

Yersinia enterocolitica and yersinia pseudotuberculosis

- Gram-negative bacilli in the family Enterobacteriaceae
- They are non-lactose-fermenting, urease-positive organisms that grow at a wide range of temperature; they are motile at 25° C but not at 37° C.
- It is a bacteria that thrive in cooler temperatures. The ability of this organism to grow at 4° C means that refrigerated meats can be sources of infection.
- The Yersinia enterocolitica serotypes that most clearly are pathogenic to humans include serotypes O:3, O:5, O:27, O:8, O:9, and O:13.
- Both *Y. enterocolitica* and *Y. pseudotuberculosis* produce a lipopolysaccharide endotoxin that has biologic properties similar to those of other gram-negative bacteria.

Epidemiology of *Y. enterocolitica*:

- The zoonotic reservoirs of *Y. enterocolitica* are diverse, including rodents, rabbits, pigs, sheep, cattle, horses, dogs, and cats. The principal reservoir of *Y. enterocolitica* is swine. *Most infected animals recover from their primary disease, remaining healthy carriers indefinitely.* The organism is excreted in large numbers in the feces by infected carriers and can contaminate drinking water and dairy products.
- Transmission of infection occurs by ingestion of contaminated food or water and, less commonly, by direct contact with infected animals or patients.

Epidemiology of *Y. pseudotuberculosis*:

- Infection caused by *Y. pseudotuberculosis* is the rarest of the yersinioses
- It has its reservoirs in various rodents, rabbits, deer, farm animals, and birds, including turkeys, ducks, geese, pigeons, pheasants, and canaries.
- Although this infection has a worldwide distribution, most cases have been reported from Europe.
- Illness occurs most frequently in the winter.
- The principal route of transmission is thought to be fecal-oral from handling infected animals or the environment contaminated by them, or through contamination in the household of food or water.

Pathophysiology

- *Y. enterocolitica* causes disease via direct invasion of the ileum intestinal mucosa.
- Infection may result in mucosal ulcerations in the terminal ileum (rarely in the ascending colon), necrotic lesions in Peyer's patches, and enlargement of mesenteric lymph nodes
- In severe cases, thrombosis of mesenteric blood vessels, intestinal necrosis, and hemorrhage may occur.
- The appendix has a normal histologic appearance or shows mild inflammation.

Clinical Manifestations

- The incubation period is 1-14 days, and the duration of stool excretion is 14-97 days.
- Symptoms typically persist for 5-14 days.
- Most infected subjects are symptomatic; however, asymptomatic carriage may occur.

➤ Infection with *Y. enterocolitica* typically manifests:

- in young children as fever and diarrhea
- in older children and adults as a pseudoappendicitis syndrome (fever, abdominal pain, tenderness in the right lower quadrant of the abdomen, and leukocytosis)

- in children younger than 1 year of age and in older children with predisposing conditions, such as excessive iron storage (eg, desferrioxamine use, sickle cell disease, beta-thalassemia) and immunosuppressive states as a bacteremia
- Focal manifestations of *Y enterocolitica* are uncommon and include:
 - pharyngitis, meningitis, osteomyelitis, pyomyositis, conjunctivitis, pneumonia, empyema, endocarditis, acute peritonitis, abscesses of the liver and spleen, and primary cutaneous infection.
- Postinfectious sequelae with *Y enterocolitica* infection include:
 - erythema nodosum, proliferative glomerulonephritis, and reactive arthritis.

➤ **The major manifestations of *Yersinia pseudotuberculosis* infection are:**

- fever, scarlatiniform rash, and abdominal symptoms.
- Acute pseudoappendiceal abdominal pain is common, resulting from ileocecal mesenteric adenitis, or terminal ileitis.
- Other findings include diarrhea, erythema nodosum, septicemia, and sterile pleural and joint effusions.

Enterocolitis.

- is characterized by diarrhea, low-grade fever, abdominal pain lasting 1-3 weeks
- vomiting is present in approximately 40% of cases
- diarrhea may be bloody in severe cases
- hematochezia is present in approximately 25% of cases; fecal leukocytes and red blood cells are a common microscopic feature.
- most cases are self-limited,
- also physicians have reported serious complications: diffuse colonic ulceration, perforation, peritonitis, and intussusception.

Exudative pharyngitis is a part of the spectrum of illness caused by *Y. enterocolitica*. 8% of patients presented with acute pharyngitis and fever, without accompanying diarrhea.

Mesenteric adenitis and/or terminal ileitis (Pseudoappendicitis syndrome)

- fever, abdominal pain, right lower quadrant tenderness, and leukocytosis
- This syndrome is most common in older children and adolescents and may be clinically indistinguishable from acute appendicitis.

Scarlatiniform rash:

- *Yersinia pseudotuberculosis* disease has been characterized by scarlatinoid-appearing rash involving the head and neck, upper and lower extremity erythema, mucous membrane enanthem, and strawberry tongue.

Septicemia typically is seen in patients who have increased iron storage (eg, chronic hemolysis, hereditary hemochromatosis)

- hepatosplenic abscesses, myocarditis, endocarditis, pulmonary abscesses, meningitis, and mucocutaneous manifestations.

Rare cases of pneumonia, empyema, and lung abscess have been reported.

Postinfectious, nonsuppurative sequelae:

Reactive arthritis:

- 10- 30% of adults with *Y. enterocolitica* infection in Scandinavia.
- Begins a few days to a month after onset of acute diarrhea and may involve the knees, ankles, toes, fingers, and wrists.
- In most cases, two to four joints become inflamed in rapid succession over a period of 2 to 14 days.
- Symptoms persist for more than 1 month in two thirds of cases and for more than 4 months in one third.
- After 12 months, most patients are asymptomatic, but a few have persistent low back pain, including sacroiliitis, which has been specifically related to the presence of HLA-B27.^[82] Ankylosing spondylitis rarely occurs.
- Synovial fluid examination typically reveals a polymorphonuclear pleocytosis, usually with fewer than 25,000 leukocytes/mm³ of fluid. Cultures are usually negative.

Reiter's syndrome

- arthritis, urethritis, and conjunctivitis,
- is much more likely to develop in persons with the HLA-B27 antigen.

Erythema nodosum

- Erythema nodosum occurs in up to 30% of cases in Scandinavia.
- Skin lesions typically (painful raised red or purple lesions) appear on the legs and trunk 2 to 20 days after onset of fever and abdominal pain
- resolve spontaneously within a month in most cases.

Yersiniosis usually is either self-limited or is responsive to therapy; however, reinfection is possible

Lab Studies:

- Detecting the organism in the stools is the best way to confirm this diagnosis. Culture is usually positive within 2 weeks of onset of disease.
- The organism can also be recovered from other sites, including the throat, lymph nodes, joint fluid, urine, bile, and blood.
- To isolate the organism in culture requires special techniques. Therefore, the laboratory should be notified when the organism is suspected clinically.

Serodiagnosis

- A variety of methods makes serodiagnosis possible (agglutination, enzyme-linked immunosorbent assays, radioimmunoassay); however, carefully interpret the serodiagnosis of *Y enterocolitica* without a positive result on stool culture. Cross-reactions can occur with other organisms
- Agglutinin titers typically increase 1-2 weeks after infection and peak at 1:200. Antibodies persist for several years.

Colonoscopy:

- Typically, the cecum contains aphthoid lesions and the terminal ileum has small, round elevations and ulcers. An exudate may be present. The left side of the colon typically is not affected, but case reports of left-sided colitis with serotype O:8 do exist.

Joint aspiration:

- Synovial fluid contains 500-60,000 white cells per cubic millimeter, with a predominance of polymorphonuclear cells. Cultures are sterile. Testing synovial fluid for bacterial antigens may be of some use in difficult cases.

Treatment

- Uncomplicated cases of diarrhea due to *Y. enterocolitica* usually resolve on their own without antibiotic treatment. However, in more severe or complicated infections, antibiotics such as aminoglycosides, doxycycline, trimethoprim-sulfamethoxazole, or fluoroquinolones may be useful.
 - Trimethoprim and sulfamethoxazole (Bactrim, Septra, Sulfatrim) 160 mg trimethoprim/800 mg sulfamethoxazole (ie, one double-strength tab) PO bid
 - Gentamicin (Garamycin) 3-6 mg/kg/d IV/IM divided q8h
 - Cefotaxime (Claforan) 1-2 g/dose IV/IM q6-8h
 - Ceftriaxone (Rocephin) 1 g IV qd for 3 d
 - Tetracycline (Sumycin) 250-500 mg PO qid
 - Levofloxacin (Levaquin) 500 mg PO/IV q24h
 - Ciprofloxacin (Cipro) 500 mg PO bid for 3 doses
 - Ampicillin (Marcillin, Omnipen) 500 mg PO q6h or 1-2 g IV q4h
 - Chloramphenicol (Chloromycetin) 500 mg PO/IV q6h for 10 d; not to exceed 4 g/d