Dirofilariasis in a Female Adult Patient in Israel

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Dirofilariasis is a parasitic zoonotic infection caused by nematodes of the genus *Dirofilaria*. *Repens* and *immitis* are the two most-common *Dirofilaria* species infecting humans and causing subcutaneous/ocular or pulmonary dirofilariasis, respectively [1,2]. Most documented cases of human infection in Europe are attributed to *Dirofilaria repens* (*D. repens*) [1,3]. Infected mosquitoes (Aedes, Anopheles, Culex) transmit the parasite as third-stage filarial larvae onto the skin of the definitive host, primarily dogs and other carnivores, during a blood meal [1,4]. The larvae enter the host's wound and within 6 to 9 months mature into sexually active adults, which reside in the subcutaneous tissue [1]. Adult worms can reach 5 to 15 centimeters in length and 0.5 millimeters in diameter [1]. In the subcutaneous tissue, the mature females produce microfilariae, which then enter the host's blood stream, from which a mosquito can become infected during a blood meal [1].

Traditionally, humans have been considered accidental hosts who fail to support completion of the worm life cycle [1,5]. Once reaching the subcutaneous tissue, the worms die before reaching maturation, causing formation of a focal granuloma [1,5].

Over the past 40 years, only eight cases of human dirofilariasis have been reported in Israel. The first report of human dirofilariasis in Israel was in 1976, and that has been followed by six more, the most recent one being in 2006 [4] [Table 1]. This case report presents a new incident of human dirofilariasis in Israel.

PATIENT DESCRIPTION

A 38 year old healthy female presenting a subcutaneous mass on her posterior thigh reported noticing the lump 2 weeks earlier due to intense pruritus at the site. On examination, the patient appeared in good general health and otherwise asymptomatic. An approximately 10-centimeter long, non-tender, round, mobile, palpable mass was apparent on her posterior thigh. No palpable enlarged lymph nodes or other masses were noted. Lab tests were normal, except for a slightly elevated percentage of eosinophil (7.7%). Ultrasound of the mass raised suspicion of a neurofibroma. A surgical open biopsy was performed and on histological analysis, a definitive diagnosis of dirofilariasis was made.

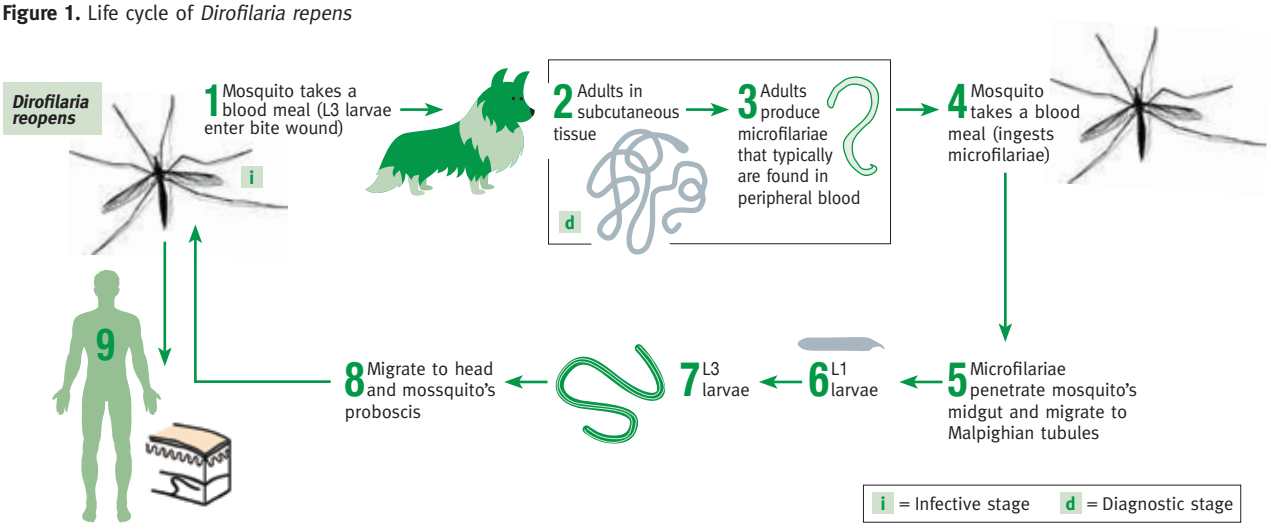
The patient was subsequently referred to an infectious disease specialist. Although the patient had traveled to India 18 years earlier, the likelihood of a long-standing dormant infection was considered low. It was therefore assumed to have been acquired in Israel. The recommendation was to surgically remove the parasitic worm.

Table 1. Reported cases of human dirofilariasis in Israel

Case number	Year published	Number of patients	Age of patient	Travel abroad	Body location	Presentation	Treatment	Sequela
1 and 2	1976	2	N/A	N/A	Eye	N/A	Surgical removal	No impairment of vision
3	1981	1	29	N/A	Cervical lymph node	3 week history of painless mass in right supraclavicular area	Surgical removal	N/A
4	1995	1	N/A	N/A	N/A	Facial nodule	N/A	N/A
5	1999	1	35	Visited Egypt previously	Subcutaneous nodule on ventral root of penis	Asymptomatic lesion was noted several weeks before	Surgical removal	N/A
6	2001	1	36	Visited Egypt 2 years prior	Left testicular area	Painless mass	Surgical removal	None
7	2001	1	16	Never	Back	Subcutaneous mass on back	Surgical removal	None
8	2006	1	65	Immigrated from Russia 6 years prior	Eye	Pain and redness in left eye beginning 2 days before presentation	Surgical removal	N/A
9	2017 (this case)	1	38	History of travel to India 18 years prior	Thigh	Growing subcutaneous mass	Surgical removal	None

N/A = not available

Figure 1. Life cycle of *Dirofilaria repens*



During a blood meal, an infected mosquito (Aedes, Anopheles, Culex) introduces third-stage filarial larvae of *Dirofilaria repens* onto the skin of the definitive host (but also occasionally humans), where they penetrate into the bite wound [1]. In the definitive host, the L3 larvae undergo two more molts into L4 and adults, the latter of which resides in subcutaneous tissues [2]. Adult females are usually 100–170 mm long by 460–650 µm wide; males are usually 50–70 mm long by 370–450 µm wide. Adults can live for 5–10 years. In subcutaneous tissue, the female worms are capable of producing microfilariae over their lifespan. The microfilariae are found in peripheral blood [3]. A mosquito ingests the microfilariae during a blood meal [4]. After ingestion, the microfilariae migrate from the mosquito's midgut through the hemocoel to the Malpighian tubules in the abdomen [5]. There, the microfilariae develop into first-stage larvae [6] and subsequently into third-stage infective larvae [7]. The third-stage infective larvae migrate to the mosquito's proboscis [8] and can infect another definitive host when it takes a blood meal [1]. In humans [9], *D. repens* usually manifests as either a wandering worm in the subcutaneous tissue or a granulomatous nodule, although there are reports of pulmonary dirofilariasis with this species.

Life cycle information courtesy of Centers for Disease Control and Prevention, Division of Parasitic Diseases and Malaria. 1600 Clifton Road Atlanta, GA 30329-4027, USA (https://www.cdc.gov/parasites/dirofilariasis/biology_d_repens.html)

Surgical exposure revealed an 8 centimeter pseudocapsule. Within the mass, necrotic tissue was observed to be invading the muscle and surrounding the sciatic nerve. Meticulous dissection was performed to separate the healthy tissue. Special care was taken to preserve the sciatic nerve during dissection. No anti-parasitic treatment was prescribed and the patient's recovery was uneventful.

Histologic examination of the mass showed severe, acute, and chronic inflammation, with fibrosis and nematode fragments within the necrotic area confirming the diagnosis. At a 2 year follow-up, there was no recurrence or sequela.

COMMENT

Dirofilaria repens is a parasite hosted by dogs and other carnivores, and is endemic to some areas of the Mediterranean [1,2]. While rarely affecting humans, the majority (75.8%) of human infections manifest in the upper parts of the body [3]. Less common, dirofilariasis may also be localized in the male genital organs (6.5%), female breast (5.4%), lungs (2.6 %), and abdominal viscera (1.3 %) [3]. Thus, the mass in the lower extremities presented by our patient was unique.

Dirofilariasis can cause subcutaneous masses mimicking neoplasms in their external and radiographic appearance and thus, should be considered in the differential diagnosis of patients presenting with subcutaneous nodules [3].

All *Dirofilaria* species are carried by mosquitoes [1,2], yet, as in the present case, most patients do not remember being bitten by a mosquito prior to presentation of symptoms [5], making diagnosis difficult. This is especially true in regions, such as Israel, where dirofilariasis is uncommon [2].

The recommended treatment for human dirofilariasis is surgical excision [1,3,5]. Careful total body examination for other masses should be performed. Prevention includes protection from mosquito bites, as well as routine deworming of pet dogs and cats.

CONCLUSIONS

This report aims to raise awareness of the rare possibility of dirofilariasis in urban areas of Israel.

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