Trichinosis

Revision Dates

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Case Definition

Confirmed Case

Clinical illness\(^{(A)}\) with laboratory confirmation of infection:
- Identification of *Trichinella* species larvae in tissue obtained by muscle biopsy
- A single positive serologic test for *Trichinella* sp.
- Identification of larvae in epidemiologically implicated food (meat).

Probable Case

Clinical illness\(^{(A)}\) in a person who is epidemiologically linked to a confirmed case.

\(^{(A)}\) Symptoms depend on the stage of the lifecycle. Adult worms in the intestine may cause diarrhea, abdominal cramps and vomiting, while systemic invasion by larvae may result in fever, myasthenia, myalgia/myositis, periorbital edema and eosinophilia. Systemic symptoms are more common.
Reporting Requirements

1. **Physicians, Health Practitioners and Others**

   Physicians, health practitioners and others shall notify the Medical Officer of Health (MOH) (or designate) of the zone, of all confirmed and probable cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two business days).

2. **Laboratories**

   All laboratories shall report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two business days) to the:
   - Chief Medical Officer of Health (CMOH) (or designate), and
   - MOH (or designate) of the zone.

3. **Alberta Health Services and First Nations Inuit Health Branch**

   - The MOH (or designate) of the zone where the case currently resides shall forward the preliminary Notifiable Disease Report (NDR) of all confirmed and probable cases to the CMOH (or designate) within two weeks of notification and the final NDR (amendment) within four weeks of notification.
   - For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two business days):
     - name,
     - date of birth,
     - out-of-province health care number,
     - out-of-province address and phone number,
     - positive laboratory report, and
     - other relevant clinical / epidemiological information.

4. **Additional Reporting Requirements**

   - Canadian Food Inspection Agency (CFIA): Under the Health of Animals Act – Reportable Diseases Regulation, all confirmed, probable, and suspect animal cases of trichinosis must be reported. Animal health issues associated with the source of human trichinosis disease should be reported by the MOH (or designate) to the District Veterinarian of the CFIA. Contact information is available at: http://www.inspection.gc.ca/english/anima/heasan/offbure.shtml
Etiology
Trichinosis is caused by an intestinal roundworm (nematode) *Trichinella*. Five species have been identified in warm-blooded animals. Human infection is most commonly caused by *Trichinella spiralis*.

The organism is freed from the cyst walls by acid pepsin digestion in the stomach and passed into the small intestine. Larvae invade the columnar epithelium in the small intestine and develop into adult worms. The adult worm produces about 500 larvae over a two to three week period and is then expelled in the feces. The larvae enter the skeletal muscles via the bloodstream were they burrow into individual muscle fibers. Over the next three weeks they increase 10 times in length as they become encysted. The larvae then become capable of infecting a new host. They remain viable for several years.

Clinical Presentation
Most infections are asymptomatic. The development of symptoms and the severity of disease are directly related to the infective dose. Heavy exposure may lead to fulminant, fatal disease.

Characteristic signs include the sudden appearance of muscle soreness and pain along with edema of the upper eyelids and fever. These symptoms may be followed by subconjunctival, subungual and retinal hemorrhages, pain, and photophobia. Thirst, profuse sweating, chills, weakness, prostration, and rapidly increasing eosinophilia may follow the ocular signs. These symptoms are caused by the larvae and usually appear during the second week after infection. The systemic symptoms usually peak two to three weeks after infection and then slowly subside. Gastrointestinal symptoms are caused by the activity of the adult worms. These symptoms may precede the ocular symptoms and include abdominal pain, vomiting, diarrhea and remittent fever. Muscle and ocular symptoms occur generally two to eight weeks after the gastrointestinal symptoms. Cardiac and neurologic complications may appear in the third to sixth week and, in most severe cases, death due to myocardial failure may occur.

Diagnosis
Trichinosis should be suspected in any person who has any of the cardinal features of periorbital edema, myositis, fever, and eosinophilia in particular if history reveals consumption of poorly cooked meat, especially pork or pork products.

Antibodies are not detectable until at least three weeks after infection. They may be measured by EIA. A diagnostic titre is 1:128. A rising antibody titre may help establish the diagnosis.

Muscle biopsy is usually not necessary, however, if there is doubt about the diagnosis a specimen may be taken and identified by microscopy.

Epidemiology
Reservoir
Animals are the only reservoir of this parasite. This includes swine, dogs, cats, horses, rats, and many wild animals such as fox, wolf, bear, polar bear, wild boar, and marine mammals in the Arctic. In the tropics, the hyena, jackal, lion, and leopard are known reservoirs.

Transmission
Eating raw or undercooked meat of animals containing the larvae, in particular pork, pork products, and beef products transmit the parasite. Feeding pigs uncooked garbage perpetuates the cycle of infection. The organism is not transmitted person to person.
Incubation Period
Systemic symptoms caused by the larvae appear eight to 15 days after ingestion of infected flesh (meat) with a range of five to 45 days. The timeframe depends on the number of parasites involved. Gastro-intestinal symptoms caused by adult worms appear within a few days.

Period of Communicability
Trichinosis is not transmitted person to person. Animal hosts remain infective for months. Meat from infected animals remains infective for considerable periods unless it is irradiated or cooked for a sufficient time to allow all parts to reach temperatures of at least 74°C. The organism may be resistant to freezing. (1)

Host Susceptibility
Susceptibility is universal.

Occurrence
General
Worldwide distribution. The number of cases depends on the practices used in preparing and eating pork or wild animal meat. The disease is often unrecognized or unreported.

Fewer than 10 cases per year are reported in the US. Approximately 75% of cases are due to inadequately processed pork. The remaining cases are most often caused by ingestion of poorly cooked bear meat, walrus meat or cougar jerky.

Canada
Infection with this organism is widespread in northern Canada. The estimated incidence rate in this population is 11/100,000. The most frequent sources have been infected polar bear and walrus meat. Numerous outbreaks have occurred. In 1998, an outbreak was reported in the Northwest Territories. Fifty-nine cases were reported, predominantly in adults. In the most populated areas of Canada there has been a decrease in incidence due to programs designed to eliminate the organism from domestic swine. (1)

Alberta (2)
No cases have been reported in Alberta in the period of 1985 to 2004.

Key Investigation
Single Case/household Cluster
- Determine the possible source of infection considering the incubation period, reservoir, and mode of transmission. Assessment may include:
  - determining contact with a potential source (reservoir) especially recent consumption of raw or undercooked meats,
  - obtaining a food history, and
  - identifying history of recent travel.
- Assess for history of similar symptoms in other members of the household.
- Obtain implicated food samples, if possible.
- Suspected contaminated food may be held to prevent consumption.
- Suspected contaminated food may be destroyed.
Control

Management of a Case
- Bedrest.
- All cases should be instructed about disease transmission and appropriate personal hygiene.
- Symptomatic and asymptomatic individuals are generally not excluded from work or daycare. Routine practices should be used in healthcare settings.

Treatment of a case
- Bedrest and salicylates are the mainstay of treatment.
- Albendazole (or mebendazole) may provide some benefit in the intestinal stage but have little effect on the muscle-embedded larvae. Albendazole is available through the Public Health Agency of Canada Special Access Program (SAP). The SAP form is available at: http://www.hc-sc.gc.ca/hpfb-dgpsa/tpd-dpt/sap_requestform_e.html
- Corticosteroids may be used in severe cases involving the lung, heart or brain.

Management of Contacts
- There is no person to person transmission of the organism.
- Individuals exposed to the suspected source of the infection should be instructed about disease transmission and appropriate personal hygiene.
- Individuals exposed to the suspected source of the infection may be monitored during the incubation period and offered treatment as necessary.

Preventive measures
- Educate food handlers about proper food preparation.
- Thoroughly cook meat allowing all parts to reach at least 74°C or until the meat turns from pink to grey in colour.
- Grind pork in separate grinder or clean grinder thoroughly before and after processing other meats.
- Storage of meat in a home freezer (-15°C) for three weeks usually sterilizes meat.
References
