The Gift of Honeymoon: An Interesting Case of Furuncular Myiasis Caused by *Dermatobia Hominis* in Taiwan and Review of the Literature

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Abstract

Travel-related cutaneous diseases are very common, and among them, myiasis ranks in the fourth place. Hereby, we present a case of a 28-year-old Taiwanese woman infested by *Dermatobia hominis* during honeymoon trip to Amazonas region and Peru. The diagnosis was confirmed by extracting the larva intraoperatively. The epidemiology, distinctive life cycle, clinical features, auxiliary diagnostic tools, therapeutic methods, and prophylactic measures of human botfly infestation will be discussed in the article. Owing to the progressive increment of international travels and ecological explorations, raising awareness of tropical diseases should be more emphasized.

Keywords: *Dermatobia hominis*, furuncular myiasis, human botfly, Taiwan

Introduction

Myiasis, by definition, is the infestation of live humans or other vertebrate hosts by the larvae of the order *Diptera*. Among the classifications, the most common clinical presentation is furuncular myiasis. *Dermatobia hominis* which is endemic in South and Central America is the most common species found in returning travelers. Herein, we report a young Taiwanese woman suffering from human botfly infestation owing to recent travel from the Amazonas region and Peru. This is the second report of human botfly infestation in a Taiwanese tourist to the best of our knowledge.

Case report

A 28-year-old Taiwanese female who has no systemic disease visited our outpatient department for the painful swelling nodule on the scalp. She also complained accompanying intermittent throbbing pain over the scalp in the recent weeks. Physical examinations revealed one coin-sized swelling nodule with central pore and serous discharge on the vertex of her scalp [Figure 1a]. She denied fever episode recently. No enlarged lymph nodes were palpated. Initially, the clinical
After the operation, we prescribed ivermectin 12 mg once and baktar (sulfamethoxazole 800 mg + trimethoprim 160 mg) twice a day for 1 week. The swelling and wound discharge subsided and healed gradually. No recurrence was observed after 1 year of follow-up.

**Discussion**

Myiasis is the infestation of humans and vertebrate animals by the larvae of the order **Diptera** (two-winged flies). The classification is based on different areas infested. Thus, it can be categorized into cutaneous, ocular, auricular, nasal, oral, urogenital, and enteric type. Among these classifications, the most common is the cutaneous type, which can be further divided into furuncular, migratory/creeping, wound, and cavitary myiasis.

Human cutaneous myiasis can be travel or nontravel related. Many species of *Diptera* are observed in the cases of myiasis, and they have unique geographic distributions and correlated clinical presentations. Furuncular myiasis is the most common presentation. Human botfly *D. hominis* in South and Central America and tumbu fly *Cordylobia anthropophaga* in tropical Africa are the leading two causative species. The human botfly in our case is the most common in returning travelers [Table 1]. Despite being named as human botfly, the main hosts of this ectoparasitic disease are in fact mammals such as cattle, sheep, horses, and pigs. In a case series conducted by Lachish et al. in 2015, 54% of the 72 cases traveled to Madidi National Park in the Amazonas Basin and Bolivia, followed by Peru and Brazil.

The literature review from 1999 to 2015 which performed by Villalobos et al., the countries where most of the foreign travelers were infected are Brazil, Bolivia, Costa Rica, Peru, and Belize.

*D. hominis* is an obligatory parasite which requires hosts for completing its life cycle. It is endemic in the neotropics. The distribution range from southern Mexico to northern Argentina. This species is florid mainly in humid, rainy, and warm environments such as rainforests and lowland forests. The botfly has its unique and interesting life cycle; the female adult botfly uses blood-sucking insects (e.g., mosquitoes, flies, and ticks) as mechanical vectors to infest hosts. This distinctive process of transportation is called phoresis. It deposits about 10–50 eggs to the underside of the abdomen of arthropods rather than laying onto the host directly. On contact with the host, the warmth of body temperature stimulates the eggs to hatch. Immediately after the hatch, the first instar (L1) penetrates the host skin through insect bite site or hair follicle painlessly. After infestation, it will develop to the second instar (L2) and then to the third instar larva (L3) during 5–10 weeks. The third instar will leave the host skin, falls to the soil, and pupates thereafter. It takes another 1 month after the pupation to mature into an adult fly. However, the lifespan of an adult fly is only 9–12 days. Its sole goal is to mate and repeat the life cycle. Therefore, it seems harmless if the infested patients can tolerate the natural life cycle.
With regard to the distinctive features of different stages of botfly larva, the first instar (L1) is bulbous form, size around with 1–1.5 mm in length. The second instar (L2) is flask-shaped, whereas the third instar (L3) is about 23 mm in length and cylinder-shaped. At the anterior segments of larvae, there are two mouth hooks which enable them to drill and feed. Several circular rows and backward protruding blackish spines surround the thoracic segments. The caudal parts are spiracles that function as respiration.[12]

In human hosts, it appears that there are no significant differences in terms of age, gender, or race. However, there is slight predominant in male travelers (58%) in a review performed from 1999 to 2015.[12] Our review which includes several case series at different countries from 1995 to 2017 [Table 1] shows 99 males versus 71 females (the percentage of male patients is 58.24), this result is similar to the study of Villalobos et al. in 2016.[12] Moreover, most of the travelers are young people in our review (the mean age is 30.64 years).

After infestation, a furuncle-like lesion will develop, especially the exposed areas of the human bodies such as scalp and extremities. Unusual sites such as back, buttock, eye, mouth, and genitalia have also been reported, though. In a study which enrolled 25 people in Mexico, 9 of 25 cases (36%) were infected over the scalp, followed by the trunk (28%) and four limbs.[3] According to the largest result to date performed by Lachish et al. in 2015, single furuncular myiasis accounts for 33 in the total 39 (85%) of D. hominis myiasis.[3]

During the larval stage, the typical symptoms and signs in most reported cases include serosanguinous discharge, sense of peculiar movement, pruritus, and lancinating pain (often but not always nocturnal).[13]

The diagnosis is mainly based on the following two criteria: identification of the typical clinical appearance and relevant travel history. The procedure of skin biopsy is usually not necessary for diagnosis, but imaging equipment such as dermoscopy and Doppler ultrasonography are helpful tools for auxiliary diagnosis.[16]

The differential diagnoses of furuncular myiasis include ruptured epidermoid cyst, abscess, furunculosis, cutaneous larvae migrans, foreign-body reaction, and insect prurigo, etc. On the whole, constitutional symptoms such as fever, malaise, and regional lymphadenopathy are rarely presented. The blood examinations are not diagnostic for furuncular myiasis, but leukocytosis and eosinophilia have been reported.

There are three published literatures to depict the characteristics of botfly larva in human bodies by using dermoscopy.[16-18] The dermoscopic features are mainly the below findings: a central pore contains a creamy-white structure with black spines and is surrounded by dilated vessels.[17] Another paper describes the breathing spiracles of the posterior segment as bird’s feet-like structures, and blackish spines surrounding the larvae are named as thorn crown.[18] However, all of the above discoveries are observed by using contact dermoscopy with fluid media. However, Silva de Lima and Rovere proposed another method that utilizing cross-polarized dermoscopy without contact to diagnose the furuncular myiasis and has the advantage of reducing cross infection.[19]

In an observational study from Mexico, Quintanilla-Cedillo et al., 25 cases of furuncular myiasis were identified by using Doppler sonography for evaluation and proved its usefulness.[5] With the help of echography (even if not equipped with color Doppler), we can make use of it to evaluate and localize the number of subcutaneous larvae inside the furunculoid lesions, thereby avoiding misdiagnosis and unnecessary treatments.[20]

The treatment of botfly infestation is to extract the larvae. Multiple therapeutic modalities have been proposed, the most common method is to asphyxiate the larvae by occluding the central punctum with objects like adhesive tapes, coal tar, paraffin, petroleum, chewing gum, wax, and nail polish. After that procedure, the larvae would be forced to emerge out spontaneously because of suffocation; therefore, we can also make use of forceps or tweezers to pull the larvae out easier. This method is called mechanical removal and is cheap with nearly no scar developed, but there is a possibility of incomplete removal of the larvae.

| Country | Case number | Male/female | Mean age (years) | Cases of Dermatobia hominis (%) | Treatment (case number) | References |
|---------|-------------|-------------|-----------------|---------------------------------|-------------------------|------------|
|         |             |             |                 |                                 | Surgical removal | Mechanical removal | NA | References |
| Israel  | 90          | 52/38       | 31.6            | 72 (80)                         | 12          | 38          | 40 | [3]         |
| Japan   | 33          | 24/9        | 35.18           | 33 (100)*                      | 6           | 12          | 15 | [4]         |
| Mexico* | 25          | 14/11       | 24.5            | 25 (100)*                      | 25          | 25          |    | [5]         |
| France  | 25          | NA          | NA              | 4 (16)                         | 25          |             |    | [6]         |
| England | 18          | NA          | NA              | 4 (22)                         | 18          |             |    | [7]         |
| Italy   | 16          | 4/4 (NA: 8) | 32[1]           | 16 (100)*                      | 14          | 2           |    | [8]         |
| Germany | 13          | NA          | NA              | 6 (46)                         | 13          |             |    | [9]         |
| Israel  | 12          | 4/8         | 23.3            | 12 (100)*                      | 7           | 4           | 1  | [10]        |
| Taiwan  | 2           | 1/1         | 28.5            | 2 (100)*                       | 1           | 1           |    | [11]        |
| Total   | 234         | 99/71 (NA: 64) | 30.64[2]         | 174 (74.4)                      | 40          | 57          | 137|             |

*Cases from residents in endemic regions rather than travelers, †Studies include only Dermatobia hominis cases, ‡The mean age excludes patients whose age is not available. NA: Data not available
Other procedures have also been reported, included injecting lidocaine to create pressure to extrude the larvae\(^{21}\) and using snake venom extractor to extract them.\(^{22}\) There are two previously published reports for using snake venom extractor, and both of them are the third instar (L3) being extracted. This interesting method is easy, rapid, relatively noninvasive, and harmless; however, more data and evidence are needed to evaluate the efficacy.\(^{22,23}\) All of the procedures that mentioned previously have the risk of imperfect extraction. To ensure removing the larvae completely, surgical removal remains the most effective, ultimate method.\(^{24}\) In our review, it reveals that there are more cases using mechanical removal than surgical intervention [Table 1].

Ivermectin is a new and preventive therapy which has shown its efficacy in cattle infested by *D. hominis*, but there are only few case reports discussing the use of ivermectin in human bodies. In 2006, TH Wakamatsu reported an 11-year-old boy of ophthalmo-myiasis externa caused by human botfly, he was treated with a single dose of oral ivermectin (200 µg/kg) and that larva was extracted successfully and easily.\(^{25}\) In addition, topical application of 1% ivermectin solution four times per day killed the larva of botfly and assisted the removal satisfactorily in an HIV-infected patient.\(^{26}\) It seems that oral ivermectin often prescribed for more severe conditions such as involvement of oral or orbital cavities where surgery is difficult feasible. In this article, we prescribed oral ivermectin (200 µg/kg) once for preventing other parasites other than human botfly. However, more studies and research are still needed to evaluate the efficacy and indications of oral ivermectin in humans.

To prevent the infestation of furuncular myiasis, the prophylactic measures depend on the different pathogens and associated unique life cycles. Therefore, we should avoid exposure to the outside environment in endemic areas. Insect repellents or mosquito nets are useful to avert blood-sucking insects bite.\(^{27}\)

Lethal complications are rarely reported. Our review found only a 5-month-old infant died from fatal cerebral myiasis owing to the penetration to the brain by botfly larvae.\(^{28}\) Other major complications are often not fatal, such as tetanus and bacterial superinfection. Interestingly, localized secondary bacterial infection over infested lesions is not so common because the larvae may produce some substances that exhibit bacteriostatic activity.\(^{2}\)

The first case report of furuncular myiasis caused by *D. hominis* in a Taiwanese man was similar to our case.\(^{11}\) Both of them were young people and traveled in the Amazonas region. The infested areas were the same, but different instars of larvae were extracted by using different methods [Table 2]. To the best of our knowledge, this is the second case of botfly infestation in a Taiwanese traveler and clinicians should pay more attention to patients who have furuncle-like lesions with a pivotal travel history from endemic countries because of the growing trend of international travels and outdoor tourism.

Declarations of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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