

# Tetanus: A Case Study

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Tetanus is a disease caused by the toxin produced by *Clostridium tetani*. The clostridium tetanus bacterium is ubiquitous, and as such, *C tetani* infection can be acquired through surgery, intravenous drug abuse, the neonate's umbilicus, bites, burns, body piercing, puncture wounds, and ear infections. In short, this organism can enter through any break in the integrity of the body. As a result of widespread vaccination, tetanus is relatively rare in the United States. Even so, there were 325 cases of tetanus reported between 1991 and 1997, or approximately 46.4 cases per year.<sup>1</sup> The following case of tetanus is one of three reported by the New York State Department of Health in 1999.

## Case Report

A 38-year-old man came to the office with a chief complaint of jaw discomfort and inability to open his mouth fully for 3 days. He also said he had struck his right shin with a hammer 10 days earlier while attempting to fix his lawn mower. The hammer had penetrated deeply through the skin, and although the wound hurt and bled, he had not sought medical attention. Seven days after the original insult, he started noticing jaw discomfort and the inability to open his mouth completely. On the 3rd day of this discomfort, his wife urged him to seek medical attention. The patient had no history of medical or surgical procedures, had no known allergies, and was not taking medications. He had received his primary tetanus series in childhood, and his last booster was definitely more than 10 years ago.

His blood pressure was 125/70 mm Hg and his temperature was 98.5°F. When examined, he was unable to open his jaw wider than 1 inch. Findings from a head and neck examination were otherwise unremarkable, his lung sounds were clear, and heart sounds were within normal limits. There was no murmur. Evaluation of his extremities showed a

raised 5-cm erythematous circumferential lesion with a centrally granulated 2.5 × 1-cm puncture wound just lateral to the mid tibial aspect of his right leg. His leg was draped in sterile fashion. Hydrogen peroxide was applied to the area and, 3 mL of 1% lidocaine was injected around the lesion. The wound was surgically débrided of all necrotic tissue and debris with a No. 15 scalpel and copiously irrigated with normal saline. A wick was inserted for drainage, and the wound was allowed to drain and to close by secondary intention.

The patient was counseled about the diagnosis of tetanus with secondary wound infection and the need for hospital admission. The patient refused admission, so he was advised about all the possible sequelae of the disease including death. Still the patient requested to be treated as an outpatient, with admission only if symptoms worsened. Two doses of human antitetanus immunoglobulin (Hyper-Tet 250 U) was procured from the local hospital pharmacy, and he was given one 250-U dose intramuscularly into the upper outer quadrant of each buttock. He was then given a 0.5-mg tetanus-diphtheria booster into the left deltoid muscle. Metronidazole, 500 mg orally four times per day, was prescribed for 10 days. The patient was instructed to go the hospital if either he changed his mind, if jaw stiffness worsened or a temperature ensued, or if he had difficulty swallowing or any other spasm or symptom occurred. I also told him that I would telephone him that evening if I did not hear from him first.

As agreed, I telephoned him approximately 11 hours later. At that time patient was free of symptoms. Not only was he afebrile and had no progression of symptoms, but his trismus had resolved completely. During a follow-up visit the next day, he was totally asymptomatic. His wound had stopped draining, and the erythematous circumferential lesion was fading, but his temperature was now 99.5°F. The wick was removed, and once again the wound was copiously irrigated with normal saline and left open to heal by secondary intention. The wound was dressed, and the patient was instructed to continue with the metronidazole four

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times a day. Ciprofloxacin, 250 mg orally two times a day, was added for any secondary infection of the wound from *Staphylococcus* or *Streptococcus* organisms. He was again instructed to go to the hospital if symptoms occurred; he was given mupirocin to apply to the wound after peroxide dabs and told to return for a follow-up visit in 4 days. The patient returned in 4 days, as instructed, and was asymptomatic. He was afebrile, and the wound was clean, dry, and granulated without erythema. Patient was told to finish his 10-day supply of metronidazole and ciprofloxacin and to return if any symptoms reappeared.

## Discussion

*C tetani* releases a toxin that interferes with the inhibitory neurotransmitters, causing the trismus, which this patient was experiencing. Antibiotic penicillin (1–5 million units every 4 hours for 10 days) is a  $\gamma$ -aminobutyric acid antagonist and therefore could have increased the spasms caused by the tetanus toxin and should not be considered first choice.<sup>2</sup> Metronidazole, orally four times a day, was chosen for an alternative outpatient treatment. Low-dose ciprofloxacin was added later, because of the possible interaction with metronidazole through their shared liver metabolism, to treat more effectively any secondary wound infection with either *Staphylococcus* or *Streptococcus* organisms.

There is no laboratory finding characteristic of tetanus. The diagnosis is entirely clinical and does not depend on bacteriologic confirmation. The incubation period of tetanus is 3 to 21 days, and the shorter the incubation, the higher the risk of death.<sup>3</sup> The initial symptom of tetanus, as in this patient, is spasm of the jaw (trismus), which, if left

untreated, would then progress to dysphagia, laryngospasm, spasm of the respiratory tract muscles, cardiorespiratory arrest, and death. It is the risk of these very consequences that the most prudent action is admission and treatment in an intensive care unit for all suspected cases of tetanus. This patient's quick resolution of his trismus can be attributed to his having received the initial tetanus series and at least one booster dose, his middle age, his slow incubation, the human antitetanus, and the surgical debridement of the contaminated wound.

The tetanus-diphtheria booster dose given on his arrival at the office would not help the immediate tetanus illness but would help prevent future disease. The ciprofloxacin-metronidazole combination kills only the *C tetani* and staphylococcal or streptococcal bacterium, but it does not neutralize the tetanus toxins. The 2000 harmonized immunization schedule, based on the collaboration of the Advisory Committee on Immunization Practice, the American Academy of Family Physicians, and the American Academy of Pediatrics, recommends routine tetanus-diphtheria booster doses at 11 to 12 years of age and every 10 years thereafter.<sup>4</sup>

## References

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