

Tissue nematode: Trichinella spiralis

Introduction

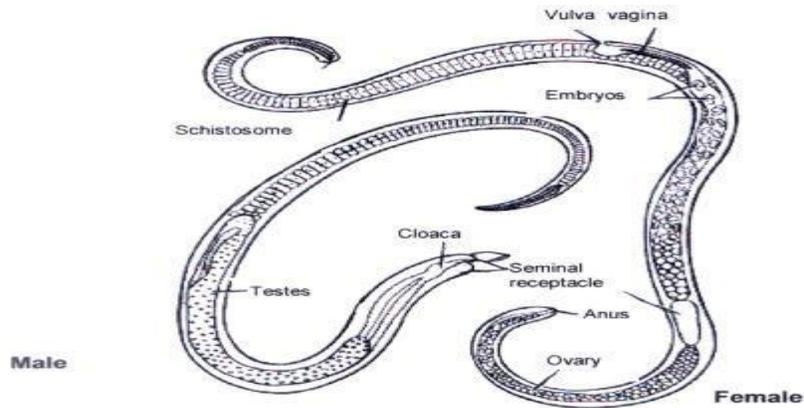
Trichinella spiralis is a viviparous nematode parasite, occurring in pigs, rodents, bears, hyenas and humans, and is liable for the disease trichinosis. It is occasionally referred to as the "pork worm" as it is characteristically encountered in undercooked pork foodstuffs. It should not be perplexed with the distantly related pork tapeworm. *Trichinella* species, the small nematode parasite of individuals, have an abnormal lifecycle, and are one of the most extensive and clinically significant parasites in the whole world. The adult worms attain maturity in the small intestine of a definitive host, such as pig. Each adult female gives rise to batches of live larvae, which bore across the intestinal wall, enter the blood stream (to feed on it) and lymphatic system, and are passed to striated muscle. Once reaching to the muscle, they encyst, or become enclosed in a capsule. Humans can become infected by eating contaminated pork, horse meat, or wild carnivorous animals such as cat, fox, or bear.

Epidemiology

Trichinosis is a disease caused by the worm. It occurs around most parts of the world, and infects majority of humans. It ranges from North America and Europe, to Japan, China and Tropical Africa.

Morphology

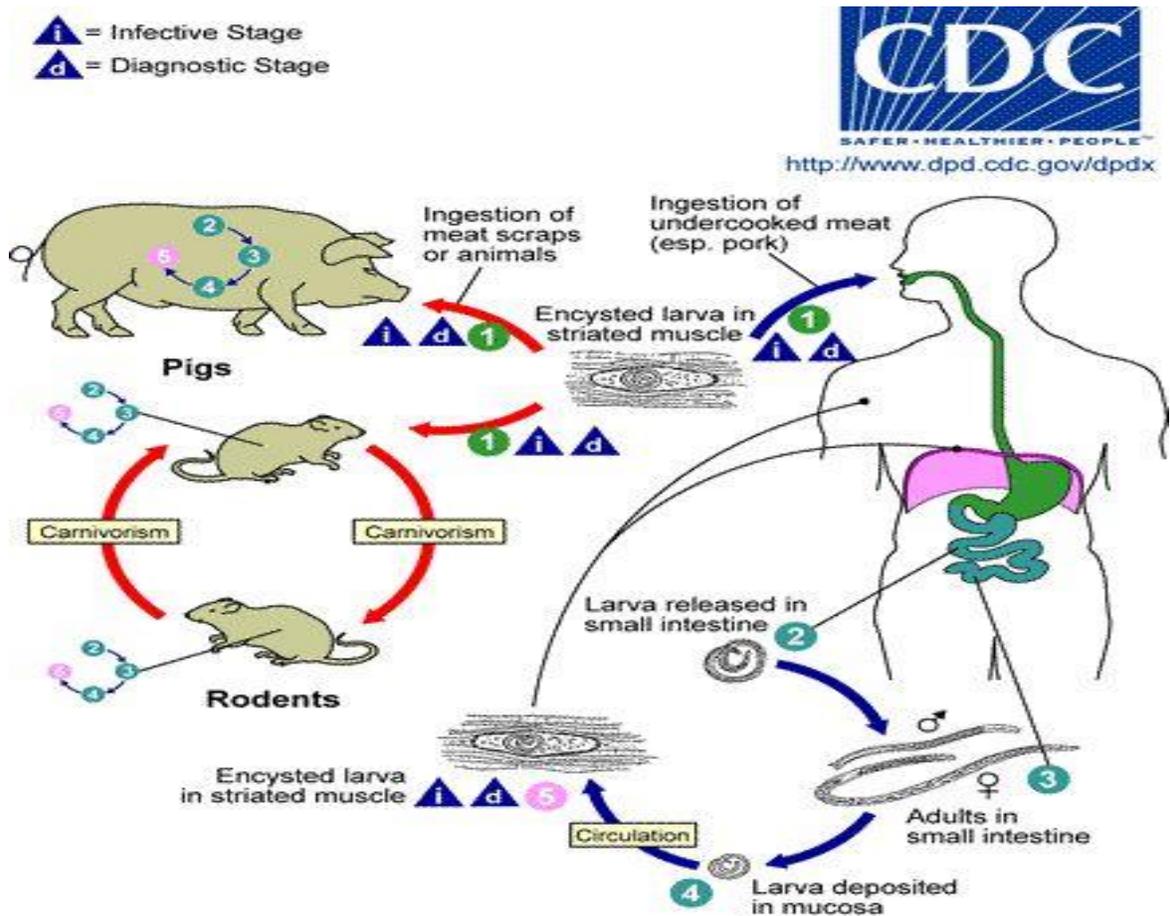
Males of *T. spiralis* measure about 1.4 and 1.6 mm long, and are more flat at anterior end than posterior end. The anus is seen in the terminal position, and they have a large copulatory pseudobursa on both the side. The **females** of *T. spiralis* are nearly twice the size of the males, and have an anal aperture situated terminally. The vulva is present close to the esophagus. The single uterus of the female is packed with developing eggs in the posterior end, whereas the anterior end bears the completely developed juveniles.



Host range

Only one host is required to complete the life cycle but change in definitive host is continuously required so that parasite does not get extinct.

Life cycle



The whole life cycle is passed in only single animal (man, pig, rat) but change of the host is necessary for the preservation of the species from extinction. Though one individual animal serves both as intermediate host and definitive host, two hosts are desired to finish the life cycle. The parasite incoming man is not capable to complete the life cycle. The continuation is maintained by other animal. The chief host of *Trichinella spiralis* is pig that serves as a pool host for human beings. Contamination of a new host is all the time brought about by intake of raw flesh of the trichinosed animal. To commence its lifecycle, *T. spiralis* adults attack the intestinal wall of a pig, and make larvae that occupy the pig's muscles. The larval forms are encapsulated as a small cystic arrangement within a muscle cell of the tainted host. When another animal (perhaps a human) consumes the tainted meat, the larvae are out from the nurse cells in the pork (due to stomach pH), and drift to the intestine, where they hole into the intestinal mucosa, mature, and initiate reproduction. Juveniles within nurse cells have an facultative anaerobic or anaerobic metabolism, but when they become activated, they opt on the aerobic metabolism uniqueness of the adult. Female *Trichinella* worms live for about six weeks and in that time can fabricate up to 1,500 larvae; when a female worm dies, she passes out of the host. The larvae add access to the passage of blood and migrate around the body of the host, in seeking of a muscle cell in which to encyst. The migration and encystment of larvae can be a reason of fever and pain, brought on by the host inflammatory reaction. In some studies, accidental migration to definite organ tissues can root myocarditis and encephalitis that consequence into death.

Symptoms

The disease is called trichinosis or less commonly trichinelliasis or trichiniasis. Demonstration varies from asymptomatic contamination to an acute fatal sickness (rare). The clinical characteristics classified according to the phase of the life cycle of worm are-

1. Stage of Intestinal Invasion (Incubation): This happens in the early period of illness (5-7 days) during which the larvae raise into adult worms and the female begins to release larvae into the circulation. Symptoms are diarrhoea, gastrointestinal nausea, abdominal cramps and sometimes vomiting. This is diagnosed as acute food poisoning chiefly when it occurs in groups of humans who have consumed the same foodstuff. In some of the individuals, constipation is seen instead of diarrhoea. The beginning of illness may be from 2 - 30 hrs of eating of infective food.
2. Stage of Larval Migration (Muscle Invasion or Migratory Phase): This happens during the discharge of larvae, their relocation, deposition and encapsulation in muscles of host. This happens from 7th to 10th day and covers a period of 4 -16 weeks. The chief symptoms are fever, swelling, oedema of face, and weakness of exaggerated muscles. Eosinophilia is a steady feature. Encephalitis and myocarditis are solemn and potentially lethal complications of toxanemia.
3. Stage of Encapsulation (Encystment Phase): This happens only in striated muscles whereas in other tissues they deteriorate and are immersed. This lasts from 1-8 months after contamination,

and other symptoms have subsided. After this phase the cysts start in on to calcify and may have everlasting injury. The clinical disease is self -limited and frequently lasts 2-3 weeks in light and 2-3 months in profound infections.

Diagnosis

Clinically diagnosis is helped by the history of utilization of inadequately cooked pork or other meat. Correct diagnosis can only be achieved by demonstrating the muscle obtained either from autopsy or biopsy. The following measures can be adopted-

- (i) Stool examination - presence of adult worm in faecal matter is rarely possible.
- (ii) Blood examination - for leucocytosis with an ascending eosinophilia.
- (iii) Serological tests - such as complement fixation, precipitin and bentonite.
- (iv) Muscle biopsy (by 3rd or 4th week of infection) suitable sites for biopsy are the tendinous insertions of deltoid or gastrocnemius muscle.
- (v) Skin test - Intradermal injection of 0.1 ml of 1 in 10000 dilution of Bachman's antigen causes an immediate erythematous patch.
- (vi) X-ray examination - if the cysts are calcified.

Treatment

Typically, patients are treated with either mebendazole or albendazole, but efficacy of such products is uncertain. Symptoms can be relieved by use of analgesics and corticosteroids.

Prophylaxis

1. Freezing meat in a standard household freezer for 20 days previous to consumption will destroy some species of *Trichinella*.
2. Cooking pork foodstuffs to temperature of 160 °F (72 °C) will destroy most species, and is the most excellent way to make sure the meat is safe to eat.
3. Good cooking practices should be implemented.
4. Illegal pork introduction from places with low security standards allows the spread of the parasite from endemic to non endemic countries therefore an eye should be kept on such transports also.
5. Cost effective measures to detect parasite in humans should be implemented.
6. The most effectual method of control is to discontinue the practice of feeding pigs with raw garbage.

7. Extermination of rats from pig farms limits the spread of infection.