilenbaum et al.[11] isolated *Staphylococcus* species in samples collected from the skin of healthy cats which are known to be the causative agents of certain infections. Sura et al.[16] reported *E. coli* as the causative agent in a cat with acute necrotizing pneumonia. In the light of these studies, the represented study is the first report of *E. coli* and *S. simulans* as the main causative agents of a feline mastitis case.

The susceptibility of the bacteria isolated from cats and dogs to certain antibiotics has been reported by various studies [11,17]. Lilenbaum et al.[11] observed varying degrees of resistance to different antibiotics in *Staphylococcus* spp. isolated from healthy cats. Moreover, 6 of the 11 isolated *S. simulans* were found to be methicillin-resistant. Similarly, Wilson (10) reported varying susceptibility to different antibiotics in a cat diagnosed with gangrenous mastitis. In our case, among the isolated pathogens, *E. coli* was susceptible to all the antibiotics, however, *S. simulans* was observed to be resistant to penicillin G and ampicillin. As a result of PCR analysis, *S. simulans* was demonstrated not contain *mecA* gene.

In parallel with the other studies in the literature, our case report shows that antibiogram and PCR analysis is a very important test in clinical mastitis cases.

In order to prevent bacteria from developing resistance to antibiotics in Van cats with mastitis, multicenter epidemiologic studies should be carried out to follow the antibiotic resistance status of pathogens and bacterial flora.

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