Pathogenesis

*Clostridium tetani* spores usually enter the body through a wound or breach in the skin. In the presence of anaerobic (low oxygen) conditions, the spores germinate. Toxins are produced and disseminated via bloodstream and lymphatic system. Toxins act at several sites within the central nervous system, including peripheral motor end plates, spinal cord, and brain, and in the sympathetic nervous system. The typical clinical manifestations of tetanus are caused when tetanus toxin interferes with release of neurotransmitters, blocking inhibitor impulses. This leads to unopposed muscle contraction and spasm. Seizures may occur, and the autonomic nervous system may also be affected.

Symptoms and Diagnosis

Tetanus is a clinical syndrome without confirmatory laboratory tests. The disease is characterized by painful muscular contractions, primarily of the masseter and neck muscles, secondarily of trunk muscles. A common first sign suggestive of tetanus in older children and adults is abdominal rigidity, although rigidity is sometimes confined to the region of injury. Generalized spasms occur, frequently induced by sensory stimuli. History of an injury or apparent portal of entry may be lacking. The organism is rarely recovered from the site of infection.

The incubation period ranges from 3 to 21 days, usually about 10 days. In general, the further the injury site is from the central nervous system, the longer the incubation period. A shorter incubation period is associated with more severe disease, complications, and a higher chance of death. In neonatal tetanus, symptoms usually appear from 4 to 14 days after birth, averaging about 7 days.

Treatment

Tetanus is a medical emergency requiring hospitalization, immediate treatment with human tetanus immune globulin (TIG) (or equine antitoxin / TAT), tetanus vaccine, drugs to control muscle spasms, aggressive wound care, and antibiotics. If immunoglobulin is not available, a tetanus toxoid (TT) booster, agents to control muscle spasm, and aggressive wound care and antibiotics. If immunoglobulin is not available, tetanus antitoxin (TAT; equine origin) in a single large dose should be given intravenously, after testing for hypersensitivity. Depending on the severity of disease, mechanical ventilation and agents to control autonomic nervous system instability may be required. An adequate airway should be maintained; tracheostomy, nasotracheal intubation, and/or mechanically assisted respiration, may be lifesaving. Sedation and muscle relaxant drugs should be used as indicated to control muscle spasms. Active immunization may be initiated concurrently with treatment.

After a Disaster

The risk of tetanus among disaster survivors and emergency responders can best be minimized by following standard immunization recommendations and providing proper wound care. Tetanus may be more commonly reported in older persons who are less likely to be adequately vaccinated than younger persons or children. Patients without a clear history of at least three tetanus vaccinations who have any wound other than clean and minor need tetanus immune globulin (TIG); not just a tetanus toxoid containing vaccine. TIG provides longer protection than antitoxin of animal origin (TAT) and causes few adverse reactions. The currently recommended prophylactic dose of TIG (Human) for wounds of average severity is 250 units intramuscularly. When tetanus toxoid and TIG (Human) are given concurrently, separate syringes and separate sites should be used. It is advisable to use diptheria tetanus toxoids vaccine (DT) (for pediatric use – 6 years of age and younger) or tetanus diphtheria toxoids vaccine (Td) (for adult use – 7 years of age and older) in wound prophylaxis instead of tetanus toxoid (TT) alone in order to also maintain adequate levels of diphtheria immunity.