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Case Report

A case of tetanus infection in an adult with a protective tetanus antibody level☆,☆☆

Abstract

Tetanus is a bacterial infection caused by *Clostridium tetani* and most commonly presents as trismus or other muscle spasms. Despite the development of the tetanus toxoid vaccine, tetanus infection has not been eradicated. Additionally, while there are hypothesized protective levels of tetanus antibody, tetanus infection may still occur in properly vaccinated individuals.

We report the case of a 31-year-old male that presented to the emergency department (ED) with a 2-day history of neck and jaw pain. He reports puncturing his hand with a rusty nail 10 days prior. His reported vaccination history was that he received his last booster vaccination 13 years prior to presentation. In the ED, tetanus vaccine, tetanus immune globulin, and metronidazole were administered. His symptoms improved over the next 2 days and resolved at day 6. Despite his presentation of tetanus infection and rule out of other causes for his symptoms, his tetanus antibody level was reported at 8.4 U/mL, which is considered to be protective.

A tetanus antibody level that is adequate for protective immunity should not preclude a patient from treatment of tetanus infection. This case demonstrates that a thorough history, physical exam, and rule out of other causes should guide treatment when there is concern for a tetanus infection.

Tetanus infection is caused by the spore-forming, anaerobic, gram-positive bacilli, *Clostridium tetani* and exposure is often due to acute injury. Infection generally manifests between 1 and 7 days and earlier presentations are typically more severe [1]. Classic symptoms of tetanus infection may include trismus (lockjaw), spasms, pain, rigidity, dysphagia, or autonomic dysfunction. Since tetanus toxoid vaccination development, the incidence of tetanus infection has declined and from 2001 to 2008, the United States average incidence was 0.1 per 1 million population [2].

We describe the case of a patient that presented with mild tetanus infection and reported last vaccination beyond the recommended 10-year booster timeframe, who ultimately was found to have protective antibody levels [3].

A 31-year-old male presented to the emergency department (ED) with 1-day history of neck and jaw pain. The neck pain progressively worsened over 8 hours and he was unable to fully close his mouth or chew and had pain with swallowing. Upon examination, the patient reports to have punctured his right palm with a rusty nail 10 days ago. His last tetanus vaccination was approximately 13 years ago.

On physical exam, the oropharynx was injected on the left more than the right with no appreciated abscess, uvula deviation or exudate. Tenderness was present along the zygomatic, anterior neck, and sternocleidomastoid muscles, however the patient retained full range of motion. He denied fever, chills, nausea, photophobia, diaphoresis, dysphagia, and numbness or tingling in the extremities. The puncture wound was barely visible and without tenderness or surrounding erythema.

The patient was extensively evaluated for causes of his symptoms. Head and neck computed tomography exam, complete blood count, basic metabolic panel, erythrocyte sedimentation rate, and C-reactive protein were all within normal limits, ruling out other causes of neck and jaw pain. Symptoms were treated with oral diazepam and diphenhydramine for concern for muscle spasms or dystonia and intravenous ketorolac for pain and inflammation. The patient denied symptom improvement following these interventions.

Based on the lack of other causative factors, a presumed tetanus infection was diagnosed. Treatment included a tetanus, diphtheria, and acellular pertussis toxoids (Tdap) vaccine, intravenous metronidazole, and human tetanus immune globulin (TIG) 3000 U as several intramuscular injections.

Thirteen hours after TIG administration, there was increased range-of-motion in his lower jaw and decreased neck pain. This was without additional pharmacologic treatment for symptomatic relief. Approximately 27 hours after TIG administration, full neck range-of-motion returned and he was able to more fully open, close, and anteriorly/posteriorly move his jaw. The patient was discharged 48 hours after ED presentation with a prescription to complete a seven-day course of oral metronidazole. During clinic evaluation, 8 days later, he was able to fully close and open his mouth, eat and speak normally, and had minimal deficits in neck and jaw range of motion. The tetanus antibody level was available and resulted at 8.4 U/mL.

Our patient exhibited mild symptoms of tetanus infection with reported puncture injury in the setting of lapse in recommended tetanus booster. Due to the lack of an alternative diagnosis, tetanus infection was deemed the cause. Treatment with Tdap, TIG, and metronidazole was necessary for resolution of symptoms. TIG neutralizes unbound endotoxin produced by *Clostridium tetani*; however, the optimal dose is not established and is reported as 500 to 6000 U [4,5]. Due to concern for active symptoms, our patient received 3000 U, which was administered as several intramuscular injections of the 250-U/mL pre-filled syringes [6].

The major point of interest in our case is the tetanus antibody level (obtained prior to TIG treatment), which was evaluated using multianalyte fluorescent detection, and resulted 3 days later at 8.4 U/mL (ARUP Laboratories, Salt Lake City, UT, USA). The historically accepted protective level is reported as ≥0.01 U/mL [7]; however, our laboratory reference range reports >0.1 U/mL. Irrespective of the reference value being used, our patient would be assumed to be protected against tetanus infection as his levels were 800 and 80 times higher, respectively. Of 12 published cases from 1972 to present that report tetanus infection in patients with protective antibody levels, our patient's antibody level was remarkably higher, 8.4 U/mL vs 0.04

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to 2.78 U/mL, even 13 years after his last tetanus vaccination [8-19]. This may have resulted in a longer *Clostridium tetani* incubation period and more mild symptoms in our patient.

The correlation between reported protective antibody levels and physiologic protection from tetanus infection should be evaluated with caution in a patient presenting with history and symptoms of possible tetanus exposure and subsequent infection. It is important that a thorough history, physical exam, and complete laboratory and imaging evaluation be performed to rule out alternative diagnoses. Tetanus infection should remain a consideration in any patient regardless of prior vaccination status or known protective antibody levels.

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