

Case Report:

Unheralded tetanus in the age of universal immunization: a case report

Sara Chinthu, Mahalingeshwara Bhat, Rakshith Shetty

Name of the Institute/College: K.S. Hegde Medical Academy

Corresponding author: Chinthu Sara Jacob , Post Graduate student, Department of General Medicine, K.S. Hegde Medical Academy, Deralakatte, Mangalore, Karnataka -575 018

Abstract

Tetanus is attributed to a toxin caused by the bacterium *Clostridium tetani* and is characterized by generalized rigidity and muscle spasms that may result in respiratory arrest and death. Tetanus typically gains access to the body through apparent or unapparent wounds. Implementation of mandatory vaccination programs has successfully reduced the prevalence of this disease worldwide. We report a case of severe, generalized tetanus in a male patient who presented to the emergency department with dysphagia and back stiffness with retrospective positive history of trauma and immunisation. The patient was admitted to the Intensive Care Unit, received the full supportive therapy for tetanus, and was discharged home in good condition.

Keywords: *Clostridium tetani*, tetanus, unapparent injury, vaccination

Introduction:

Tetanus is a life-threatening infectious disease with grave consequences if not detected and treated at an early stage. An infection found more frequently in Tropical climates; it has accounted for 58,900 deaths worldwide in 2013.(1) We report a case of tetanus in a 40-year-old man from Kerala, India, who presented to the emergency department with dysphagia and neck stiffness, with history of injury and tetanus vaccination that was administered ten days prior to presentation.

Case Report:

A 40-year-old man from Kerala who works as a hotel employee, presented to the emergency department complaining of progressive dysphagia to fluids and solids, inability to open his mouth completely, back pain and neck pain, that had worsened over the past two days. Patient gave history of injury to the plantar aspect of left foot by a rusted iron nail which was subsequently removed, for which tetanus toxoid was administered. He was healthy, not known to have any medical illnesses and was not using any medications. Examination revealed him to be anxious, sweaty with stable vital signs, tachycardia and fluctuating blood pressure levels. The rest of his examination revealed extended neck stiffness and partially opened mouth (locked jaw) and trismus. Spatula test was not performed due to incomplete negotiation of spatula due to difficulty in opening the mouth. Blackish discoloration in the plantar aspect of left foot 3cm from the lateral margin of the foot and 4cm below the little toe was noticed.

All of his investigations including blood cultures were unremarkable. In the emergency department, metronidazole was started intravenously and tetanus immunoglobulin (TIG) 3000IU (half dose deep IM and half dose IV) was administered. The patient was immediately shifted to the Intensive Care Unit (ICU) for observation. In the ICU, injection Crystalline Penicillin 20 lakh units IV administered. Diazepam 10 mg was

given intravenously every six hourly. On the second day of ICU admission, the patient started to develop generalized spasticity, labile blood pressures, and heart rate. Respiratory compromise in terms of difficulty of breathing and low oxygen saturation eventually developed, and hence, was intubated and connected to mechanical ventilator. The patient was maintained on high doses of sedative agents: Midazolam, fentanyl IV infusion, followed by an infusion of vecuronium, a paralytic agent, and baclofen as a muscle relaxant. Magnesium sulphate Infusion was also added to control his autonomic dysfunction. Tracheostomy was performed and he was kept on mechanical ventilation for almost one month before he was switched to pressure support. By day forty of hospitalization, mechanical ventilation was weaned off, sedation stopped, and physiotherapy started. Two days later, his tracheotomy was decannulated, and the patient was eventually sent to the medical ward, where he spent 7 more days before being discharged home, fully ambulated for physiotherapy and follow-up.

Discussion:

Clostridium tetani is a large spore forming anaerobic gram-positive bacillus, which is shaped like a club with a spore at one end. Transmission of tetanus is primarily through open and contaminated wounds. Tetanus may also follow elective surgery, burns, deep puncture wounds, crush wounds, otitis media, dental infections, animal bites, abortion, and pregnancy. Clostridium tetani produces a distinct tetanospasmin, a neurotoxin that is responsible for all the clinical manifestations of tetanus when it reaches the peripheral nerves. Tetanospasmin prevents the release of the inhibitory neurotransmitters glycine and gamma-aminobutyric acid resulting in overactivation of the sympathetic system.(2)

Tetanus is diagnosed by virtue of distinct history and clinical signs. The incubation period of tetanus is approximately 3–21 days and the shorter the incubation, the higher the risk of death. There are no confirmatory laboratory tests for this disease. The first sign of tetanus is intense spasm. The muscles of the jaw, neck, back, and abdomen may also be involved. There are various types of tetanus, including generalized, local, cephalic, and neonatal tetanus. The manifestations of generalized tetanus include pain, stiffness, rigidity, opisthotonos, and laryngeal spasm. The spasms are painful and may culminate in respiratory arrest and death. The local tetanus has a low mortality. Cephalic tetanus is an unusual form that damages the cranial nerves. Neonatal tetanus occurs in the new-born around the 1st week of life, transmitted through the umbilical cord.(3) Severity of tetanus can be graded according to the Ablett classification into four grades.(4)

Our patient's chief complaint was dysphagia and stiffness in the neck. He had spasms in his jaw muscles, leading to inability to open his mouth. Treatment is entered around neutralization of tetanospasmin and care for muscle spasms. Human TIG neutralizes circulating tetanospasmin.(2)

There are no laboratory test to confirm diagnosis. The wound cultures are often negative with a yield of C. tetani being positive in only 30% of the cases. The serologic testing for antitetanus antibodies is, usually, done to look for inadequate vaccination which may indicate either low or negative level. Unfortunately, tetanus can occur even in the presence of protective levels of antibodies. Therefore, serology can be used as supportive test if it is negative or poorly positive. However, it cannot be relied on to rule out the disease if it is strongly positive in highly suspicious scenarios.(2) That being said, Anti tetanus immunisation has proved to be one of the most successful preventive measures in medical practice. The accepted protective titre of neutralising antibody is 0.01 U/ml.(5)

Although we did not measure the antibody titre in our patient, he had received a full course of four immunisations in childhood together with booster doses and 10 days before his admission to hospital. This is considered to be a protective response in the event of exposure to tetanus. In the absence of any evidence that the patient was immunodeficient (that is, normal serum immunoglobulin values and no history of recurrent infections) it seems unlikely that he had not mounted an immune response.

The development of tetanus despite full immunisation is actually extremely rare—it is estimated at 4 per 100 million immunocompetent vaccinated subjects. However, the mechanism of immunisation failure is unclear. Theories include a high toxin load that disables the host immune defences, antigenic variability between toxin and toxoid, and selective suppression of the immune response.(6)

Conclusion:

Tetanus is a life-threatening infection, which is largely preventable. Without timely detection and management, it is fatal. Despite widespread increases in vaccination, tetanus continues to haunt the world of infectious diseases. Tetanus is a clinical diagnosis, and serious cases of tetanus must be managed in an ICU setup. Muscle spasms can be difficult to control, resulting in orthopaedic complications and may need prolonged sedative-relaxant infusions. Long-term mechanical ventilation may sometimes be required in these patients, with its superceding complications, such as ventilator-associated pneumonia, adult respiratory distress syndrome, sepsis, gastrointestinal stress ulcers, mechanical tube blockade, and tracheomalacia. Early tracheostomy can help in quicker weaning from ventilator and reduce the overall complication rates. Despite several preventive strategies, tetanus remains a serious health problem in the developing world.

Bibliography:

1. Gulamhussein MA, Li Y, Guha A. Localized Tetanus in an Adult Patient: Case Report. *J Orthop Case Rep.* 2016;6(4):100–2.
2. Alfilfil WA, Alshahrani MS, Abdulkbaser MA, El Fakarany NE. Severe generalized tetanus: A case report and literature review. *Saudi J Med Sci* 2015;3:167-9
3. Hariharan U, Sonowal S, Kaur R, Choudhary L. Tetanus and its continuing menace in the developing world: Critical care management. *Saudi Crit Care J* 2018;2:15-7
4. Chatterjee K, Ghosh A, Sengupta RS. A toe that pointed the wrong way: An unusual presentation of tetanus. *J Neurosci Rural Pract.* 2016 Jan 1;7(1):150.
5. Shimoni Z, Dobrousin A, Cohen J, Pitlik S. Tetanus in an immunised patient. *BMJ.* 1999 Oct 16;319(7216):1049.
6. Crone NE, Reder AT. Severe tetanus in immunized patients with high anti-tetanus titers. *Neurology.* 1992 Apr;42(4):761–4.