

Case Report

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A case report of nosocomial myiasis caused by *Musca domestica* and literature review

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Introduction

Myiasis disease was defined by Zumpt as a parasitic invasion of the tissues of humans by dipterous larvae [1]. It is distributed throughout the world, particularly in tropical and subtropical regions [2]. Due to her geographic conditions, which provide suitable conditions for the presence of various myiasis agents, Tunisia is not except from this kind of infestation. It most commonly found in elder, debilitated, immunocompromised individuals, low socioeconomic status or others who are not able to ensure basic hygiene. Based on the involved tissues or cavities of body organs, myiasis may be categorized clinically as: cutaneous myiasis, myiasis of external orifice and myiasis of internal organ [3]. Myiasis agents, affect mainly the uncovered areas of the body which are easy accessible to egg-laying and development of the larvae that explain the fact that cutaneous myiasis, is the most commonly reported entity among all. In addition to their medical importance as mechanical vectors of

Abstract

Myiasis disease was defined by Zumpt as a parasitic invasion of the tissues of humans by dipterous larvae. Myiasis agents, affect mainly the uncovered areas of the body. In addition to their medical importance as mechanical vectors of parasitic disease agents' dipteran true flies can make myiasis in hospital environment called nosocomial myiasis which is rarely reported. In this paper we report the first case of anal nosocomial myiasis in a Tunisian patient caused by *Musca domestica*.

Keywords: Nosocomial; Myiasis; *Musca domestica*; Tunisia.

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Case report

A 31-year-old male patient, without pathological history, was victim of a traffic accident (collision between 2 cars), on 02/11/2021. There was no death on the spot. The patient was referred to the nearest emergency room with on admission examination: Glasgow score 4/15, pupils in tight miosis, Polypnea at 22 cycles per minute, SpO₂ 88% in air ambient, bilateral snoring rales and tachycardia. The patient was intubated. He underwent a body-scan that showed a meningeal hemorrhage and fractures in the cervical vertebrae C5/C6. The patient was kept in the emergency room for 36 hours before his admission to the

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Intensive Care Unit of the Military Hospital of Tunis (Day 0). On the second day, the evolution was marked by a fever (39.8°C) and, a biological inflammatory syndrome with hyperleukocytosis (16200 cells/mm³) and high level of C-reactive protein (360 mg/l) and procalcitonin (34 µg/l). He was put on Augmentin® for suspected aspiration lung disease. An infectious investigation was requested including a microbiological examination of Cerebrospinal fluid, urine, protected tracheal sample and blood culture. On day 3 due to the persistence of septic shock, the patient was put on Tazocillin, Vancomycin. At the same day and af-

ter the patient's care (shower, diaper change, etc.), the nurse reported the presence of a multitude of small, sticky white worms in the patient's intimate areas, which were collected and sent to the laboratory of parasitology for identification. The intimate areas were shaved with classic toilet and antiseptic desinfection. The evolution was marked by a devastating worsening of the patient's condition and death on Day 4 due to septic shock and multiple visceral failures.

Laboratory diagnosis

Based on Zumpt criteria, the larval specimens were identified *Musca domestica* larval stage L3. They are creamy-white cylindrical larvae measuring 8 mm (Figure 1). The anterior end of the larva was tapered and contained one pair of hooks (Figure 2). The posterior end was broad and flattened with respiratory spiracles which have three sinuous slits surrounded by a heavily sclerotized ring with a conspicuous perforated button (Figure 3).



Figure 1: *Musca domestica* larval stage L3.



Figure 2: Tapered anterior end of the larva containing one pair of hooks (red arrow).



Figure 3: The posterior end of the larva showing: Pair of brown 'D' shaped respiratory spiracles, a chitinised ring (red arrow) and 3 sinuous 'm' shaped stigmatic slits on each spiracle (yellow arrows).

Table 1: Overview of cases of human myiasis due to *Musca domestica*.

Author [reference]	Year	Country	Area	Age Year	Gender	Predisposing factors	Localisation
Sunder Singh Dogra [13]	2009	India	Urbain	16	Female	hypotonic cerebral palsy Poor orodental hygiene	Oral myiasis
Ambey R [14]	2012	India	Urbain	Newborn	Male	Poor hygiene	Umbilical myiasis
Venkataramana Kandi [15]	2013	India	Rural	6	Male	Poor hygiene Infested food	Intestinal myiasis
Singla V [16]	2013	America	Rural	25	Male	Profession: gardener	Oral myiasis
Rajkumar N Parwani [17]	2014	Malaysia	Urbain	42	Female	Poor oral hygiene Maxillofacial trauma	Oral myiasis
Rahman [18]	2015	Pakistan	Urbain	12	Female	poor sanitary conditions multiple heavily crusted, purulent lesions all over the scalp	Cutaneousmyiasis (scalp)
Zafar Iqbal [19]	2016	India	Urbain	3	Female	Chronic otitis	Ear

Table 2: Overview of cases of nosocomial myiasis.

Author [reference]	Year	Country	Age	Gender	Localisation	Specie
Lucia Quesada Labo [20]	2012	Latin America	91	Male	Nasal cavity	<i>Lucilia cuprina</i>
Mr Youssefi [21]	2012	Iran	69	Male	Nasal cavity	<i>Lucilia sericata</i>
M dutto [22]	2012	Italy	81	Male	Foot	<i>Sarcophaga africa</i>
Naseh Maleki Ravasan [23]	2012	Iran	5.5	Female	Nasal cavity	<i>Woholfartia nuba</i>
Sung Jae Heo [24]	2013	Korea	82	Female	Nasal cavity	<i>Lucilia sericata</i>
Mahbobeh Alizadeh [25]	2013	Iran	36	Female	Pharynx and tracheal trunk	<i>Lucilia sericata</i>
Mun Jang [26]	2013	Korea	37	Male	Oral cavity	<i>Lucilia sericata</i>
Mohsen Njjari [27]	2014	Iran	63	Male	Oral cavity	<i>Lucilia sericata</i>
Seyed Farzin Mircheraghi [28]	2016	Iran	74	Female	Nasal cavity	<i>Chrysomya bezziana</i>
Hugo Martinez [29]	2018	Mexico	57	Male	Nasal cavity	<i>Lucilia sericata</i>
Hugo Martinez [30]	2019	Mexico	13	Male	Oral cavity	<i>Lucilia sericata</i>
Jing Sun [31]	2019	China	89	Male	Oral cavity	<i>Lucilia sericata</i>
Minyu Zhou [32]	2021	China	5 months	Female	Mouth	<i>Sarcophaga ruficornis</i>

Dicussion

Musca domestica commonly known house fly, lives close to humans and contaminate the food, and breed in garbage and animal faeces [7]. We present here the first evidence of this species in Tunisia. Cases of myiasis caused by the house fly are rarely reported in the literature. It is a cosmopolitan pest of both farm and home, where can carry serious diseases. The virulence of this insect is related to the annoyance and the indirect damage caused by the transmission of pathogens such as bacteria, virus, fungi, protozoa, and nematodes. There are two ways of infestation of maggots into humans. The most frequent one is the direct inoculation of eggs on living tissues or on the mucous membranes of natural body orifices [8]. The second way is by ingestion of contaminated food, which is described in patients with poor food hygiene.

In table 1, we summarized the recent case reports of human myiasis due to *Musca domestica* and their epidemiological characteristics. The majority of patients had predisposing factors mainly poor hygiene (71.4%). The patients lived in the Asian continent in 87% of cases. The average age of the patients is 17.3 years with 57% females. Oral cavity is the most affected anatomic site in 3 cases (43%).

Lifecycle of these flies takes around 7 to 10 days from the egg stage to larval, pupa and adult fly. However, under suboptimal conditions, the lifecycle may require up to 2 months. Female fly can lay up to 500 eggs in several batches. The maggot emerges from the egg in warm weather within 8 to 20 hours. The larva goes through 3 instars and become a full-grown maggot. Maggots feed on the decomposing tissue that is why, an intermediate host is always required. Pupae, which have a different shape from the larva, complete their development in 2 to 6 days at 32°C to 37°C [9].

We confirmed the nosocomial infection in our patient based on two arguments. First, larvae of *M. domestica*, which were at the third instar transition, were noted, five days after hospitalization: 36 H at the emergency room + 72 H at the intensive care Unit. The second argument is based on the fact that the margin anal was cleaned at time of admission and larvae were found long after 72 hours of admission to the intensive care unit of the Military hospital of Tunis.

As long as the fly larvae are free living and only circumstantially adapt themselves to parasitic dependence to a host, it is referred as facultative. The larvae of *Musca domestica* are among the main agents of facultative myiasis, in addition to other species such as *Calliphora*, *SpPhaenicia.sp*, *Lucilia*, *Sp*. Nosocomial myiasis is a facultative and accidental infestation. Despite it is caused by facultative agents, it can be fatal and life threatening [10]. This kind of infestation, mainly affects patients with predisposing factors such as mental retardation, hemiplegia and patients in comatose state as our case. Nosocomial myiasis is also rarely reported even in endemic areas [11,12].

A review of the literature (table 2) from 2012 through 2021 disclosed 13 cases of nosocomial myiasis. Based on the clinical/anatomical features, the majority of cases (84%) were nasal (46%) and oral (38%) myiasis. The patients' age ranged from 5 months to 91 years old. The majority of the myiasis cases were due to *Lucilia sericata* (60%). More than 38% of all cases are reported from Iran. Analysis of the documented cases based on gender showed 60% were male and 40% were female.

The traditional treatment consists in the mechanical removal of the larvae because standard guidelines for treating oral myiasis do not exist. The use of ivermectine, a semisynthetic macrolide antibiotic, allows having favorable results. Topical antibiotics can be used as coadjuvants in treatment [33]. The fatal evolution in our case is not linked to the parasitic attack but rather to a multiorgan failure.

Control of flies is an important step to prevent infestation. Collective prevention is based on setting up a fly-management program to fight against adult flies. Personal prevention could be done by the use of mosquito nets, to prevent maggots from reaching the human body and residual wall sprays, which can be applied where flies congregate.

Conclusion

Known as a mechanical transmitter of organisms pathogenic, *Musca domestica* is also a myiasis-producer. This is the first report of nosocomial myiasis in Tunisia probably due to a lack of expertise in identifying fly larvae.

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