Tehran University of Medical Sciences Publication
http://tums.ac.ir

Iran J Parasitol

Open access Journal at
http://ijpa.tums.ac.ir

Iranian Society of Parasitology
http://isp.tums.ac.ir

Case Report

Nasopharyngeal Myiasis in Intensive Care Unit (ICU) Patients: Report of Two Cases

Hosna Zobairy [1], Parisa Modaresi [2], Miguel M Cabada [3], *Ahmad Sofi-Mahmudi [4]

1. *Department of Otolaryngology, Kurdistan University of Medical Sciences, Sanandaj, Iran*
2. *Department of Pathology, Kurdistan University of Medical Sciences, Sanandaj, Iran*
3. *Division of Infectious Diseases, University of Texas Medical Branch. Galveston, Texas*
4. *Cochrane Iran Associate Centre, National Institute for Medical Research Development (NIMAD), Tehran, Iran*

Received 20 Apr 2021
Accepted 12 Jun 2021

Keywords:
Nosocomial myiasis;
Nasopharyngeal;
COVID-19;
Lucilia sericata

***Correspondence Email:**
sofimahmudi@research.ac.ir

Abstract
Nosocomial myiasis is a rare event that has a higher incidence in the hospitals of poor and developing countries. The presence of nosocomial myiasis reflects the need for improved medical facilities and increased awareness among healthcare personnel. Severely ill patients are more susceptible, such as those with impaired consciousness, paralysis, and underlying diseases. The two cases here in described represent the first report of nosocomial myiasis in the Kurdistan Province, in Western Iran and one of them is the first report of myiasis involving a COVID-19-infected patient. The causal agent was *Lucilia sericata*. The taxonomical identification of the larvae of the second and third instar was based on the morphology of the cephaloskeleton, anterior spiracles, and peritreme plaques.

Introduction

In medicine, the term myiasis (meaning "fly") refers to the parasitic infestation of human tissue by dipterous larvae (1). Although myiasis is a rare condition in developed countries, it is common in tropical and subtropical countries and places with low hygienic conditions. This kind of infection is underreported, which is the reason why real number of cases might be more than reported (2, 3). Human myiasis is among the five most common dermatologic conditions in travelers (7-11% of cases) to Latin American countries and is usually caused by *Dermatobia hominis* (4). The annual incidence in Ecuador is suggested

to be between 4.7 and 23/100,000 people depending on the region. However, no identification of the larvae species was performed in the more than 2,000 cases identified (2, 5).

Only a few reports are available in the scientific literature about nosocomial myiasis in developed countries. It was first reported in 1980 and refers to an infestation originating in a hospital environment (6). The risk factors for the infestation in the hospital environment include altered mental status, paralysis, open wounds, comorbidities such as diabetes mellitus, vascular disease, and advanced cancer (7).

There are eight types of myiasis, namely traumatic, oral, nasal, aural, ophthalmomyiasis (externa and interna), enteric, urinogenital, and rectal (8). In tropical and underdeveloped nations, nasal myiasis is rather frequent. The maggots cause necrosis, sloughing, and destruction of intranasal tissue, reaching deep and inaccessible parts of the nose and paranasal sinuses. Manual extraction of maggots in such a condition is challenging, and multiple sittings are required (9). The bulk of deaths in human myiasis was observed to be caused by nasal cavity involvement (10). There have been reports of cases of nasal myiasis spreading to the esophagus and even the stomach, with a deadly consequence due to tissue destruction (11). However, most cases are diagnosed sooner due to severe discomfort and treated before other deeper structures are affected. In the literature, *Lucilia sericata* has been reported as the cause of the most often reported instances of nosocomial myiasis, both globally and in Iran (3, 8, 12, 13).

SARS-CoV-2, the virus causing coronavirus disease 2019 (COVID-19) can cause a severe debilitating illness requiring critical care and can affect the immune system (6). This may favor the occurrence of opportunistic infections such as myiasis.

Here we report two cases of nosocomial myiasis caused by *L. (Phaenicia) sericata* in the Intensive Care Unit (ICU) of Kawsar Hospital in Sanandaj, western Iran one of which had possible COVID-19 infection (7).

Case report

Case 1: An 18-years-old male was admitted to the hospital in 2020 after a car accident sustaining head trauma with loss of consciousness (Glasgow coma scale was 3). Informed consent was taken from his family regarding scientific reporting of the patient condition.

He had no underlying medical conditions. The brain computer tomography (CT) scan showed a large subarachnoid hemorrhage. The chest CT, done as part of the trauma survey, showed bilateral lung infiltrates suggestive of COVID-19 pneumonia. The COVID-19 reverse transcription polymerase chain reaction (RT-PCR) test was negative, but due to typical lung involvement, he was isolated in the ICU. Two days after admission, multiple white motile larvae exuded from his nose, mouth, and lacrimal punctum (Fig. 1). The paranasal CT scan showed pansinusitis. The patient was scheduled for surgical exploration of the sinuses. His nasopharyngeal cavity was irrigated with a solution of povidone-iodine in normal saline every four hours. The day after, the patient underwent functional endoscopic sinus surgery (FESS) with removal of four larvae from the nasal cavity. The sinuses appeared to have an otherwise completely normal ostium and none of his sinuses was manipulated further. No more larvae were passed on the day after surgery. The patient died after one week due to severe brain edema.

Fig. 1: Larvae, which are moving out of the nasal cavity

The pathological specimens contained three live larvae measuring about 1 cm in length and 0.1 cm in diameter. The direct wet mount microscopy was used for the initial diagnosis (Fig. 2). The method for larvae species identification was based on Centers for Disease Control and Prevention criteria (14).

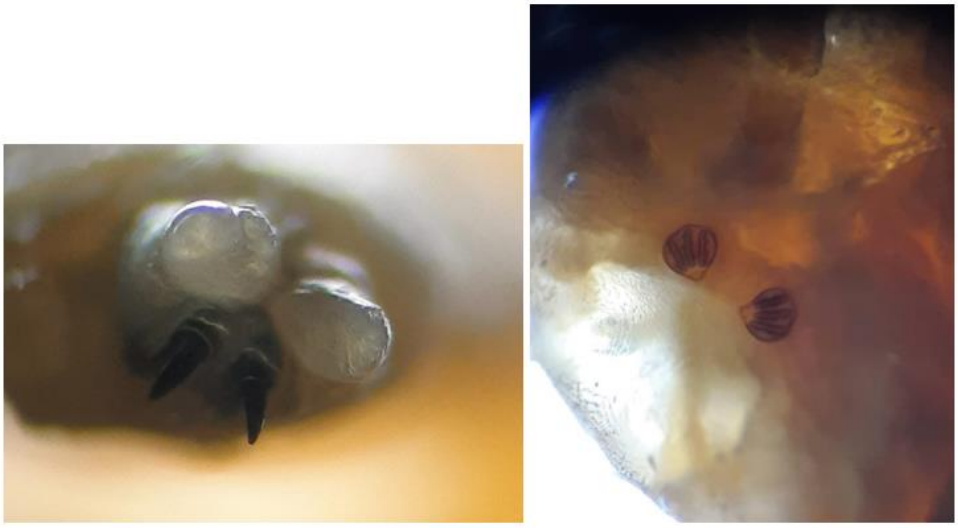

Fig. 2: Microscopic view of the larvae

Case 2: A 32-years-old male with a history of intermittent amphetamine use was admitted to the ICU in 2019 after a motorcycle accident causing severe traumatic brain injury. Informed consent was taken from the family upon admission. After four days of hospitalization, multiple white motile larvae spontaneously came out from his nose and mouth. The CT scan of the paranasal sinuses showed opacification of the right maxillary sinus. The patient underwent FESS and larvae were removed from the nasal cavity. The right maxillary sinus was opened and showed mild sinusitis but no larvae. No anatomical abnormality was seen during FESS surgery. Days after surgery there was no larvae left in his nasal cavity. The patient was discharged home in vegetative state due to traumatic brain injury. The patient was followed up for three years and there was no recurrence of myiasis in the head or neck.

Treatment

The larvae removed from our patients were identified as *L. (Phaenicia) sericata* (8). Both patients were treated with mechanical larvae removal by endoscopy, which is a common protocol for myiasis involving the nasopharyngeal cavity. Given their critical condition, they were treated in the operating room using nasal endoscopy, povidone-iodine irrigation, and mechanical removal of larvae. Both were cleared from the infestation with no further larvae passed in the days following the operation.

Discussion

Sixteen out of 31 provinces of Iran have reported myiasis (62% of the reported cases were from Fars province). There have been no reports of myiasis in Kurdistan province. The rate of nosocomial myiasis in Iran is around 4% and the mortality rate is 1.3% (15). Nasopharyngeal myiasis occurs mostly during the summer months in hospitalized patients. Since Kurdistan has a cold climate, the needed temperature for larva production, which is 20-29 °C, would be possible only during summer.

L. (Phaenicia) sericata is known as the green bottle blowfly or sheep strike blowfly. The female fly prefers necrotic tissue to deposit its eggs (15). If nosocomial myiasis is diagnosed at the early stage of the infestation, it can be benign and asymptomatic (2). Fortunately, this problem was diagnosed early in our cases; thus, no necrotic tissue was evident in the nasal cavity during surgery in both of our patients. Our case is similar to myiasis reported in developed countries where ICU is one of the restricted and cleanest areas in the hospital. Among the risk factors associated with myiasis, only severe alteration of the level of consciousness was present in the patients (16). Both of our patients had severe head injuries. They were intubated due to loss of consciousness, which is one of the major predisposing factors for myiasis. The patients were infected in August, the warmest month in Kurdistan Province, when incidence is known to increase. Measures like improving nursing care, regular pest control, applying windows screens, covering food, using fans or bug zapper can prevent the occurrence of myiasis in the hospital (17). Increasing the number of nurses can be effective as well. However, this kind of infection has a bad effect on hospital reputation and has a psychological impact on patients and family members (2, 18).

SARS-CoV-2 can affect the patient's immune system in different ways. The cytokine storm and hyperinflammation caused by the infection leads to multi-organ damage and death (19). Salehi et al. described the risks of opportunistic fungal infections in COVID-19 patients in Iran. Their study suggested that patients were most likely to develop pulmonary aspergillosis, oral candidiasis, or pneumocystis pneumonia (20). However, several diagnoses in this study were probable as the ascertainment of opportunistic fungal infections remains challenging in resource-poor settings. A direct association of ectoparasite

infections and severe COVID-19 diseases has not been reported. However, it is likely that the major risk factor for nosocomial myiasis in our first patient was critical illness with altered mentation.

Conclusion

Patients in this study were admitted to the hospital after being injured in accidents. They were diagnosed with nosocomial myiasis infection and mechanical removal was done for them. Whereas one of the patients was followed-up for three years, the other one died after a week from the admission to the hospital due to severe edema in his brain.

Acknowledgements

Authors did not receive any financial support for conducting and reporting of this study.

Conflicts of interest

Authors declare that they have no conflict of interest.

References

1. Farrag HMM, Huseein EAM, Almatary AM, Othman RA. Morphological and initial molecular characterization of *Clogmia albipunctatus* larvae (Diptera: Psychodidae) causing urinary myiasis in Egypt. PLoS Negl Trop Dis. 2019;13(12):e0007887.
2. Martínez-Rojano H, Huerta H, Hernández-Triana LM, Ruiz Pérez EF, Sámano R. Nosocomial Myiasis Caused by *Lucilia sericata* (Diptera: Calliphoridae) in a Pediatric Patient in Mexico. Case Rep Infect Dis. 2020;2020:1285459.
3. Ahmadpour E, Youssefi MR, Nazari M, Hosseini SA, Rakhshanpour A, Rahimi MT. Nosocomial Myiasis in an Intensive Care Unit (ICU): A Case Report. Iran J Public Health. 2019;48(6):1165-8.
4. Villalobos G, Vega-Memije ME, Maravilla P, Martinez-Hernandez F. Myiasis caused by *Dermatobia hominis*: countries with increased risk for travelers going to neotropic areas. Int J Dermatol. 2016;55(10):1060-8.
5. Calvopina M, Ortiz-Prado E, Castañeda B, et al. Human myiasis in Ecuador. PLoS Negl Trop Dis. 2020;14(2):e0007858.
6. Mielke U, Schlote A. "Hospital infection resulting from maggots". Zeitschrift fur Arztliche Fortbildung (Jena). 1980;74(11):556-8.
7. Alizadeh M, Mowlavi GhR, Kargar F, Nateghpour M, Akbarzadeh, K, Hajenorouzali-Tehrani M. A Review of Myiasis in Iran and a New Nosocomial Case from Tehran, Iran. J Arthropod Borne Dis. 2014; 8(2): 124-131.
8. Singh A, Singh Z. Incidence of myiasis among humans-a review. Parasitol Res. 2015;114(9):3183-99.
9. Soni NK. Endoscopy in nasal myiasis. Trop Doct. 2000;30(4):225-7.
10. Baker MC. Green-bottle fly worm infestation of the ear. Myiasis of the ear caused by *Phaenica sericata*. The Laryngoscope. 1953;63(6):545-8.
11. Taylor HM. Screwworm (*Cochliomyia americana*) infestation in man. Ann Otol Rhinol Laryngol. 1950;59(2):531-40.
12. Smith DR, Clevenger RR. Nosocomial nasal myiasis. Arch Pathol Lab Med. 1986;110(5):439-40.
13. Babamahmoudi F, Rafinejhad J, Enayati A. Nasal myiasis due to *Lucilia sericata* (Meigen, 1826) from Iran: a case report. Trop Biomed. 2012;29(1):175-9.
14. Dodge HR. Dlptera: pictorial key to principal families of public health importance. In: Prevention CfDCa, editor.
15. Alizadeh M, Mowlavi G, Kargar F, Nateghpour M, Akbarzadeh K, Hajenorouzali-Tehrani M. A review of myiasis in Iran and a new nosocomial case from Tehran, Iran. J Arthropod Borne Dis. 2014;8(2):124.
16. Millikan LE. Myiasis. Clinics in Dermatology. 1999;17(2):191-5.
17. Robbins K, Khachemoune A. Cutaneous myiasis: a review of the common types of myiasis. Int J Dermatol. 2010;49(10):1092-8.

18. Sherman RA, Roselle G, Bills C, Danko LH, Eldridge N. Healthcare-associated myiasis: prevention and intervention. Infect Control Hosp Epidemiol. 2005;26(10):828-32.
19. Yazdanpanah F, Hamblin MR, Rezaei N. The immune system and COVID-19: Friend or foe? Life Sci. 2020:117900.
20. Salehi M, Ahmadikia K, Badali H, Khodavaisy S. Opportunistic fungal infections in the epidemic area of COVID-19: a clinical and diagnostic perspective from Iran. Mycopathologia. 2020;185(4):607-11.