

# Postoperative Wound Myiasis Caused by *Sarcophaga carnaria*

*Sarcophaga carnaria*'nın Neden Olduğu Postoperatif Yara Myiasisi

Sefa Ergün<sup>1</sup>, Ozan Akıncı<sup>1</sup>, Serhat Sirekbasan<sup>2</sup>, Ahmet Kocaeli<sup>1</sup>

<sup>1</sup>Department of General Surgery, İstanbul University Cerrahpaşa School of Medicine, İstanbul, Turkey

<sup>2</sup>Department of Clinical Microbiology, İstanbul University Cerrahpaşa School of Medicine, İstanbul, Turkey

## ABSTRACT

Myiasis is a parasitic infection caused by dipteran larvae settling in living tissue and organs. Infestation is generally found in tropical and rural areas, where interaction with animals is common. It is diagnosed based on the evidence of the existence of dipteran larvae in tissues and organs. When planning the treatment, identifying the type of larvae is as important as identifying the infected organ or system. In this case report, we present the case of a female who had a biliary tract injury caused by laparoscopic cholecystectomy and who developed a postoperative enterocutaneous fistula and myiasis caused by third-stage *Sarcophaga* sp. larvae at the incision area.

**Keywords:** Myiasis, *Sarcophaga*, wound

**Received:** 27.11.2016

**Accepted:** 08.06.2016

## ÖZ

Myiasis, diptera larvalarının canlı doku ve organlara yerleşmesi sonucu oluşan paraziter bir enfeksiyondur. Myiasis özellikle tropikal coğrafya ve hayvansal temasın yoğun olduğu kırsal kesimde gözlenen bir enfestasyondur. Tanı, doku ve organda diptera takımına ait larvaların görülmesiyle konulur. Tedavi planlanırken etkilenen organ veya sistemin yanı sıra larva tiplendirmesi de önem arz eder. Bu olgu sunumumuzda laparoskopik kolesistektomi operasyonu sonrası safra yolu yaralanması nedeniyle opere edilen, postoperatif enterokutan fistül gelişen ve insizyon yerinde üçüncü evre *Sarcophaga* sp. larvalarının myiazise yol açtığı bir kadın hasta ile ilgili deneyimimizi paylaşacağız.

**Anahtar Kelimeler:** Myiasis, *sarcophaga*, yara

**Geliş Tarihi:** 27.11.2016

**Kabul Tarihi:** 08.06.2016

## INTRODUCTION

Myiasis is the infestation of vertebrates by dipteran larvae settling in living tissue and organs (1, 2). In mammals, dipteran larvae can feed on the host's living or dead tissue, liquid body substance, or ingested food and can cause a broad range of infestations depending on the location in the body and the relationship between the larvae and the host (2). It can be widely seen in tropical climates and is more often found in animals than in humans. In stock-breeding areas, particularly in summer, the number of myiasis cases increase. Poor hygiene, low socioeconomic status, coming into contact with animals, advanced age,

mental retardation, wounds, diabetes mellitus, and vascular diseases are predisposing factors for myiasis in humans. In the International Classification of Diseases-10, it can be classified as dermal, subdermal, cutaneous, wound, nasopharyngeal, ophthalmic, auricular, intestinal, and urogenital (3). However, based on the type of pathogens and infestation, it can be grouped as obligatory, facultative, and accidental (4). Myiasis that develops in a hospital setting is referred to as nosocomial myiasis. It is mostly seen in intensive care patients with hypoesthesia or disturbed consciousness, preventing the patient from sensing contact from the fly (5).

**Address for Correspondence / Yazışma Adresi:** Dr. Sefa Ergün E-mail: sefaergun@yahoo.com

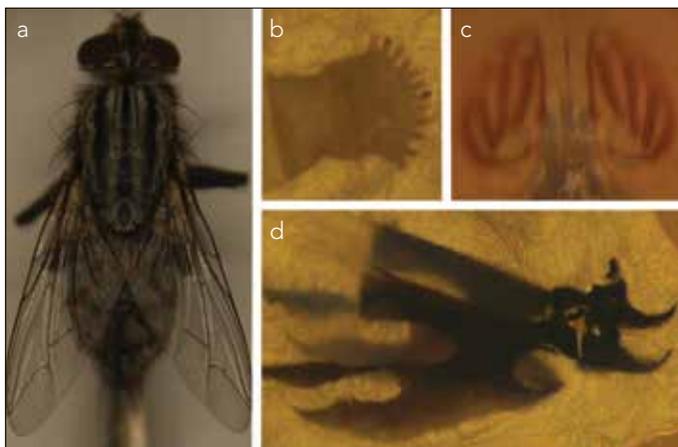
DOI: 10.5152/tpd.2016.4621

©Copyright 2016 Turkish Society for Parasitology - Available online at www.tparazitolderg.org

©Telif hakkı 2016 Türkiye Parazitoloji Derneği - Makale metnine www.tparazitolderg.org web sayfasından ulaşılabilir.



**Figure 1. a-b.** The larvae on the wound were collected on a gauze. The wound discharge and the wound after the larvae were cleaned



**Figure 2. a-d.** *Sarcophaga* sp. (a) Adults obtained from the larvae; (b) Larval anterior spiracle; (c) Larval posterior spiracle; (d) Cephalopharyngeal skeleton

The most common factor of myiasis is Calyptratae species consisting of *Sarcophaga*, *Oestridae*, *Calliphora*, and *Muscoidea* families (6). These flies lay their eggs or larvae in open tissue or cavities. After 15–24 h, the larvae hatch and reach the larvae 3 stage in a couple of days (7, 8).

In this case report, we present a female living in İstanbul who had a biliary tract injury after laparoscopic cholecystectomy and who developed a postoperative enterocutaneous fistula and myiasis caused by *Sarcophaga* sp. larvae at the incision area.

### CASE REPORT

Our patient was a 75-year-old housewife living in central İstanbul who had a history of congestive heart failure. She underwent laparoscopic cholecystectomy for cholelithiasis 5 months earlier. She underwent hepaticojejunostomy for a biliary track injury and later developed an enterocutaneous fistula. After 45 days, she was brought to our clinic by her relatives for medical dressing of

the wound. When the wound was opened, 18 living larvae were observed. Anamnesis revealed that the patient was cared for by her daughter for the past 2 weeks and that the bandage was not opened for the last 2 days.

A physical examination revealed that the incision of the operation in the right subcostal part of the abdomen did not fully heal; there was a stoma bag due to a discharge, redness, and swelling around the incision (Figure 1). Eighteen living larvae were collected by forceps and kept in a sterile container containing saline. There were no signs of deep tissue penetration. A wound swab was collected. The wound was treated by 0.9% saline and povidone iodine.

The patient's vital signs were as follows: body temperature on admission 37.1°C; pulse, 86/min, and blood pressure, 115/56 mm/Hg. Her white blood cell count (WBC) was 5.000 mm<sup>3</sup>; neutrophils were 79.5%, lymphocytes were 8.7%, monocytes were 11.7%, and eosinophils were 0.1%. Her C-reactive protein level was 20 (normal <5) mg/L. Wound swab samples were positive for *Escherichia coli*, *Candida albicans*, and *Pseudomonas aeruginosa*. The patient was put on antibiotic treatment for infectious diseases based on her antibiogram. Her wound was periodically cleaned. No larvae were observed in the follow-ups. A control examination performed after 3 weeks showed no inflammation, redness, or discharge in the wound area.

The collected larvae were sent to the Medical Microbiology Department of Cerrahpasa Medical Faculty in saline. The living and dead larvae were macroscopically and microscopically examined in the laboratory; they were then examined under a stereomicroscope (Olympus, 10×). The larvae were 8–11 mm in length.

Some living larvae were placed in chicken liver to let them complete their larval stage and obtain adult flies. Larvae, which completed their development when placed on wood flour to initiate pupation, and adult flies were obtained after pupation. Later,

forms of the sclerites at the front end of the larvae and stigmata at the front and back ends of the larvae were examined for their number and structure to attempt to identify the larval stage and species of the fly. Some living larvae were kept in a chamber for 12 days at 24°C in 50% partial humidity to complete their stages and morph into flies. Adult flies obtained from living larvae were investigated, and the identified characteristics were compared with those in the larval stage (9, 10).

It was determined that the examined larvae and adult flies belonged to *Sarcophaga* sp. (Figure 2).

Written informed consent was received from the patient.

## DISCUSSION

Myiasis is an ectoparasitic infestation prevalent in tropical and subtropical climates with an increased incidence in individuals living in rural areas, who are in close contact to animals, with low socioeconomic status, and who have poor hygiene, open wound, diabetes, mental retardation, and vascular diseases and are at an advanced age. Adult flies causing myiasis lay their eggs in living tissue, organs, and cavities, particularly in summer. Myiasis can be accompanied by pain, redness, itching, and secondary bacterial infections (2, 6, 11, 12). Myiasis is known to cause tissue deconstruction. Along with the mechanical effect of the larvae, the collagenase they excrete causes the deconstruction (13).

*Sarcophaga* species causing myiasis may also carry polioviruses, *Salmonella* sp. and *Shigella* sp. bacteria along with protozoa, and some helminthes (*Entamoeba histolytica*, *Giardia lamblia*, *Hymenolepis nana*, and *Ascaris lumbricoides*), and they pose a threat to public health (14).

Wound myiasis occurs when a fly larva settles in the open wound of a mammalian host. These infestations may be caused by facultative or obligatory parasites. In our patient, *Sarcophaga* belonged to the facultative group, which is more likely to cause local destruction, deep tissue invasion, and secondary infection (2). There were no findings of deep tissue invasion observed in our patient.

Wound myiasis initially occurs when flies lay eggs in necrotic, bleeding, and abscessed lesions. Wounds with high alkaline pH discharge (pH: 7.1–7.5) are more akin to breeding (15). Neuropathic ulcers, psoriasis, seborrheic keratosis, onychomycosis, skin lymphoma, basal cell carcinoma, herpes zoster virus infection, leprosy, and impetigo can increase the occurrence of myiasis (2).

In 1986, Arbit et al. (16) reported a *Sarcophaga* infestation in squamous cell carcinoma of the scalp and skull. In Spain, Merino et al. (17) reported patients with myiasis with superficial localization in the leg and ear and stated that the removal of larvae and infected tissue plays the main role in treatment.

In 2011, Ahmad et al. (18) reported on patients with gastrointestinal myiasis caused by *Sarcophaga* species and showed that these cases were mostly encountered in patients with poor hygiene and a low socioeconomic environment.

In Turkey, Türk et al. (19) reported a 14-year-old child with nasal myiasis who was hospitalized in the intensive care unit because

of a road accident.

Settling of dipteran larvae after death is referred to as postmortem colonization, and in forensic science, the growth of larvae can be used in calculating the time of death (20).

Increasing international tourist and business trips result in an increase in diseases caused by infectious agents. Myiasis is the fifth most occurring dermatological disease, with a rate of 7.3–11% (21).

Basic treatment for myiasis includes the collection of all visible larvae, debridement in cases of necrotic tissue, antiseptic solution irrigation, and daily changing of medical dressing. It has been reported that antibiotic treatments and anti-parasitic medications can be used against complications (22, 23).

Myiasis can cause panic to patients and healthcare personnel. As preventive measures, it is important to pay attention to personal hygiene, wash all produce before eating, avoid sleeping outside or naked in epidemic areas, wear long clothes, and dress open wounds (24).

In the treatment of some necrotic wounds, maggots are used as the means of debridement, disinfection and healing. The most commonly used larvae are *Lucilia sericata*. These larvae should be kept sterile before a procedure can be performed (2, 25).

## CONCLUSION

People living in tropical and rural areas, with open wounds, and a predisposing disease have a risk of myiasis. As a means of prevention, people with an open wound should seek medical attention in healthcare centers and pay attention to personal hygiene. In particular, in summer, people should be careful in patient care and wound treatment.

---

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - S.E., A.K.; Design - S.E., O.A.; Supervision - S.E., A.K.; Funding - O.A., S.S.; Materials - S.E., O.A., S.S.; Data Collection and/or Processing - S.E., O.A., S.S.; Analysis and/or Interpretation - S.E., A.K.; Literature Review - S.E., O.A.; Writing - S.E., O.A., S.S.; Critical Review - A.K., S.E.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

---

**Hasta Onamı:** Yazılı hasta onamı bu çalışmaya katılan hastalardan alınmıştır.

**Hakem Değerlendirmesi:** Dış bağımsız.

**Yazar Katkıları:** Fikir - S.E., A.K.; Tasarım - S.E., O.A.; Denetleme - S.E., A.K.; Kaynaklar - O.A., S.S.; Malzemeler - S.E., O.A., S.S.; Veri Toplanması ve/veya İşlemesi - S.E., O.A., S.S.; Analiz ve/veya Yorum - S.E., A.K.; Literatür Taraması - S.E., O.A.; Yazıyı Yazan - S.E., O.A., S.S.; Eleştirel İnceleme - A.K., S.E.

**Çıkar Çatışması:** Yazarlar çıkar çatışması bildirmemişlerdir.

**Finansal Destek:** Yazarlar bu çalışma için finansal destek almadığını belirtmiştir.

## REFERENCES

- Schmidt, Gerald D, Larry S. Roberts, and John Janovy. Gerald D. Schmidt & Larry S. Roberts' Foundations of Parasitology. Wm. C. Brown, 1996.
- Francesconi F, Lupi O. Myiasis. Clin Microbiol Rev 2012; 25: 79-105. [\[CrossRef\]](#)
- Kamala R, et al. Oral Myiasis-A Case Report. Indian Journal of Public Health Research & Development, 2013, 4.3: 130.
- Kettle DS. "Medical and Veterinary Entomology. CAB International, Wallington." (1990).
- Hira PR, Assad RM, Okasha G, Al-Ali FM, Iqbal J, Mutawali KE, et al. Myiasis in Kuwait: nosocomial infections caused by *Lucilia sericata* and *Megaselia scalaris*. Am J Trop Med Hyg 2004; 70: 386-9.
- Stevens JR, Wallman JF. The evolution of myiasis in humans and other animals in the Old and New Worlds (part I): phylogenetic analyses. Trends Parasitol 2006; 22: 129-36. [\[CrossRef\]](#)
- Dinçer Ş. İnsan ve Hayvanlarda Myiasis. Özcel MA, Daldal N, editors. Parazitolojide Artropod Hastalıkları ve Vektörler. Türkiye Parazitoloj Derg Yay No: 13, İzmir, 1997, p. 169-34.
- Kılıç K, Arslan MO, Kara M. Kars' ta Bir Kadında *Lucilia sericata* (Diptera: Calliphoridae)'nin Neden Olduğu Postoperatif Yara Myiasisi. Türkiye Parazitoloj Derg 2011; 35: 43-6. [\[CrossRef\]](#)
- Ferrar P. A guide to breeding habits and immature stages of diptera cyclorrhapha. In: Lyneborg L. Entomonograph. Vol. 8. Vinderup, Denmark, 1987: Part 1-2.
- Merdivenci A. Myiasis Fly, Medical Entomology. Istanbul Univ. Medical Faculty Press, Istanbul, 1973.
- Zumpt F, Stimie M. Myiasis in Man and Animals in the Old World. A Textbook for Physicians, Veterinarians and Zoologists. Myiasis in Man and Animals in the Old World. A Textbook for Physicians, Veterinarians and Zoologists. 1965.
- Talari AS, Sadr F, Doroodgar A, Talari MR. Wound myiasis caused by *Lucilia sericata*. Arch Iranian Med 2004; 7: 128-9.
- Ciftcioglu N, Altintas K, Haberal M. A case of human orotrachealmyiasis caused by *Wohlfahrtia magnifica*. Parasitol Res 1997; 83: 34-6.
- Ahmad AK, Abdel-Hafeez EH, Makhloof M, Abdel-Raheem EM. Gastrointestinal Myiasis by Larvae of *Sarcophaga* sp. and *Oestrus* sp. in Egypt: Report of Cases, and Endoscopic and Morphological Studies. Korean J Parasitol 2011; 49: 51-7. [\[CrossRef\]](#)
- Goddard J. Physician's guide to arthropods of medical importance. CRC Press, 2012. [\[CrossRef\]](#)
- Arbit E, Varon RE, Brem SS. Myiatic scalp and skull infection with diptera *Sarcophaga*: case report. Neurosurgery 1986; 18: 361-362. [\[CrossRef\]](#)
- Merino FJ, Campos, A, Nebreda T, Canovas C, Cuezva F. [Cutaneous myiasis by *Sarcophaga* sp.]. Enferm Infecc Microbiol Clin 2000; 18: 19-21.
- Ahmad, A. K., Abdel-Hafeez, E. H., Makhloof, M., & Abdel-Raheem, E. M. Gastrointestinal myiasis by Larvae of *Sarcophaga* sp. and *Oestrus* sp. in Egypt: report of cases, and
- Türk M, Aşar I, Ozbel Y, Sener AG, Uner A, Türker M. A case of nasomyiasis whose agent was *Sarcophaga* sp. Türkiye Parazitoloj Derg 2006; 30: 330-2.
- Sanford MR, Whitworth TL, Phatak DR. Human wound colonization by *Lucilia eximia* and *Chrysomya rufifacies* (Diptera: Calliphoridae): myiasis, perimortem, or postmortem colonization? J Med Entomol 2014; 51: 716-9. [\[CrossRef\]](#)
- Hochedez P, Caumes E. Common skin infections in travelers. J Travel Med 2008; 15: 252-62. [\[CrossRef\]](#)
- Weber, Albert, et al. Zoonoses: infectious diseases transmissible from animals to humans. Washington, DC: ASM Press, 2003.
- Sesterhenn AM, Pfützner W, Bräulke DM, Wiegand S, Werner JA, Taubert A. Cutaneous manifestation of myiasis in malignant wounds of the head and neck. Eur J Dermatol 2009; 19: 64-8.
- Blacklock B, Thompson MG. A study of the tumbu-fly *Cordylobia anthropophaga* Grunberg in Sierra Leone. Ann Trop Med Parasitol 1923; 17: 443-510. [\[CrossRef\]](#)
- Nigam Y, Bexfield A, Thomas S, Ratcliffe NA. Maggot therapy: the science and implication for CAM Part I—history and bacterial resistance. Evid Based Complement Alternat Med 2006; 3: 223-7. [\[CrossRef\]](#)