Trichinellosis
(Trichinosis)
Table of Contents

Trichinellosis
(Trichinosis)

Overview[1, 2, 3, 5]

Trichinellosis, also known as trichinosis is a disease caused by an intestinal roundworm of various *Trichinella* spp., whose larvae migrate to and become encapsulated in muscle tissue. Trichinellosis is acquired when undercooked meat containing infective larvae are consumed. Commercial and home-raised pork remain a source of human infections, but meats other than pork, such as venison, horse meat, and particularly meats from wild carnivorous or omnivorous game (bear, boar, cougar, fox, dog, wolf, seal, and walrus) now are common sources of infection. The disease is not transmitted from person to person.

Clinical illness in humans is highly variable and can range from inapparent to fulminating, fatal disease, depending on the number of larvae ingested. The incubation period is usually less than one month. During the first week after ingesting infected meat, a person can experience abdominal discomfort, nausea, vomiting, and/or diarrhea. Two to eight weeks later, as larvae migrate into tissues, fever, myalgia, periorbital edema, urticarial rash, and conjunctival and subungual hemorrhages can develop. In severe infections myocarditis, neurologic involvement, and pneumonitis can follow in 1-2 months. Larvae can remain viable in tissues for years; calcification of some larvae in skeletal muscle usually occurs within 6 to 24 months and may be detected on radiographs.

Medications can be used to treat the roundworms in the intestines, but are less effective for *Trichinella* larvae already in muscle tissues. Once the larvae have become established in skeletal muscle cells, usually by 3 to 4 weeks post infection, treatment may not completely eliminate the infection and associated symptoms.

The best prevention is to properly cook pork and wild game meat. Curing (salting), drying, smoking, or microwaving meat alone does not consistently kill infective worms; homemade jerky and sausage were the cause of many cases of trichinellosis reported to CDC in recent years.

For additional information on trichinellosis, please refer to the following texts:

- *Control of Communicable Diseases Manual*. (CCDM), American Public Health Association. 19th ed. 2008.
- American Academy of Pediatrics. *Red Book: 2012 Report of the Committee on Infectious Diseases.* 29th ed. 2012.
- Kazura, James W. *Tissue Nematodes, Including Trichinellosis, Dracunculiasis, and the Filariases*. In: Gerald L. Mandell, John E. Bennett, & Raphael Dolin, Eds. *Principles and Practice of Infectious Diseases,* 7th Ed.
- Centers for Disease Control and Prevention – Parasites – Trichinellosis (also known as Trichinosis) - Resources for Health Professionals website: http://www.cdc.gov/parasites/trichinellosis/health_professionals/index.html#dx.

2014 Case Definition – Trichinellosis (4/15)[4, 6]

Clinical Description

A disease caused by ingestion of *Trichinella* larvae, usually through consumption of *Trichinella*-containing meat - or food contaminated with such meat - that has been inadequately cooked prior to consumption. The disease has variable clinical manifestations. Common signs and symptoms among symptomatic persons include eosinophilia, fever, myalgia, and periorbital edema.

Laboratory Criteria for Diagnosis

Human Specimens:

- Demonstration of *Trichinella* larvae in tissue obtained by biopsy, **or**
- Positive serologic test for *Trichinella.*

Food Specimens:

- Demonstration of *Trichinella* larvae in the food item (probable).

Epidemiologic Linkage

Persons who shared the implicated meat/meal should be investigated and considered for case status as described above.

Criteria to Distinguish a New Case from an Existing Case

Serial or subsequent cases of trichinellosis experienced by one individual should only be counted if there is an additional epidemiologically compatible exposure. Because the duration of antibodies to *Trichinella* spp. is not known, mere presence of antibodies without a clinically-compatible illness **AND** an epidemiologically compatible exposure may not indicate a new infection, especially among persons with frequent consumption of wild game that is known to harbor the parasite.

Case Classification

Suspected

Instances where there is no clinically compatible illness should be reported as suspect if the person shared an epidemiologically implicated meal, or ate an epidemiologically implicated meat product, and has a positive serologic test for trichinellosis (and no known prior history of *Trichinella* infection).

Probable

A clinically compatible illness in a person who shared an epidemiologically implicated meal or ate an epidemiologically implicated meat product, **or**

A clinically compatible illness in a person who consumed a meat product in which the parasite was demonstrated.

Confirmed

A clinically compatible illness that is laboratory confirmed in the patient.

(*Continued on next page.*)

Comments: Epidemiologically implicated meals or meat products are defined as a meal or meat product that was consumed by a person who subsequently developed a clinically compatible illness that was laboratory confirmed.

Negative serologic results may not accurately reflect disease status if blood was drawn less than 3-4 weeks from symptom onset (Wilson et. al, 2006).

Information Needed for Investigation

Verify the diagnosis. Obtain demographic, clinical and laboratory information on the case from the attending physician, hospital, and/or laboratory. Obtain the other epidemiological information necessary to complete the Disease Case Report (CD-1) and the Trichinosis Surveillance Case Report (CDC) from the patient or a knowledgeable family member.

Establish the extent of illness. Ask about illnesses among household, childcare, hospital, long-term care, and other close contacts. If ill persons are identified, advise them to seek medical attention and to alert their medical provider that they may have been exposed to trichinellosis. Determine whether the case is associated with a food recall. *COMMENTS:* Trichinosis is not transmitted from person to person. *Trichinella* are transmitted by ingestion of inadequately cooked meat or meat products, especially pork and wild game.

Identifying the source of infection. Trichinellosis is currently relatively rare. During 2008–2010, on average 20 cases were reported nationally per year. Cases are less commonly associated with pork products these days and more often associated with eating raw or undercooked wild game meats. The Information obtained from the "Trichinosis Case Report" will be used to help identify the source.

- Has the case recently consumed any bear meat or other wild game?
- Has the case traveled to an endemic area?
- If the suspect food is associated with a commercial establishment, embargo all remaining suspect food and collect food samples for testing.
- If the suspect food is intended for home use, it should not be used and collect food samples for testing.

Sometimes the source cannot be identified.

Provide information about trichinellosis to persons at risk for infection and the general public as needed. Efforts should be made to promote *Trichinella* awareness and provide prevention information to the public to reduce the risk of trichinellosis. Information on trichinellosis prevention can be found on CDC's website at: http://www.cdc.gov/parasites/trichinellosis/prevent.html.

***Trichinella* Surveillance.** Review WebSurv to determine whether there have been other cases in the same geographic area or institution. When cases are related by person, place, or time, efforts should be made to identify a common source**.** Information obtained through the Trichinosis Surveillance Case Report will be used to identify a possible source of infection and to characterize persons or geographic areas in which additional efforts are needed to raise awareness and reduce disease incidence. When investigating a suspected outbreak of

gastrointestinal illness of unknown etiology, see the Outbreak Investigation section of the CDIRM.

Notification

- The local public health agency (LPHA) should immediately contact the District Communicable Disease Coordinator, or the Senior Epidemiology Specialist for the District, or the Missouri Department of Health and Senior Services (MDHSS) - BCDCP, phone (573) 751-6113, Fax (573) 526-0235, or for afterhours notification contact the MDHSS/ERC at (800) 392-0272 (24/7) immediately if an outbreak* of trichinellosis is suspected.
- If a case(s) is associated with a childcare center, BCDCP or the LPHA will contact the Bureau of Environmental Health Services, phone (573) 751-6095, Fax (573) 526-7377 and the Section for Child Care Regulation, phone (573) 751-2450, Fax (573) 526-5345.
- If a case(s) is associated with a long-term care facility, BCDCP or the LPHA will contact the Section for Long Term Care Regulation, phone (573) 526-8524, Fax (573) 751-8493.
- If a case is associated with a hospital, hospital-based long-term care facility, or ambulatory surgical center BCDCP or the LPHA will contact the Bureau of Health Services Regulation phone (573) 751-6303, Fax (573) 526-3621.

*Outbreak is defined as the occurrence in a community or region, illness(es) similar in nature, clearly in excess of normal expectancy and derived from a common or a propagated source.

Control Measures[2]

Transmission to swine can be prevented by not feeding swine garbage, by preventing cannibalism among animals, and by effective rat control. The public should be educated about the necessity of cooking pork and meat of wild animals thoroughly (>160°F [71°C] internal temperature). Freezing pork less than 6 inches thick at 5°F (–15°C) for 20 days kills *T spiralis*. However, *Trichinella* organisms in wild animals, such as bears and raccoons, are resistant to freezing. People known to have ingested contaminated meat recently should be appropriately treated. For treatment information see CDC's website at: http://www.cdc.gov/parasites/trichinellosis/health_professionals/index.html#tx.

For additional information see:

- *Control of Communicable Diseases Manual*. (CCDM), American Public Health Association. 19th ed. 2008.
- Kazura, James W. *Tissue Nematodes, Including Trichinellosis, Dracunculiasis, and the Filariases*. In: Gerald L. Mandell, John E. Bennett, & Raphael Dolin, Eds. *Principles and Practice of Infectious Diseases*, 7th Ed.

Laboratory Procedures[2, 5]

The diagnosis of trichinellosis is based on history of consumption of potentially contaminated meat, the presence of compatible signs and symptoms, and identification of *Trichinella* larvae in biopsy muscle tissue or specific antibody in serum.

- Eosinophilia approaching 70%, in conjunction with compatible symptoms and dietary history, suggests the diagnosis. Increases in concentrations of muscle enzymes, such as creatinine phosphokinase and lactic dehydrogenase, occur. Identification of larvae in suspect

meat can be the most rapid source of diagnostic information. Encapsulated larvae in a skeletal muscle biopsy specimen (particularly deltoid and gastrocnemius) can be visualized microscopically beginning 2 weeks after infection by examining hematoxylin-eosin stained slides or sediment from digested muscle tissue.[2]

- Serologic tests are available through the Missouri State Public Health Laboratory (MSPHL) from the CDC. Serum antibody titers rarely become positive before the second week of illness. Testing paired acute and convalescent serum specimens usually is diagnostic. Prior approval of an epidemiologist is needed before these specimens are submitted to CDC. Please contact the District Communicable Disease Coordinator before shipping these specimens. The SPHL telephone number is (573-751-3334) and the MSPHL website is available at: http://health.mo.gov/lab/index.php (4/15).
- Additional diagnostic information is available from CDC's website at: http://www.cdc.gov/parasites/trichinellosis/health_professionals/index.html#dx (4/15).

Reporting Requirements

Trichinellosis is a Category 3 reportable disease and shall be reported to the local public health agencies or to the Missouri Department of Health and Senior Services (MDHSS) within three days of first knowledge or suspicion by telephone, facsimile, or rapid communication.

As a Nationally Notifiable Condition, all cases prior to classification are a **STANDARD** report to the CDC. **STANDARD** reporting requires the MDHSS to report to CDC by electronic transmission via WebSurv within the next normal reporting cycle.

1. For all reported cases, complete a "Disease Case Report" (CD-1) and a "Trichinosis Surveillance Case Report" (CDC 54.7 E) and send the completed forms to the DHSS District Health Office.
2. Entry of the completed CD-1 into WebSurv negates the need for the paper CD-1 to be forwarded to the District Health Office.
3. MDHSS will report to CDC following the above reporting criteria (see box).
4. All outbreaks or "suspected" outbreaks must be reported as soon as possible (by phone, fax, or e-mail) to the District Communicable Disease Coordinator or the District Senior Epidemiology Specialist. This can be accomplished by completing the Missouri Outbreak Surveillance Report (CD-51).
5. When an outbreak is associated with food, a National Outbreak Reporting System – Foodborne Disease Transmission (CDC 52.13) is to be completed and submitted to the District Communicable Disease Coordinator at the conclusion of the outbreak.
6. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the District Communicable Disease Coordinator.

References

1. American Public Health Association. *Trichinellosis (Trichiniasis, Trichinosis)*. In: Heymann, D Ed. *Control of Communicable Diseases Manual*. 19th ed. Washington, D.C. American Public Health Association; 2008: 622-625.
2. American Academy of Pediatrics. *Trichinellosis* (*Trichinella spiralis*). In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2012 Report of the Committee on Infectious Disease*, 29th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2012: 728-729.
3. Kazura, James W. *Tissue Nematodes, Including Trichinellosis, Dracunculiasis, and the Filariases*. In: Gerald L. Mandell, John E. Bennett, & Raphael Dolin, Eds. *Principles and Practice of Infectious Diseases*, 7th ed., Pennsylvania: Churchill Livingstone Elsevier, 2010:Vol. 2: 3587-3588.
4. CDC's National Notifiable Diseases Surveillance System (NNDSS) and Case Definitions. http://wwwn.cdc.gov/nndss/ (4/15).
5. Centers for Disease Control and Prevention – Parasites – Trichinellosis (also known as Trichinosis) website. http://www.cdc.gov/parasites/trichinellosis/index.html (4/15)
6. Wilson M, Schantz P, Nutman T, 2006. Molecular and immunological approaches to the diagnosis of parasitic infection. Detrick B, Hamilton RG, Folds JD, eds. Manual of Molecular and Clinical Laboratory Immunology. Washington, DC: American Society for Microbiology, 557-568.
7. Centers for Disease Control and Prevention. Trichinellosis Surveillance - United States, 2002-2007. MMWR 2009:58 (No. SS-9). http://www.cdc.gov/mmwr/pdf/ss/ss5809.pdf (4/15).
8. Murrell K., Pozio E. Worldwide Occurrence and Impact of Human Trichinellosis, 1986-2009. Emerging Infectious Diseases, Centers for Disease Control and Prevention. Vol. 17, No. 12, December 2011. http://wwwnc.cdc.gov/eid/article/17/12/11-0896_intro.htm (4/15).