

Larva Migrans Overview

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Larva migrans is a group of clinical syndromes that result from the movement of parasite larvae through host tissues. The symptoms vary with the location and extent of the migration. Organisms may travel through the skin (cutaneous larva migrans) or internal organs (visceral larva migrans). Some larvae invade the eye (ocular larva migrans). Each form of the disease can be caused by a number of organisms. The syndromes are loosely defined and the list of causative agents varies with the author.

Cutaneous Larva Migrans

Larval migration in the skin of the host causes cutaneous larva migrans. These infections are often acquired by skin contact with environmental sources of larvae, such as the soil. The larvae cause a pruritic, migrating dermatitis as they travel through the skin. Many of these infections are self-limiting.

Animal hookworms are the most common cause of cutaneous larva migrans in humans. *Ancylostoma braziliense* is the most important species. Less often, cutaneous larva migrans is caused by *A. caninum*, *A. ceylanicum*, *A. tubaeforme*, *Uncinaria stenocephala* or *Bunostomum phlebotomum*. In their usual hosts, the entry of hookworm larvae into the skin is followed by penetration of the dermis. In the dermis, the larvae enter via veins or lymphatic vessels, eventually reach the blood, and migrate through the lungs before reaching the intestines, where they mature into adults. In abnormal hosts such as humans, zoonotic hookworms can enter the epidermis, but most species cannot readily penetrate the dermis. Instead, these larvae remain trapped in the skin and migrate for a time in the epidermis before dying. *A. ceylanicum* is an exception to this pattern, in that the larvae migrate but are able to establish patent infections in the human intestine.

The threadworms *Strongyloides papillosus*, *S. westeri*, *S. stercoralis*, *S. procyonis* and *S. myopotami* can cause a very similar clinical syndrome. *Strongyloides* spp. larvae move more rapidly in human skin than hookworms, and some authors call this infection larva currens (“racing larva”) rather than cutaneous larva migrans.

Other parasites such as *Gnathostoma spinigerum* and *Dirofilaria repens* can travel through the skin and cause dermatitis or swelling. Some authors consider these syndromes to be cutaneous larva migrans.

Parasites adapted to humans can cause some cases of cutaneous larva migrans. The human hookworms *Ancylostoma duodenale* and *Necator americanus* migrate through the skin to reach the intestinal tract. In people who have been previously exposed, an allergic reaction to the parasites results in a pruritic dermatitis similar to that caused by zoonotic hookworms.

Rare cutaneous infections by free-living nematodes such as *Peloderma strongyloides* have been reported in humans.

Visceral Larva Migrans

Visceral larva migrans occurs when parasitic larvae migrate through the internal organs of the host. Humans can acquire these infections by ingesting parasite eggs, or by eating tissues from intermediate or paratenic hosts that contain larvae. The symptoms vary with the number of parasites and the tissue(s) invaded. Central nervous system (CNS) infections are often the most serious form.

Toxocara canis and *T. cati* are the most important causes of visceral larva migrans in humans. In their normal canine or feline hosts, *Toxocara* eggs hatch in the intestines, but the larvae leave the gastrointestinal tract and migrate through the tissues. When they reach the intestines a second time, they mature into adult worms. In humans and other paratenic hosts, the larvae do not complete this migration, and eventually encyst in the tissues. *T. vitulorum* (found in cattle) and *T. pteropodis* (found in bats) may also be able to cause visceral larva migrans, but these species have been less well studied.

Visceral larva migrans caused by *Baylisascaris procyonis*, an ascarid of raccoons, has been documented uncommonly in people. However, most of the reported cases have been serious, as the CNS and/or the eye were involved (see also ocular larva migrans). *B. procyonis* larvae can cause significant damage because they migrate extensively, continue to grow, and become much larger than *Toxocara* spp.

Larva Migrans

Several cases of CNS disease were fatal, and many survivors have had permanent neurological damage. Successful treatment of clinical cases seems to be difficult, possibly because irreversible damage develops before most cases are diagnosed. Milder or asymptomatic cases of baylisascariasis may also occur in people, but are likely to be underdiagnosed. *B. procyonis* also causes visceral larva migrans, including neurological disease, in many species of mammals, marsupials and birds. In addition to raccoons, this parasite can reach the intestines and mature in dogs (which can serve as both definitive and intermediate hosts), kinkajous and possibly other species.

Ascaris suum, an intestinal roundworm of pigs is a rare cause of visceral larva migrans in humans. Human infections usually occur after accidentally ingesting parasite eggs, but they can also result from eating larvae in raw beef or chicken liver. In humans, *A. suum* larvae can invade the liver and lungs, resulting in eosinophilic pneumonia as well as pseudotumors and other liver lesions. Neurological syndromes and rare cases of myelitis have been documented. Larval *A. suum* infections have also been reported in species other than humans, including cattle.

Many other parasites migrate through the tissues and cause similar syndromes. Some but not all authors consider these syndromes to be visceral larva migrans. These parasites include:

- *Gnathostoma spinigerum* (gnathostomiasis).
- *Capillaria hepatica* (capillariasis).
- *Angiostrongylus cantonensis*(angiostrongyliasis)
- *Angiostrongylus costaricensis* (angiostrongyliasis)
- *Gongylonema* spp. (gonglynemiasis)
- *Lagochilascaris* spp.
- *Dirofilaria immitis* (dirofilariasis)
- *Anisakis* spp. (anisakiasis)
- *Pseudoterranova* spp. (anisakiasis)
- The tissue phase of some human nematodes, including *Strongyloides stercoralis* and *Ascaris lumbricoides*, can cause clinical syndromes similar to visceral larva migrans.

Ocular Larva Migrans

Ocular larva migrans occurs when migrating larvae invade the eye of the host. Symptoms of visceral larva migrans may or may not be present at the time. Ocular larva migrans is often unilateral. The symptoms vary with the location and activity of the larvae, as well as the amount of inflammation, but can include blindness. Zoonotic nematodes that have been found within the globe of the eye include:

- *Toxocara canis* and *T. cati*. These species are the most common cause of ocular larva migrans.
- *Baylisascaris procyonis*

- *Ancylostoma* spp.
- *Gnathostoma* spp.
- *Angiostrongylus cantonensis*
- *Dirofilaria* spp.
- *Acanthocheilonema* spp.
- *Onchocerca* spp.
- *Thelazia* spp.

The larvae of other helminths (e.g., certain tapeworms and flukes) may also potentially invade the ocular and periocular tissues, either in conjunction with, or in the absence of systemic disease.

Internet Resources

Centers for Disease Control and Prevention (CDC)

<http://www.cdc.gov/parasites/zoonotichookworm/>
<http://www.cdc.gov/parasites/toxocariasis/index.html>
<http://www.cdc.gov/parasites/baylisascaris/index.html>

CDC Guidelines for Veterinarians: Prevention of Zoonotic Transmission of Ascarids and Hookworms of Dogs and Cats

<http://stacks.cdc.gov/view/cdc/5908>

Public Health Agency of Canada. Pathogen Safety Data Sheets. –

<http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/index-eng.php>

The Merck Manual

<http://www.merckmanuals.com/professional/index.html>

The Merck Veterinary Manual

<http://www.merckmanuals.com/vet/index.html>

References

- Acha PN, Szyfres B (Pan American Health Organization [PAHO]). Zoonoses and communicable diseases common to man and animals. Volume 3. Parasitoses. 3rd ed. Washington DC: PAHO; 2003. Scientific and Technical Publication No. 580. Cutaneous larva migrans; p. 249-52.
- Bowman DD, Montgomery SP, Zajak AM, Eberhard ML, Kazacos KR. Hookworms of dogs and cats as agents of cutaneous larva migrans. *Trends Parasitol.* 2010; 26(4): 162-7. Inatomi Y, Murakami T, Tokunaga M, Ishiwata K, Nawa Y, Uchino M. Encephalopathy caused by visceral larva migrans due to *Ascaris suum*. *J Neurol Sci.* 1999;164(2):195-9.
- Juckett G. Pets and parasites. *Am Fam Physician.* 1997;56(7):1763-1774, 1777-8.
- Juzych LA, Douglass MC. Cutaneous larva migrans. *eMedicine.com*; 2012 Jan. Available at: <http://emedicine.medscape.com/article/1108784-overview>. Accessed 09 Dec 2013
- Kahn CM, Line S, editors. The Merck veterinary manual. 10th ed. Whitehouse Station, NJ: Merck and Co; 2010. Zoonoses. Nematodes; p 2791-7.

- Kelsey DS. Enteric nematodes of lower animals transmitted to humans: zoonoses [monograph online]. In Baron S, editor. *Medical Microbiology*. 4th ed. New York: Churchill Livingstone; 1996. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK8176>
- Kim S, Maekawa Y, Matsuoka T, Imoto S, Ando K, Mita K, Kim H, Nakajima T, Ku K, Koterazawa T, Fukuda K, Yano Y, Nakaji M, Kudo M, Kim K, Hirai M, Hayashi Y. Eosinophilic pseudotumor of the liver due to *Ascaris suum* infection . *Hepatol Res*. 2002;23(4):306.
- Kwon IH, Kim HS, Lee JH, Choi MH, Chai JY, Nakamura-Uchiyama F, Nawa Y, Cho KH. A serologically diagnosed human case of cutaneous larva migrans caused by *Ancylostoma caninum*. *Korean J Parasitol*. 2003;41(4):233-237.
- Lee ACY, Schantz PM, Kazacos KR, Montgomery SP, Bowman DD. Epidemiologic and zoonotic aspects of ascarid infections in dogs and cats. *Trends Parasitol*. 2010;26(4):155-61.
- Macpherson CN. The epidemiology and public health importance of toxocariasis: a zoonosis of global importance. *Int J Parasitol*. 2013;43(12-13):999-1008.
- Otranto D, Eberhard ML. Zoonotic helminths affecting the human eye. *Parasit Vectors*. 2011; 4:41.
- Osoegawa M, Matsumoto S, Ochi H, Yamasaki K, Horiuchi I, Kira YO, Ishiwata K, Nakamura-Uchiyama F, Nawa Y. Localised myelitis caused by visceral larva migrans due to *Ascaris suum* masquerading as an isolated spinal cord tumour. *J Neurol Neurosurg Psychiatry*. 2001;70(2):265-6.
- Sakakibara A, Baba K, Niwa S, Yagi T, Wakayama H, Yoshida K, Kobayashi T, Yokoi T, Hara K, Itoh M, Kimura E. Visceral larva migrans due to *Ascaris suum* which presented with eosinophilic pneumonia and multiple intra-hepatic lesions with severe eosinophil infiltration--outbreak in a Japanese area other than Kyushu. *Intern Med*. 2002;41(7):574-9.
- Traub RJ. *Ancylostoma ceylanicum*, a re-emerging but neglected parasitic zoonosis. *Int J Parasitol*. 2013;43(12-13):1009-15. Velho PE, Faria AV, Cintra ML, de Souza EM, de Moraes AM. Larva migrans: a case report and review. *Rev Inst Med trop S Paulo*. 2003;45(3): 167-71.
- Yoshida S, Matsui M, Wang HY, Oeda T, Sasaki T, Komure O, Ozawa K, Konisi T, Saida T, Yoshikawa H, Nawa Y. [A case of myeloradiculitis as a complication of visceral larva migrans due to *Ascaris suum*] [abstract]. *Rinsho Shinkeigaku*. 2004;44(3):198-202.

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