



Harry L. Arnold Jr. MD Case of the Month

Tetanus: Still "Inexcusable"

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Introduction

Deemed "the inexcusable disease" by Edsall in 1876,¹ tetanus remains a potentially fatal disease that is easily preventable. Although vaccination is stressed, and its benefit is well-known, many cases are reported each year in the United States, especially in those shown to be at increased risk.² Tetanus must be recognized in its early stages, and it should be considered in patients with uncertain immunization status. Herein, we describe the case of a patient from the Marshall Islands who received treatment in our medical facility.

Case Report

A 22-year-old Marshallese male presented with complaint of fever and lower back pain. He was admitted to the hospital in Majuro where he was found to have a temperature of 102 degrees Fahrenheit and significant muscular rigidity. He was treated with diazepam five milligrams intravenously and ibuprofen 800 milligrams orally as needed for symptoms. He was given penicillin G, ceftriaxone, and gentamicin as well as tetanus toxoid.

There was no known past medical history, and immunizations were reportedly up-to-date. The patient had undergone no surgeries. His only medication prior to admission included an occasional acetaminophen; he had no known drug allergies. He smoked approximately three cigarettes per day, indulged in marijuana on the weekends, and consumed alcohol infrequently. He was unemployed, but his daily activities included carrying heavy sacks. He lived with his father and three others; he had no siblings.

The patient was transferred to our medical facility five days after his initial presentation. There had been no significant change in the patient's condition over this time period. On arrival history was obtained with the assistance of an interpreter; there was no history of trauma, bite, or penetrating wound. He denied headache, photophobia, or other symptoms. The medical attendant reported that most adults in Majuro receive only the initial tetanus immunization as children and rarely receive booster shots.

On physical examination, the patient was afebrile (temperature, 98.4 degrees Fahrenheit) and tachycardic (pulse, 117 beats per minute); his blood pressure was 130/59 and respirations were 27 breaths per minute. In general, he was alert and oriented; there was noticeable discomfort with movement. Pupils were equal and reactive, extraocular movements were intact. There was decreased jaw mobility with a two-centimeter opening. Nuchal rigidity was also evident. Lungs were clear to auscultation. Heart sounds were regular. The abdomen was intermittently rigid with audible bowel sounds. Superficial cutaneous abrasions were noted on the right elbow and bilateral pretibial regions; otherwise, no obvious puncture wounds or entry sites were identified. Neurologic examination was notable for restricted conjugate gaze, risus sardonicus with mild stimulation, and increased spastic tone throughout; there was no clonus. Laboratory data including complete blood count, electrolytes, and urinalysis which were within normal limits; hepatic panel was notable for an aspartate aminotransferase of 202 U/L. Creatine kinase was 5520 U/L.

The patient was admitted to the intensive care unit where observation was required due to the need for sedation and subsequent risk of respiratory compromise and cardiac arrest. He was given human tetanus immune globulin (HTIG) 500 unit dose to neutralize the tetanus toxin. His antibiotic regimen was altered to include metronidazole 500 mg intravenously every six hours given its decreased GABA agonist activity compared to penicillin G. Supportive measures were initiated including diazepam 10 milligrams intravenously every six hours for sedation, seizure prophylaxis, and control of muscle spasms. Propanolol 20 milligrams orally every six hours was given to decrease sympathetic tone. An intravenous fentanyl drip at 100 micrograms per hour was initiated to control pain. Sedation was later achieved with a lorazepam drip at one milligram per hour. Decubitus and aspiration precautions were observed; deep venous thrombosis prophylaxis was with heparin 5,000 units subcutaneously twice daily. Unnecessary stimuli were avoided.

Treatment was largely supportive throughout the remainder of our patient's one month hospitalization. Attention was focused on preventive measures to include control of spasms, autonomic hyperactivity, pain, stimuli, and malnutrition. Opisthotonic posturing was noted with verbal and tactile stimuli and occasionally while the patient slept. Nutrition remained marginal for the first two weeks of the hospitalization despite efforts to provide supplementation, and a percutaneous endoscopic gastrostomy tube was placed by gastroenterology on hospital day number nineteen. The patient's rigidity gradually subsided and sedation was tapered. He recovered completely and was without neurological sequelae. There were no respiratory complications. The patient was discharged on hospital day number thirty with a plan for rehabilitation of deconditioning.

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Discussion

The incidence of tetanus in the United States has declined significantly since 560 cases were reported in the year 1947.³ The reported average of 41 cases annually for the years 1995-1997 was the lowest to date with 0.15 cases per million population.² Immunization remains the key to prevention; few patients with tetanus (13%) have received a primary series of tetanus vaccination and only 33% receive proper wound prophylaxis.² Several factors have been associated with decreased immunity, and despite emphasis on the need for immunization, the risk remains highest in minorities, the elderly (especially women), the poverty-stricken, the uneducated, and those born outside the United States.⁴ This trend has gone unchanged for decades and accounts for higher mortality rates our elderly population.^{2,4,5} In underdeveloped countries the figures remain staggering with 50,000 deaths due to tetanus each year.⁵

Trismus is reported in almost all patients with tetanus.^{5,6} The initial presentation is often accompanied by dysphagia, headache, restlessness, and nuchal rigidity.^{6,7} In the generalized form of tetanus, the condition progresses to spasms with a "sudden burst of tonic contractions of muscle groups causing opisthotonus, flexion, and adduction of the arms with clenching of the fists on the thorax".⁷ Extension of the legs completes this picture of what has been described as the "tetanic seizure".^{7,8} Spasms occur with minimal stimuli and can be quite painful.⁹ All muscle groups can be affected leading to respiratory paralysis, a well-known complication of the disease.^{8,9} Autonomic dysfunction has emerged as the leading cause of death in these patients and is characterized by tachycardia, arrhythmias, excess sweating, and labile hypertension.^{6,10}

The diagnosis of tetanus remains one of clinical suspicion. Laboratory data is often either unreliable or unavailable.^{5,8} Muscular rigidity coupled with sympathetic overactivity distinguishes tetanus from other ailments which it may mimic such as tetany, meningitis, stiff-man syndrome, rabies, hysteria, strychnine poisoning, and dystonic reactions.^{9,11} Patients with a history of injury followed by symptoms and those without clear portal of entry should be considered at risk for tetanus and treated.^{7,11}

Treatment focuses on efforts to neutralize the toxin, debride the wound, and provide supportive care.⁵ HTIG neutralizes the toxin and shortens the course of the disease.^{5,8} Surgical debridement and removal of foreign matter may be required in some cases. Administration of metronidazole has been shown to improve survival, and special attention should be given to airway protection, inhibition of

seizures, and treatment of autonomic dysfunction.⁵ Benzodiazepines are recommended to control spasms, provide sedation, and prevent tetanic seizures; neuromuscular blockade may be considered in severe cases.⁸ Control of autonomic dysfunction can be achieved with beta blockers or morphine; however, beta blockers have been associated with an increased risk of cardiac arrest and should be administered in a monitored setting.^{5,8}

Prevention has gone unchanged for decades and consists of vaccination and wound care.¹² Primary immunization in patients younger than 7 years of age includes injection with diphtheria, tetanus, and pertussis (DTP) vaccine at ages 2, 4, 6 and 15 months with boosters at 4 to 6 years and at 11 to 12 years of age.^{2,5,13} Three injections with tetanus and diphtheria (Td) four weeks apart followed by booster at one year is reserved for those requiring primary immunization at an age greater than seven.^{5,11} All patients should receive Td booster every ten years. Wound prophylaxis is based on the patient's immunization status and classification of the wound as tetanus-prone (greater than six hours old, contaminated, deep and infected) or nontetanus-prone (less than six hours old, clean, superficial, and noninfected).^{2,5,8} Tetanus-prone wounds in patients with uncertain immunization status require primary immunization and HTIG.^{2,10} If immunization can be proven or the wound is clean, no HTIG is required.² If it has been more than ten years since the last booster in a nontetanus-prone wound or more than five years in a tetanus-prone wound, a booster shot should be given, even in those with up-to-date immunization.²

This case illustrates the classic presentation of tetanus. No portal of entry is identified in many patients, and uncertain immunization status cannot be relied upon. Our patient responded well to supportive therapy and had an uncomplicated course. The importance of vaccination cannot be overemphasized. Unfortunately, our knowledge of the fatal nature of tetanus and the methods by which it can be prevented has not aided us in eliminating the disease. Primary care providers must routinely screen their patients for vaccination status, as the prevalence remains high in our elderly and others at increased risk. Indeed, there is no excuse.

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