MYIASIS IN KUWAIT: NOSOCOMIAL INFECTIONS CAUSED BY LUCILIA SERICATA AND MEGASELIA SCALARIS

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Abstract. Myiasis, the invasion of live human tissue by larvae of Diptera (true flies), is reported in the nasopharynx and a leg wound in two patients who were hospitalized for more than 72 hours in Mubarak Al-Kabeer Teaching Hospital in Kuwait City, Kuwait. On the fourth and fifth days after a 10-year-old Kuwaiti boy was admitted to the hospital intensive care unit in a bloodied and comatose state following a traffic accident, ‘worms’ that came out of his nostrils were fixed, cleared, and identified as second and third instar of Lucilia sericata (Diptera: Calliphoridae). After 14 days, ‘worms’ were seen in the original dressing of a 35-year-old Iranian man admitted to the Orthopedic Unit of the hospital with multiple lacerations and fractures. The larvae, in various stages of development, were identified as those of Megaselia scalaris (Diptera: Phoridae). Since the presence of larvae in both patients was recorded after a stay of at least 3–4 days in the hospital, by definition, these infestations are considered nosocomial.

INTRODUCTION

Human myiasis is the invasion of the tissues of humans by the larvae of Diptera (true flies). It occurs worldwide, but more often in hot and humid climates. Species causing myiasis can be obligate, facultative, or accidental.1 We have previously reported ophthalmomyiasis of humans due to Oestrus ovis, the sheep nasal bot fly, an obligate parasite of sheep found in Kuwait and worldwide.2 We have also reported facultative and accidental myiasis caused by O. ovis, Psychoda sp., and Megaselia sp.3 We now report on two cases of facultative myiasis, one a case of nasopharyngeal myiasis and another of wound myiasis complicating a skeletal traction. Since both of these infestations manifested more than three days after the hospitalization of the patients, by definition, these may be considered nosocomial.

CASE 1

A 10-year-old Kuwaiti boy was admitted to the Intensive Care Unit (ICU) of Mubarak Al-Kabeer Teaching Hospital in Kuwait City, Kuwait following a traffic accident. He had a head wound on the right side and his face was bloody when admitted. His face was cleaned during subsequent treatment. Further examination showed that he had fractures of both femurs. He had been comatose since being admitted.

On the fourth and fifth days after admission, while still comatose, larvae were seen coming out of both of his nostrils. These were collected into saline and sent to the laboratory for identification. It was reported that larvae were also seen emerging from the right ear, but these were discarded. The nursing staff also reported that they had seen a green fly on the nose of the patient on the fifth day after admission.

CASE 2

A 35-year-old Iranian man was rushed to the Casualty Department of Mubarak Al-Kabeer Teaching Hospital after concrete from a building site at which he was working fell on him. On examination, he had lacerations on the right thigh and lower limb. He also had multiple fractures of the pelvis and the right tibia. After being cleaned, the leg was bandaged from the upper part of the femur to the mid-calf. A skeletal traction was placed on the upper part of the tibia. After approximately 14 days, the gauze bandage at the site of the traction was discolored and foul-smelling. At this time, it was surmised that there was an underlying infection of the skin. When the dressing was being changed, tiny white ‘worms’ were seen on the original dressing around the orthopedic scars. Some of these were placed in saline and sent to the laboratory for identification. No organisms were seen coming out of the wound, which was clean and without necrosis.

MATERIALS AND METHODS

All larvae that were placed in saline were transferred into 70% ethanol. They were cleared in lactophenol, dehydrated, and, where appropriate, mounted as previously described.2

Following the discovery of a fly and the probability that flies had entered the ICU from the vicinity of the hospital, the Insect and Rodent Control Division of the Ministry of Health trapped flies by hand nets between 8:00 AM and 1:00 PM on a single day in the immediate area and identified the species.

RESULTS

Case 1. Of the five specimens examined in detail from case 1, three were second instar larvae, one was a second instar larva molting to a third instar, and one was a third instar. On the basis of the morphology and size of the larvae, the cephalopharyngeal skeletons of the third instar with mouth hooks lacking the accessory sclerite, the anterior spiracles and bands of spines, and the posterior spiracles with the complete peritreme (Figure 1), the larvae were identified as Lucilia species (Diptera: Calliphoridae). A closer examination of the second instar showed that the spiracles had 7–8 lobes (Figure 2). This is characteristic of L. sericata rather than L. cuprina, which has 4–5 lobes.4 Lucilia sericata is more widely distributed in Kuwait than L. cuprina, which has been identified from just one location in the country.5 Lucilia sericata is a facultative ectoparasite and is commonly known as the green bottle blowfly or sheep strike blowfly.
Case 2. The five fly larvae from the second patient were 5–7 mm in length, white, and fusiform. Identification of the larvae as those of a phorid fly, *Megaselia scalaris* (Diptera: Phoridae), was based on the general appearance of the posterior spiracles (Figure 3), the particular appearance of the cephalopharyngeal skeleton (Figure 4), and the dimensions of the various processes and the fine hairs and spiracles on the integument of the abdominal segments. Furthermore, our specimens were matched against voucher specimens of larvae from a series of which some were reared to adults.

Fly capture. Fifty flies were caught around the vicinity of the hospital, especially the kitchen area. These were identified as *Musca domestica* (94%), *Musca sorbens* (2%), and *Chrysomya albiceps* (4%).

**DISCUSSION**

The three most damaging species of flies causing wound myiasis of humans globally are the two calliphorid screwworm blowflies *Cochliomyia hominivorax* and *Chrysomya bezziana* and the sarcophagid fleshfly *Wohlfahrtia magnifica*. The larvae of all three species are obligate parasites and require a living host. Many other species of blowfly and, to a lesser extent, fleshfly can be facultative parasites of humans, including species of the genera *Lucilia*, *Chrysomya*, *Calliphora*, *Phormia*, and *Sarcophaga*.1

The identification of the larvae of *Lucilia* sp. posed difficulties here because none could be reared to adults for confirmation based on adult morphology. However, the available characteristics, especially the number of lobes of the anterior...
spiracles of the second instar larvae (Figure 2), together with knowledge of the distribution of *Lucilia* species in Kuwait, indicate that the larvae were *L. sericata*.

The eggs of *Lucilia* sp. are laid on the host. Adult flies are highly sensitive to chemical stimuli and able to locate suitable oviposition sites readily. Wounds with necrotic areas are ideal sites for egg deposition and larval development. The rate of development after deposition is temperature dependent. Above 30°C, the incubation of eggs of *L. sericata* took 10–12 hours and completion of the larval feeding stage an additional 2.5 days, giving a total of three days to the end of feeding. Greenberg indicated that the average minimum duration from egg laying to completion of the second instar stage for *Phaenicia* (= *Lucilia*) sericata was just over two days (50 hours) at 29°C. The normal range of human body temperature is 36.1–37.8°C, but nostril temperature might be approximately 30°C.9

In case 1, larvae of *L. sericata* were noted four days (96 hours) after admission to the hospital. Our belief that the myiasis was nosocomial is based on the development rates of the larvae, which were approximately at the second to third instar transition, therefore, no more than two or three days old. If the egg deposition had occurred at the accident site, the larvae would then have been at least mature, post-feeding third instars. The observation by the nurses of a green fly on the patient while he was in the ICU is further evidence of the potential for nosocomial infestation. Facilitatory conditions in this case included the patient’s inability to fend off flies, the initial presence of blood/mucus around the wounds, the hot/humid climate, and the ground floor location of the ICU. Thus, the evidence indicated that the nasal infestation occurred during hospitalization and is, therefore, considered nosocomial. Nasal infestations were the most common in a short review of hospital-acquired myiasis in the United States they occurred in four of six cases, five of which were due to *P. sericata*.11 Nosocomial myiasis of the nasal cavities due to *L. sericata* has also been reported in the Middle East12 and Europe.13,14

In the second case, the wound was cleaned and bandaged at the time of admission and larvae were found long after 72 hours of hospitalization. These facts therefore characterize this infestation as nosocomial. It could be argued that this was a case of myiasis or merely an infestation of the dressing. The fact that there was no necrotic tissue does not exclude myiasis because maggot infestations can diminish the growth of pathogenic bacteria during the healing of a wound.15

The identification of *M. scalaris* is of clinical significance. An earlier report from Kuwait implicated *Megaselia* sp. in intestinal myiasis.3 At that time, not much significance was placed on this finding because the organism could have been in food products that originated abroad and were imported into Kuwait. Thus, *Megaselia* sp. was not regarded as indigeneus *per se*. However, more than 60 *Megaselia* spp. are now known in the Arabian peninsula (Disney RHL, unpublished data), and the widely distributed *M. scalaris* has been reported in Kuwait (Al-Houty W, unpublished data), Saudi Arabia,16 and Yemen (Disney RHL, unpublished data). *Megaselia scalaris* has a global distribution and has been reported in cases of wound myiasis from a number of locations around the world.17 Austen reported 63 larvae of *M. scalaris* in a wound on a man’s foot in Belize, while Hardy reported larvae of the same species invading a one-year-old surgical site on the chest of a patient in Hawaii. Ours is the first such report from Kuwait.

These two reports of nosocomial myiasis are important for reasons other than the peculiarities of each case. Myiasis causes anxiety and confusion even among medical staff. Potential morbidity caused by myiasis includes intense pruritus and irritability. Transmission of infectious agents and local tissue damage should also be considered in the management of this disease.

Most reports of nosocomial myiasis have been of sporadic, facultative infestations, particularly in debilitated patients.11 Factors contributing to nosocomial infections include hypoesthesia or disturbed consciousness, which prevents the patient’s sensation of fly contact, as was certainly the case in our first patient. Furthermore, paralysis or immobility may prevent a patient from fending off a fly even if detected, as was probably the case in both our patients.

Preventive measures against phorids are difficult because they are so small and can enter through most fly screenings and, as in this case, underneath bandages. However, for prevention of blowfly and fleshfly myiasis, maintaining clean dressings on wounds will stop infestation by species that would otherwise deposit eggs or larvae into open wounds. Particular attention should be given to the wound dressings.
and plaster casts of elderly or infirmed patients because these can actually conceal infestations to which these patients are unable to respond.20 The case of nasal myiasis we report was difficult to prevent because bandaging the patient’s nose was not an option. However, where a high risk of myiasis is identified, even such wounds can be protected by covering with mosquito netting, through which the patient can breathe. Both cases we report were a challenge to what might normally be perfectly adequate practice to prevent hospital-acquired infestations. As well as bandaging and regular inspection of wounds, to minimize development of and therefore damage caused by any eggs/larvae that are deposited, fly screens can be placed over windows to prevent fly entry and fly electrocutors can be installed on the walls in rooms and corridors to kill any flies that do enter.

This is the first report of nasopharyngeal and wound myiasis in Kuwait. There is a paucity of such information from this country, probably because specimens tend to be discarded without study due to a lack of expertise in identifying fly larvae and in the absence of a reference center. Since both infections were identified 72 hours after the hospital admission, these cases can be categorized as nosocomial. We hope that our report will stimulate others to present similar clinical findings and to contribute to the pool of knowledge on the subject in Kuwait and the Middle East from which there is a dearth of such data.

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