

Case Report

A Canadian Farmer Had Generalized Tetanus After Undergoing Orthopedic Surgery.

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Abstract

The incidence of tetanus is very low in modern nations. In Alberta, we describe the first tetanus case since 2016. The farmer experienced fevers, shoulder pain, and trismus eight days after orthopedic surgery. Recovery from tetanus immunoglobulin was quick. We draw attention to pathophysiology, epidemiology, risk factors, and diagnostic difficulties.

Keywords : Immunoglobulin, tetanus, trismus, *Clostridium tetani*, and risk factors.

CASE REPORT

A 66-year-old guy with stiff shoulders and sore throat arrived at a rural emergency room in Alberta, Canada. He had an easy total left hip replacement for advanced primary osteoarthritis twelve days prior to presentation. He experienced subjective fevers with chills, a sore throat, and intense night sweats eight days later. The following morning, he began to feel stiff and have painful muscle spasms in his upper extremities, starting in his hands and then spreading to his shoulders, neck, and jaw. The patient was taken to a tertiary care facility after a temperature of 38.1°C was recorded.

The patient's medical history was noteworthy for autoimmune gastritis, gout, hypertension, and gastroesophageal reflux disease. Tramadol was used to treat post-operative pain, nifedipine, telmisartan, sildenafil, pantoprazole, naproxen for gout when necessary, and enoxaparin injections for the prevention of deep vein thrombosis after surgery. Elk, cattle, bison, and seed crops were all under the patient's care on farms. Wearing gloves all the time, he denied any recent injuries. More than 15 years had passed since he last got any vaccines or booster shots. His history of intravenous drug use was disputed. He denied going anywhere recently.

Upon assessment, he had a core temperature of 37.2°C, a heart rate of 78 beats per minute, a respiratory rate of 16 breaths per minute, and a room air oxygen saturation of 94%. He had a left arm blood pressure of 161/79 and a right arm blood

pressure of 138/79. When auscultated, the lungs were clean. Palpation of the anterior cervical chain and submandibular region revealed discomfort, but no lymphadenopathy. Temporomandibular joint pain prevented the patient from opening his jaw completely. A musculoskeletal examination showed a minor bilateral shoulder effusion. Shoulder abduction strength was 2/5 bilaterally (restricted by pain); wrist flexion and extension, biceps, and triceps strength were 4/5 bilaterally. The surgery location on the left hip looked immaculate and showed no signs of infection. No more skin lesions were found during the head-to-toe dermatological examination. There was nothing noteworthy about the rest of the examination.

A white blood cell count of 11,200/mm³ with 84% neutrophils was found in laboratory investigations. Hemoglobin levels were 10.4 g/dL. C-reactive protein was 220.5 mg/L (reference range: <8), ferritin was 522 µg/L (reference range: 15 to 200), and serum sodium was 131 mmol/L. Both the liver panel and creatine kinase were normal. The results of blood cultures were negative. COVID-19, influenza, respiratory syncytial virus, parainfluenza, coronavirus, metapneumovirus, and adenovirus all showed negative results from nucleic acid amplification testing.

Periprosthetic gas was visible in soft tissue on a hip radiograph. An MRI of the C-spine and a CT scan of the soft tissues and neck came out negative for deep space abscess or compression. The arthrocentesis of the left shoulder

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revealed no crystals with unusual chemistry. A CT scan of the chest, abdomen, and pelvis was ordered due to the difference in blood pressure between the arms; the results showed no signs of large vessel vasculitis. Given the recent tramadol prescription, serotonin syndrome was included in the differential diagnosis. However, the patient showed no signs of delirium and had only used tramadol rarely. Although the patient was not disoriented and did not take any questionable medications, neuroleptic malignant syndrome (NMS) was taken into consideration. An uncommon manifestation of acute inflammatory demyelinating polyneuropathy (AIDP) was ruled out by a neurology consultation. Neither polymyalgia rheumatica (PMR) nor dermatomyositis were consistent with the clinical presentation and normal creatine kinase. An infectious disease consultation was necessary because of the indications of tetanus, which included trismus, raised inflammatory markers, fever, and increased muscle tone. The infectious disease team was unable to confirm the mechanism of infection; nonetheless, a working diagnosis of tetanus was supported by the constellation of symptoms, the overdue vaccine, and data that contradicted alternative ideas. Tetanus immune globulin (TIG) was administered when tetanus antitoxin levels were determined. The Public Health department was notified of his presumed case. TIG and oral metronidazole were administered to the patient upon admission. A CT scan of his left hip to check for tissue necrosis or a deep-seated infection revealed nothing unusual. Under close observation, the patient had a low threshold for ICU admission and was given benzodiazepines when necessary to treat spasms. After 3000 IU of TIG was administered, the patient's condition significantly improved. When his neck and shoulders were palpated, he denied any pain. Both upper extremity strength (5/5) and neck and extremity tone recovered to normal. 6000 units of intramuscular TIG had been administered to the patient by the third day after admission. He felt a quick and thorough reaction. Unfortunately, tetanus antitoxin was extracted after the first dose was administered; yet, despite TIG treatment, titers showed a poor level of immunity (0.360 IU/mL, reference range, 0.1 to 0.5). Before being released, he was vaccinated against Tdap. Although aspiration failed, a left hip ultrasound was performed because his prosthetic joint was thought to be a possible source of infection. Due to the possibility that the tetanus was caused by a hardware infection, the patient was sent home on a six-week course of oral metronidazole. When his infectious disease doctor saw him six months later, he was still doing well.

DISCUSSION

We report the province of Alberta's first tetanus case since 2016 [1], which is a sickness that requires notification.

Agricultural exposure, a recent invasive treatment, and the lack of a booster immunization were known risk factors for the patient. The results of a complete dermatological examination showed no signs of a cultureable wound. The therapeutic trial, which involved a significant and comprehensive response to tetanus immunoglobulin, strengthened the clinical diagnosis. Convulsive muscular spasms and widespread stiffness are hallmarks of tetanus, an acute neurologic illness [2]. The bacterium *Clostridium tetani* produces the exotoxin tetanospasmin, which is the cause of it. Spore-forming and anaerobic, *C. tetani* is found on the skin of adults in agricultural environments and its spores are widely dispersed in soil and the intestines of both farm and domesticated animals [3]. Tetani exposure frequently happens as a result of a contaminated instrument cutting or puncturing a wound, which introduces endospores into an environment with low oxygen levels [4]. After internalizing at the presynaptic membranes of motor neurons, tetanus toxin is transported retrogradely to the central nervous system, where it selectively inhibits the release of glycine and GABA from inhibitory neurons. This results in the usual tetanus symptoms and uncontrollably firing motor neurons. Although it might vary from one day to several months, the typical incubation period is eight days [5].

Approximately 80% of tetanus cases [6,7] are generalized tetanus. The initial symptom is frequently painful trismus, or "lockjaw," and it usually progresses in a descending pattern with inflexible pectoral, abdominal, and leg muscles, odynophagia, and stiff neck. Opisthotonos and "risus sardonicus," a frozen smile with raised eyebrows due to facial muscular tension, are examples of historical descriptions [8]. In addition, patients exhibit episodes of tachycardia, fever, and elevated blood pressure [2]. Muscle spasms are common.

Tetanus complications include autonomic instability that can result in arrhythmias, fractures from prolonged contractions, and laryngospasms that can impede breathing [2]. Eleven percent of tetanus cases are deadly, despite current treatment. Even though there is no visible disease in 20% of tetanus deaths, aspiration pneumonia is frequently discovered during autopsy.

Since only 30% of tetanus cases can be isolated from a wound, the diagnosis is solely clinical [2,6]. Tetanospasmin can now be tested using PCR, although this method is expensive and not widely available [9].

Global vaccination campaigns are to blame for the decrease in tetanus incidence and mortality. Tetanus toxoid-containing vaccinations (TTCV) are commonly given during prenatal care and are part of standard immunization regimens around the world [3]. It is advised that adults and adolescents get a tetanus vaccine every ten years [10].

In industrialized nations, tetanus is uncommon. According to

Canadian data from 1920–1940, tetanus causes 26–55 deaths each year [10]. Morbidity and mortality sharply decreased as a result of TTCV initiatives, which were first implemented in the 19400s. There have only been six fatalities since 2000, with an average of three instances recorded per year between 2000 and 2013. In Alberta, where there are more than 3 million people, this event represents the ninth documented occurrence since 2000 [1]. Around 50,000 deaths worldwide are attributed to tetanus each year, with agricultural areas in developing nations having the highest incidence due to increased contact with animal excrement and insufficient immunization [8]. Neonatal tetanus is the most common cause of tetanus in rural regions of tropical countries in Asia, Africa, and South America, where tetanus fatality rates can surpass 50%.

Since tetanus is rarely encountered in developed nations because of the effectiveness of immunization efforts, this case poses a challenge to doctors. A clinical diagnosis of tetanus in our patient necessitated a quick response to a therapeutic treatment, thorough exclusion of rheumatologic, neurologic, and other infectious disease symptoms, and suspicion based on demographic and historical risk factors. His recent total left hip replacement may have contributed to the infection, albeit the exact mechanism was unknown. The traditional eight-day incubation time is appropriate, even though this is regarded as a clean surgery. Although there is little recent research on tetanus after prosthetic material implantation, there have been reports of post-operative tetanus after orthopaedic [11] and gastrointestinal surgery using prosthetics [12,13]. Unsterile enoxaparin injections and prior puncture wounds that had healed at presentation are other possible causes. Despite being extremely uncommon in Canada, tetanus is a treatable and potentially fatal illness. In order to identify its unusual symptoms, practitioners need to be aware of the risk factors for tetanus. Notably, routine vaccinations and primary care are sometimes inaccessible to older persons living in rural locations. Low immunity and agricultural exposure are characteristics of tetanus infection in this group. We must keep up the global endeavor to use immunization to lower the burden and death of tetanus, even beyond diagnostic suspicion.

CONCLUSIONS

In developed countries, tetanus is an uncommon disease entity. However, because of the high death rate linked to this illness, physicians must be aware of common risk factors and clinical characteristics in order to start treatment on time. In our clinical scenario, a patient who had recently undergone invasive surgery, had been exposed to agriculture, and had not received a tetanus booster shot showed signs of trismus, stiffness, and increasing muscle spasms. To rule out other possible diagnosis, a thorough assessment involving experts

in rheumatology, neurology, and infectious diseases was carried out. In the end, a prompt and thorough clinical response to a therapeutic treatment trial verified the clinical diagnosis of tetanus.

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