



SALMONELLA TYPHI

Compiled by Dr Juanita Smit

March 2015

Typhoid fever, also known as enteric fever, is a potentially fatal multi-systemic illness caused primarily by *Salmonella enterica*, subspecies *enterica* serovar *typhi*.

The varying manifestations of typhoid fever make this disease a true diagnostic challenge. The classic presentation includes fever, malaise, diffuse abdominal pain, and constipation. Untreated, typhoid fever is a gruelling illness that may progress to delirium, intestinal haemorrhage, bowel perforation, and death within 1 month of onset. Survivors may be left with long-term or permanent neuro-psychiatric complications.

Diagnosis

The diagnosis of typhoid fever (enteric fever) is primarily clinical.

- Culture
 - The criterion standard for diagnosis of typhoid fever has long been culture isolation of the organism. Cultures are widely considered 100% specific.
 - Culture of bone marrow aspirate is 90% sensitive until at least 5 days after commencement of antibiotics.
 - Blood, intestinal secretions, and stool culture results are positive for *S typhi* in approximately 85%-90% of patients with typhoid fever who present within the first week of onset. They decline to 20%-30% later in the disease course. In particular, stool culture may be positive for *S typhi* several days after ingestion of the bacteria secondary to inflammation of the intra-luminal dendritic cells. Later in the illness, stool culture results are positive because of bacteria shed through the gallbladder.
 - Multiple blood cultures (>3) yield a sensitivity of 73%-97%. Large-volume (10-30 mL) blood culture and clot culture may increase the likelihood of detection.
 - Stool culture alone yields a sensitivity of less than 50%, and urine culture alone is even less sensitive.
- Specific serologic tests
 - Assays that identify *Salmonella* antibodies or antigens support the diagnosis of typhoid fever, but these results should be confirmed with cultures.
 - The Widal test was the mainstay of typhoid fever diagnosis for decades. It is used to measure agglutinating antibodies against H and O antigens of *S typhi*. Neither sensitive nor specific, the Widal test is no longer considered to be an acceptable diagnostic test method.
- Other nonspecific laboratory studies
 - Most patients with typhoid fever are moderately anaemic have an elevated erythrocyte sedimentation rate (ESR), thrombocytopenia and relative lymphopenia.
 - Most also have a slightly elevated prothrombin time (PT), activated partial thromboplastin time (aPTT) and decreased fibrinogen levels.
 - Circulating fibrin degradation products commonly rise to levels seen in subclinical disseminated intravascular coagulation (DIC).
 - Liver transaminase and serum bilirubin values usually rise to twice the reference range.
 - Mild hyponatremia and hypokalemia are common.

Treatment

Definitive treatment of typhoid fever (enteric fever) is based on susceptibility. Fluoroquinolones are highly effective against susceptible organisms, yielding a better cure rate than cephalosporins. Unfortunately, resistance to first-generation fluoroquinolones is widespread in many parts of Asia.

In recent years, third-generation cephalosporins have been used in regions with high fluoroquinolone resistance rates, particularly in south Asia and Vietnam.

How is Typhoid Spread

Salmonella typhi lives only in humans. Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract. In addition, a small number of persons, called carriers, recover from typhoid fever, but continue to carry the bacteria. Both ill persons and carriers shed *Salmonella typhi* in their stool.

Typhoid fever is spread by eating food or drinking beverages that have been handled by a person who is shedding *Salmonella typhi* or if sewage contaminated with *Salmonella typhi* bacteria gets into water used for drinking or washing food. Therefore, typhoid fever is more common in areas of the world where handwashing is less frequent and water is likely to be contaminated with sewage.

Once *Salmonella typhi* bacteria are ingested, they multiply and spread into the bloodstream.

Basic actions to protect against typhoid fever:

- Avoid risky foods and drinks.
- Get vaccinated against typhoid fever.
- If you drink water, buy it bottled or bring it to a rolling boil for 1 minute before you drink it. Bottled carbonated water is safer than uncarbonated water.
- Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and that are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well.
- When you eat raw fruit or vegetables that can be peeled, peel them yourself. (Wash your hands with soap first.) Do not eat the peelings.
- Avoid foods and beverages from street vendors. It is difficult for food to be kept clean on the street.



References:

1. <http://emedicine.medscape.com/article/231135-overview>, accessed 05 March 2015.
2. http://www.cdc.gov/nczved/divisions/dfbmd/diseases/typhoid_fever/, accessed 05 March 2015.

HEAD OFFICE

Lancet Corner, Ground Floor, Cnr Menton and Stanley Roads, Richmond, Johannesburg, South Africa.
(011) 358 0800
24-hour emergency service

PRETORIA MAIN LABORATORY

1st Floor Pencardia Building, 509 Pretorius Street, Arcadia, South Africa.
(012) 483 0100

DURBAN MAIN LABORATORY

102 Lancet Medical Centre, 74 Ismail C Meer Street, Durban, South Africa.
(031) 308 6500