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## OLGU SUNUMU

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### Opportunistic Cutaneous Myiasis in a Wolf: A Case Report

An about 9 month old wolf was presented to our clinic with the complaints of injury, cachexia, prostration and incoordination. Multiple malodors and suppurating wounds complicated diffusely with myiasis were observed in and around its right ear and on the same aspects of its head and neck. The case also demonstrated malodorous external otitis and marked pedal reflex. No sign of gunshot wound was determined in radiography. Following shaving hair and cleaning the sites, the worms visible through the wounds were removed with a forceps and those located deeper were dislodged introducing 10% ether'd iodophorme solution to the wounds. An antibiotic ointment was applied daily to all wounds and the neck was kept dressed until healing. External otitis was treated administrating fortified antibiotic drop twice a day and 4 drops each. Parenteral antibiotic and vitamin B complex were prescribed for a week. Fluid administration continued until eating started. It was seen that the animal started eating itself in 3 days, managed to stay on its legs in a week and enabled to run in 20 days. The animal regained capacity for hunting about 2 months and then was freed to where found first. In conclusion the present case report suggests that the wounded wild wolves are at higher risk of myiasis which may cause dead unless a prompt and effective treatment is applied.

**Key Words:** Wolf, wound, myiasis, treatment.

#### Kurtta Fırsatçı Deri Myiazisi Üzerine Bir Olgu Sunumu

Kliniğimize yaklaşık olarak 9 aylık bir kurt yaralanma, kaşeksi, bitkinlik ve koordinasyon bozukluğu gibi şikayetlerle sunulmuştur. Hayvanın sağ kulağının içi ve çevresi ile aynı tarafın baş ve boyun kısımlarında myiasisle yaygın şekilde komplike olmuş çok sayıda kötü kokulu ve akıntılı yara saptanmıştır. Olguda kötü kokulu otitis eksterna ve pedal reflex gibi belirtiler de gözlemlenmiştir. Yapılan radyografik değerlendirmede silah yaralanması belirlenmemiştir. Kılar tıraş edilip bölgenin temizliği yapıldıktan sonra yarada gözlenen larvalar bir pens yardımıyla uzaklaştırılmıştır. Derinde yer alanlar %10'luk ether'd iodophorme solüsyonu yaraya dökülerek uzaklaştırılmaya çalışılmıştır. Tüm yara bölgesine antibiyotikli merhem uygulanmış ve boyun kısmı pansuman altında korunmuştur. Otitis eksterna, günde iki kez 4'er damla güçlendirilmiş antibiyotik uygulaması yapılarak sağaltılmaya çalışılmıştır. Bir hafta süreyle parenteral antibiyotik ve vitamin B uygulamaları yapılmıştır. Hayvan yemeye başlayana kadar sıvı uygulamasına devam edilmiştir. Hayvanın 3 gün içinde kendi kendine yemeye başladığı, bir hafta içinde ayakları üzerinde durmayı başardığı ve 20 gün içinde ise koşabildiği görülmüştür. İki ay içinde avlama gücüne ulaşan olgu ilk bulunduğu yerde bırakılmıştır. Sonuç olarak, mevcut olgu sunumunda yaralı vahşi kurtların hızlı ve etkili sağaltımlarının yapılmaması durumunda ölümle sonuçlanabilen yüksek miyazis riski taşıdığı kanısına varılmıştır.

**Anahtar Kelimeler:** Kurt, yara, myiazis, sağaltım.

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#### Introduction

A wound is an injury to superficial cutaneous structures and to structures underlying the skin (1). In the wild life, wolves suffer from a variety of injuries during hunting large prey animals with horns, illegal hunting, car crash and leg-held traps. They can also undergo injuries due to falls from rock ledges, drowning in swift rivers and fights with other wolves on territory disputes or mating and attacks by animal with tusk (2).

The invasion of human or animal tissue by the larvae of Diptera flies is known as myiasis (3, 4). This has been reported in dogs, goats, cat, sheep, camels, horses and geese (5-10) but according to the work of Schnur et al (10) the dog is the one of the most frequently affected animal amongst these species.

Myiasis can come in all sorts of variations, depending on the fly species and where the larvae (maggots) are located. Larval stages are usually associated with skin wounds of any domestic animal that have become contaminated with bacteria or with a matted hair coat contaminated with feces (13). Some flies may lay eggs in open wounds, other larvae may invade unbroken skin or enter the body through the nose or ears, and still others may be swallowed if the eggs are deposited on the lips or on food (11). As a result, several clinical forms have been described, including the furuncular (14), opportunistic and creeping myiasis (3). Opportunistic myiasis occurs when the flies lay their eggs in open wounds, ulcers, or cavities (3). It leads to sever health problem and

extensive damage to the host tissues if left untreated (8, 10). Myiasis is a serious problem for the livestock industry resulting in severe economic losses worldwide (8-11).

Misdiagnosis of myiasis may result in incorrect treatment, anxiety, and excessive scarring (12). Therapy of opportunistic myiasis consists of mechanical or surgical debridement (3, 8, 9) pharmaceutical treatment (8,9) and application of toxic substances to the larvae or eggs and producing localized hypoxia to force emergence of the larvae (3). In this case report, the clinical characteristics of wolf myiasis were explained and the treatment procedure applied has been described. It was thought that it would be useful to bring such a rarely encountered case into the attention of veterinary practitioners.

### Case Presentation

An approximately 9 month old wild male wolf was presented to the Small Animal Clinic of Veterinary Teaching Hospital of Fırat University by the personals of Elazıđ Wild Life Conservation Department. Its age was estimated on the basis of physical and dental examinations. The case was chronically ill, cachectic, and rejected eating or anorectic with lack of an interest with surrounding. He presented incoordination and tried to turn around on its right side (Figure 1). His very dirty and matted coat obscured the wound areas during examination.



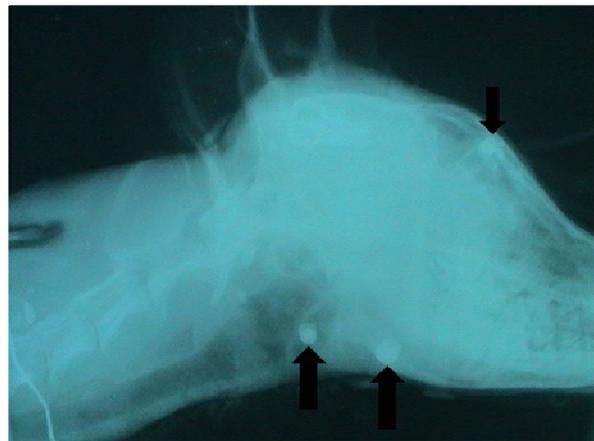
**Figure 1.** The first appearance of the case with muzzle recumbent unconsciously on the table.

Careful clinic examination revealed that the wolf had several wound holes on the right temporal aspect of the forehead and in and around the ear of the same side. The same aspect of the neck also contained many dirty contaminated wounds of different sizes. All affected sites were malodorous and included numerous highly active larvae (Figure 2). Ooscopic examination demonstrated that a similar abnormality extended midway down to the external ear canal. Following removal of larvae and cleansing the ear canal, the auricular mucosa was found as edematous and hyperemic and covered with patchy scabs with hemorrhagic loci underneath. The auricular membrane had abnormal and slightly outwardly bulged appearance. The case also demonstrated external otitis

associated with marked pedal reflex. Radiographic evaluation revealed no signs of foreign body and gunshot (Figure 3). The hair coat also contained numerous fleas and ticks.



**Figure 2.** Neck wounds contains numerous larvae exposed after clipping the dirty and matted hair around.



**Figure 3.** A laterolateral radiographic view of the head and neck of the case with no signs of a foreign body or gunshot. Arrows show the muzzle's buckles.

**Treatment procedures:** Having clipped and shaved hairs in the affected sites, the wounds became well visualized (Figure 4, 5), which allowed an easier access for removal of the larvae. The larvae hidden beneath the skin next to the wounded edges exited outside with lightly massaging the affected areas. The exposed larvae were removed with the use of sterile medical forceps. Those penetrated deeper into the wounds were dislodged introducing 10% ether'd iodophorme to the sites. All regions were irrigated with warm tap water, cleaned with a polyvinylpyrrolidone containing antiseptic solution (Polyod, Drogsan) diluted in 1:20 and dried with a sterile gauze pad. The wounds of the neck were dressed with usual manner after applying topical antibiotic (Furacin, Eczacıbaşı) ointments. The dressing was frequently changed to aid in cleansing of the wound, drainage of suppuration and applying fresh ointment. A topical broad spectrum antibiotic spray (Pyedif, Dif) was

applied to the wounds on the forehead where was left uncovered until healed.



**Figure 4.** The multiple wounds of variable sizes are seen on the neck following shaving the hair and cleansing thoroughly the site from larvae and contaminants.



**Figure 5.** Several small skin holes on the right forehead of the case with diffuse edematous swelling extended into the ear.

Aural myiasis was treated starting first with clipping the hairs around the ear and in the external ear canal orifice. Mechanical removal of larvae with a forceps and cleansing of debridement and discharge with a sterile ear pick were followed. Then, fortified antibiotic solution (Gentavet-G, VETAŞ) three times a day was applied. This application continued until complete recovery was obtained. Additionally, a broad-spectrum antimicrobial agent (Armapen, Arma) was prescribed as 1 ml/10kg twice a day for a week. The case received i.v. 500 ml 5% deksro-fleks (Eczacıbaşı) solution per day as 20ml/kg/hour infusion manner until dehydration resolved and the animal accepted oral feeding. Because the case presented incoordination and turning around on its right side, the presence of some nervous problems were

suspected and thus vitamin B complex (Berovit, Sanofi Doğu) and vitamin C (Vitce, Sanovel) was parenterally administered for 5 days with s.c. or i.m. dose of 5ml/day each. Systemic administration also included s.c. doramectin (Dextomax, Pfizer) injection at the rate of 1ml/50 kg.

## Results

The animal accepted oral feeding one day after presentation with a help which continued two days until it managed to stay on sternal recumbence position and use its paws to the grasp and its teeth to tear its food into pieces. It was able to stay on its legs within three days. Incoordination and turning round disappeared within a week (Figure 6). Wound healing and external otitis responded rapidly to the therapy and almost a full recovery was obtained in two weeks (Figure 7). It enabled to run in 20 days, nevertheless, it retained in its box with a cage about two months for gaining its strength to hunt.



**Figure 6.** Appearance of the case one week after initiation of the treatment. Almost all wounds have healed and the antibiotic spray has been applied to the regions to repel the fly and protect microbial contamination. It was capable of standing up and walking.



**Figure 7.** Healthy appearance of the case with full recovery two weeks after presentation.

## Discussion

The present report describes the clinical characteristics of opportunistic cutaneous myiasis in a

wild wolf and a treatment procedure that permits its rapid cure. Orfanou et al. (9) have reported that myiasis causes significant distress to the affected dogs, which has been expressed by Farkas et al. (5) in their study on the sheep with untreated myiasis. This clinical condition was also observed in the present case with more marked form. Therefore we agree with their suggestion that effective treatment is important for maintaining welfare standards of animals with such a disorder.

The wolf can be considered as much important as the farm and stray dogs form the epidemiologic point of view of myiasis (10) because they can act as both reservoirs and carriers of the parasitic fly species. According to Schnur et al (10), the dogs with myiasis but left undiagnosed or untreated have the potential to be vectors in the spread of these flies even across international boundaries while they are transported for various purposes such as leisure, sport or breeding. A wolf can travel daily many places (2), which naturally means that it carries a potential risk to spread these flies over a large territory even neighboring countries (2).

In outdoor animals, dirty, matted fur creates humidity of the microenvironment of the skin, an ideal condition for the formation of a skin infection (9, 13). Additionally, fecal or urine-stained coats, draining wounds or inflamed tissues have noted to attract the flies infestation (8). The matted fur can make problem worse via obscuring the area from view, delaying discovery of the problem. Overweight, chronically ill and incontinent animals are especially at risk, so the animals with such conditions should be monitor very closely for signs of myiasis in fly activity seasons (13). The present case had very dirty and matted fur with multiple contaminated wounds of different sizes on the various sites of its body. It was chronically ill, debilitated and cachectic, presented incoordination with a lack of interest with its surrounding. However, as it was recovered from the wild, it remained undetermined whether these conditions occurred prior to or after the case of myiasis. Whatever the reasons were, the myiasis appears to cause severe welfare problems and tissue destruction (8, 10).

The effects of the fly strike on animal is depend on its severity, i.e. mild strikes can cause rapid loss of condition, and bad strikes as it was in the current case can be fatal. Strikes should be diagnosed early and behavior of animal is a good indicator of myiasis. Affected animals become depressed, stand with their heads down, anorectic, and attempt to bite the infested areas (13) with which many clinical signs of the present case also conform well.

Miyasis in dogs and cats has limited prophylactic and therapy alternatives and following its diagnosis a prompt treatment should be initiated. In order to value the extent of the miyasis and remove the larvae mechanically, the hair around the wound should be carefully shaved. As those located deeper in the wound are not dislodged easily, sedation or anesthesia may be required (13). Because the present case was lethargic and debilitated, neither anesthesia nor sedation was found as necessary.

The affected sites were examined at certain intervals after the first treatment (9) since unaffected fly eggs may remain unrecognized here during the treatment (13). The suspected locations of the head and neck were clipped and shaved during which most of the larvae were observed to have been removed. The larvae visible in the wound were mechanically taken away with an aid of a forceps. Then as advocated (9) a gentle massage with hand was also applied to the skin along the vicinities of the wounds to force the larvae set deeper to come out.

In a study (9) on seven dogs with myiasis at different parts of the body, the treatment included mechanical removal of larvae, cleansing of the area and administrations of injectable moxidectin and a broad-spectrum antimicrobial agent. Complete recovery was achieved within 1.5 months except that of preputial infestations which required 2.5 months. In the present case, full recovery was obtained within 2 weeks. The causes of this difference can be attributed to the location of the lesion as is pointed out in the former study and some variations between the treatments of both studies. In this study exclusive of the former one, was used 10 % ether iodoforme which to our clinical observations promotes rapid healing especially in contaminated wounds. The other cause of this difference could be attributed to species variations. Wolf wound may heal much faster than the dog, which is perhaps necessary for these animals to survive longer in the wild life.

Namazi and Fallahzadeh (15) have used a dilute permanganate potassium solution to treat miyasis of a 60-year-old male farmer with squamous cell carcinoma lesion on his lower right leg. This solution produce anoxic and malodorous environment (3) which forced the larvae to evacuate the lesion (15). In this study, for the possibility of the presence of the worms located deeper or hidden under the skin, 10% ether'd iodoforme was administered to the region in stead of the former solution once a day during three days. Iodoforme containing about 29 parts of pure iodine in 30, the carbon and hydrogen with which it is associated render the iodine non irritant, when applied topically (16). This agent perhaps with similar actions as permanganate potassium solution (3) was found to force the larvae to expose from the wound. In addition to the characteristics mentioned it has been reported to have antiseptic, analgesic and anaesthetic effects (16, 17). To our own personal observations, this agent also has a capability to promote cicatrization, due to its expected stimulatory effect on inflammatory process (16). The rapid healing of the wounds of the present case can be partially attributed to this action and partially to the quick healing characteristic of the carnivorous skin (1). Iodoforme is markedly anesthetic when locally applied, owing to a benumbing influence upon the peripheral nerves (16). The beneficiary effects of the anesthetic feature of the agent could be appreciated with pleasant behavioral changes in the animal immediately after the removal of all larvae and administration of this agent.

A study (9) on epidemiological and clinical features and therapeutic considerations of myiasis in a cohort of 163 dogs monitored during 4 fly activity seasons diagnosed it in seven dogs with overall incidence rate of 0.58%. Of these cases three had cutaneous myiasis of the thigh, 2 myiasis of the ear canal, 2 myiasis of the prepuce, 1 myiasis of the toes and 1 myiasis of the vagina. In the present case, myiasis was diagnosed in the ear canal, which along with findings of the previous study (9), indicates a predisposition of ear canal lesions to this infestation. This predisposition can be attributed to anatomical characteristics of the ear canal, a funnel-shaped tube extending from the external acoustic meatus at the base of the pinna to the tympanic membrane (18). The ear canal is not well-ventilated in the canids with long-pendulous-hair filled ear (19), which produce a humidity micro environment inducing infection (9). Otitis with malodor discharge may readily attract fly to strike to the region (14). On the other hand, the canids with erect ear like the wild wolf have an inclination to the strike of biting flies (18) that results in dermatitis which can be associated with myiasis if extended into ear canal and left untreated. The hair in the head makes the ear canal an attractive site for larviposition (9). The ear canal of the present case contained malodorous discharge associated with many larvae. Even though it was unclear in the present case whether or not infected and malodorous dermatitis has any affect, these factors attract the fly strike with a resultant of myiasis in the other parts of the body (9, 13).

In the present case, external otitis may have aggravated the problem. Farkas et al. (8) and Schnur et al. (10) have also reported myiasis in various sites on the bodies of dogs. Infested body sites included limbs (six cases), external genitalia (two), ears (three), nose (one) and neck (one) (8). These infected locations also shows that the ear is one of the potential sites for the development of myiasis. Cramer-Ribeiro et al. (19) also found that the ear was the body site most frequently infested by fly in dogs. They and Orfanou et al (9) determined that the genital areas were other more frequently infested places. The present authors thus agree with those (8) who suggested that as wounded animals are at higher risk of infestation both owners and veterinarians should pay regular attention to any wounds and to the natural orifices of their animals, especially during the fly activity seasons.

Myiasis causes significant losses in farm animals, in contrast, few cases have been reported in domestic

carnivores (8, 9, 19). As the present study reports a single case, it apparently have no a statistical value. However, when the clinical signs of the case were evaluated as a whole it could readily be understand how the wounded carnivores are actually under a great risk from myiasis. Carnivore animals by their natures always have a tendency to fighting for food, on territory disputes or mating or are attacked by large carnivores (2). If the injury occurs during fly activity seasons and is left untreated as mostly the case for the wild animals and stray dogs (8, 9), it would not be difficulty to anticipate the extent of the danger of myiasis that they are likely to experience. These facts appear to validate the assumption that the risk of myiasis in stray dogs and also wild carnivores is much higher than reported (8, 9). However, this result needs further confirmation.

Some studies (8, 9) have reported that the majority of the dogs underwent myiasis were males and the condition was attributed to wounding due to inter-dog aggression, territorial behavior and fights (8). The possible causes of the wolf skin injuries have noted above, of which some correspond to those noted before (8). The present case was male and the type and the location of the wounds draw attention to the similar causes.

To our knowledge, this is the first report in the wild wolf in Turkey. It appears that myiasis is a life treating condition for the wild animals. Prophylactic measure such as ivermectin and doramectin administration may be applied to the animals in national conservation parks. However, such a measure should be applied before the occurrence of myiasis, since in case of myiasis, ivermectin alone has been found to be ineffective and adjunct therapies such as mechanical removal of larvae and systemic antibiotic administration have been employed for having a full recovery (8, 9). A similar procedure was pursued during the treatment of the present case and a successful conclusion was obtained.

In summary, the present case report indicates that in the wild life the wounded wolves are at higher risk of myiasis which may cause dead unless early diagnosis plus prompt and effective treatment are applied. Therefore, it was suggested that the wounded wild animals should be reported rapidly to responsible authorities in order to tackle with such conditions effectively.

## References

1. Waldron RD, Trevor P. Management of superficial skin wound. In: Slatter DH (Editor). Textbook of Small Animal Surgery 2nd Edition, Volume 1. Philadelphia: Saunders 1992: 296-279.
2. <http://www.wolfcountry.net/information/WolfInjuries.html>. 17.07.2011
3. Spigel GT. Opportunistic Cutaneous Myiasis. Arch Dermatol 1988; 124(7): 1014-1015.
4. Otranto D. The immunology of myiasis: parasite survival and host defense strategies. Trends Parasitol 2001; 17(4): 176-182.
5. Farkas R, Hall MJR, Kelemen F. Wound myiasis of sheep in Hungary. Vet Parasitol 1997; 69: 133-144.
6. Farkas R, Kepes GY. Traumatic myiasis of horses caused by *Wohlfahrtia magnifica*. Acta Veterinaria Hungarica 2001; 49: 311-318.

7. Farkas R, Szanto Z, Hall MJR. Traumatic myiasis of geese in Hungary. *Vet Parasitol* 2001; 95: 45-52.
8. Farkas R, Hall MJR, Bougazou AK, Lhor Y, Khallaayoune K. Traumatic myiasis in dogs caused by *Wohlfahrtia magnifica* and its importance in the epidemiology of wohlfartiosis of livestock. *Med Vet Entomol* 2009; 23(Suppl.1): 80-85.
9. Orfanou DC, Papadopoulos E, Cripps PJ, Athanasiou LV, Fthenakis GC. Myiasis in a dog shelter in Greece: Epidemiological and clinical features and therapeutic considerations. *Vet Parasitol* 2011; 181: 374-378.
10. Schnur HJ, Zivotofsky D, Wilamowski A. Myiasis in domestic animals in Israel. *Vet Parasitol* 2009; 161: 352-355.
11. John D, Petri W. *Markell and Voge's Medical Parasitology*. 9th Edition, Missouri: Saunders 2006: 328-334.
12. Guillozet N. Diagnosing Myiasis. *JAMA* 1980; 244(7): 698-699.
13. *The Merck Veterinary Manuel. The integumentary system*. Brewer, NJ: Merck & Co, 2011.
14. TF, Wilson ME, Gonzalez E, Felsenstein D, Bacon Therapy and Furuncular Myiasis. *JAMA* 1993; 270(17): 2087-2088.
15. Namazi MR, Fallahzadeh MK. Wound myiasis in a patient with squamous cell carcinoma. *The Scientific World Journal* 2009; 1(9): 1192-1193.
16. <http://www.magnumarchive.com/c/practical-medicine-volume-3/Parenchymatous.html>. VinDaj Inc 2011. 19.07.2011.
17. Antepliođlu H., Samsar E., Akın F. *Veteriner Genel Şirurji*. Ankara: A.Ü. Basımevi 1978: 311-326.
18. Krahwinkel DJ. External ear canal. In: Slatter DH (Editor). *Textbook of Small Animal Surgery 2nd Edition, Volume 2*. Philadelphia: Saunders 1992: 1560-1567.
19. Cramer-Ribeiro BC, Sanavria A, Monteiro HHMS, De Oliveira MQ, De Souza FS. Inquiry of cases of myiasis by *Cochliomyia hominivorax* in dogs (*Canis familiaris*) of the northern and western zones of Rio de Janeiro city in 2000. *Braz J Vet Res Anim Sci* 2003; 40: 13-20.