

Tetanus in Bahrain: Case Report, Epidemiology and Literature Review

Safaa Alkhawaja^{1*}, Rawan Al Agha¹ and Jaleela Sayed Jawad²

¹Infection Disease Unit, Department of Internal Medicine, Salmaneya Medical Center, Ministry of Health, Kingdom of Bahrain

²Head of Immunization Group, Public Health Directorate, Ministry of Health, Kingdom of Bahrain

*Corresponding author: Safaa Alkhawaja, Infection Disease Unit, Department of Internal Medicine, Salmaneya Medical Center, Ministry of Health, Kingdom of Bahrain, Tel: +9733 9733 356; E-mail: skhawaja@health.gov.bh

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Abstract

Objective: To describe a rare case with generalized tetanus to reinforce the relevance of early detection and management.

Case report: A 38 year old Pakistani man presented with neck stiffness to the emergency room 12 d after he had trivial nail injury to his foot for which he didn't need to seek any medical advice. Tetanus was diagnosed based on clinical symptoms and history. The management consist of antibiotics therapy with penicillin-metronidazole, tetanus toxoid and tetanus immunoglobulin with other supportive measure in the ICU. The patient had full recovery after 6 w stay in ICU followed by intensive physiotherapy and rehabilitation. Tetanus is a forgotten disease in the Kingdom of Bahrain and many practicing physicians have not seen a case of the disease in their career.

Keywords: Bahrain; *Clostridium tetani*; Immunization; Tetanus

Introduction

Tetanus is a potentially lethal disease due to the effect of neurotropic exotoxin produced *Clostridium tetani*, which is gram-positive, spore forming non-encapsulated bacillus that is present naturally in the soil and wider environment throughout the world, it can penetrates into the human body through soil contaminated wound or bite, once in a suitable anaerobic environment such as a contaminated wound, the spores are able to germinate and the bacteria multiply at the wound site and release tetanus toxin that diffuses into the body.

Due to the continued presence of *Clostridium tetani* spores in the environment, and given that herd immunity plays no part in tetanus prevention; complete eradication of tetanus is unlikely and cases will continue to occur and the best preventive strategy is through immunization and proper treatment of wounds and traumatic injuries.

Tetanus is classified into four symptomatic types: neonatal, generalized, which represents the most frequent form (more than 80%), local and cephalic [1]. The diagnosis is essentially clinical while the treatment needs to be considered a matter of emergency and lifesaving. Although the organism is widely distributed throughout the world, this disease disproportionately affects developing countries [2] due to insufficient immunization coverage.

In developed countries effective immunization program that has been implemented during the second half of the 20th century have significantly reduced the incidence of tetanus to sporadic cases only [3].

United States Centers for Disease Control and Prevention (CDC) reported that their annual incidence is 0.1 cases/million population overall [4,5].

Other developed countries like England and Wales also has low annual incidence of 0.2 cases/million population, with the highest incidence in patients above the age of 64 years [6].

On the contrary, tetanus remains endemic in developing world, and its incidence often increases following natural disasters such as earthquakes and tsunamis, approximately one million cases of tetanus are estimated to occur worldwide each year, with 300,000 to 500,000 deaths [7]. Among patients admitted for neurologic conditions to one hospital in Nigeria, tetanus was the second most common cause (14%) after stroke [8].

Case-fatality rates in developing countries remain high and have not changed significantly in the past several decades. The pooled fatality rate of 3043 adult African patients reported in 27 studies was 43 percent [9].

The rarity and unfamiliarity surrounding tetanus among practitioners in developed countries strengthens the necessity of reporting this case to highlights its clinical presentation and risk factors which are important for early diagnosis and appropriate treatment.

The Case

A 37 year old Pakistani gentleman, who works in Bahrain as a laborer, presented to the Accident and Emergency Department with complain of neck stiffness of one day duration. He gave history of left big toe injury around twelve days before presenting to the hospital. He did not seek any medical care at the time of inciting injury. The patient was healthy and not known case of any medical illness and not using any kind of medication. The vaccination history regarding tetanus was not clear. On examination, he was looking comfortable with normal vitals. He had moderate spasm of the neck muscle and was unable to open his mouth fully, otherwise all other physical examination was normal and the wound on the left big toe was healthy with very minimal indurations but with no signs of cellulitis. His initial labs

showed high white cell count (16,000) with bands of 4% and a mild elevation of CK of 599 U/L. The diagnosis of tetanus was a challenge in this case since there was no apparent dirty wound as a port of entry for the organism, and the only clue was history of trivial foot injury by nail 12 d prior to his neck stiffness and lack of complete tetanus immunization. He was admitted with clinical suspicion of tetanus and managed accordingly. The case was given intramuscular injection of tetanus toxoid and tetanus immunoglobulin 3000 units and was started on penicillin G (3 million units, IV Q4 h) and metronidazole (500 mg IV Q8 h) planned for a total of 10 d. The patient was evaluated by the surgical team for exploration of the wound site under local anesthesia with removal of minimal devitalized tissue and to ensure the absence of foreign bodies.

The patient then was transferred to the ICU where he was electively intubated due to the high risk of airway compromise and laryngeal spasm, he was sedated with morphine 6 mg/h and midazolam infusion 3 mg/h, with oral baclofen 15 mg Q 8 h to control the muscle spasticity. During ICU stay, the patient developed nosocomial infections, initially he had VAP with pseudomonas for which he was treated appropriately with antibiotics, and then he had candidemia secondary to the central line which was managed with line removal and antifungal therapy. After 3 w of ICU stay, tracheotomy was created, then from the 5th w of ICU stay he was weaned gradually from the mechanical ventilator successfully concomitant with tapering of sedatives with good tolerance. After 45 d in the ICU, the patient was shifted to the medical ward where he stayed for ten more days supported by intensive physiotherapy and rehabilitation. The tracheostomy was closed and he was given the second dose of the tetanus toxoid (6 w from the first dose). Thereafter, patient was discharged home almost fully self-dependent and planned to continue with physiotherapy and to receive the third dose of the tetanus toxoid on schedule after 6 months.

Discussion

Tetanus has become a rare disease in the Kingdom of Bahrain, yet it remains a potential fatal condition without prompt and aggressive early management and this case is worth reporting as it highlights the importance of early suspension of the disease. In Bahrain, tetanus is considered eliminated after the implementation of vaccination programs and aggressive management of any risky wound. No single case of tetanus has been reported among Bahrainis since 1985 [10]. Tetanus vaccine introduced as part of childhood DPT vaccination in 1957 and expanded to pregnant women as tetanus toxoid in 1970. During 1995 Td vaccination booster for students at age of 13 years was started. The vaccine also is given for injured and adult or elderly without documented history of vaccination. High routine immunization coverage is sustained in Kingdom of Bahrain [11].

However, foreign laborer are considered as high risk group for developing tetanus due to their inadequate immunization and repeated exposure to tetanus-prone wounds, since 1985; there was one single reported case of tetanus in Bahrain in 2013 among expatriate worker [12] and here we are reporting the second case of tetanus of 38 years old Pakistani man who presented to the emergency department with neck stiffness.

The differential diagnosis of early tetanus is wide, hence the importance of keeping an open mind when facing patients in our increasingly globalized world and the importance of taking thorough history to get any valuable clues including history of country of origin, occupation, immunization and trauma.

The disease is usually diagnosed by high clinical suspicion, the clinician should be alert to any high risk patient presenting with hypertonia and muscle spasm the diagnosis of tetanus is mainly clinical. The wound cultures are often negative with a yield of *Clostridium tetani* only 30% of the time. The muscular rigidity usually first involves the masticatory muscles with subsequent lock-jaw, then the disease usually diffuses with a descending pattern with systemic muscular involvement [13].

Potential life-threatening complications of tetanus include pneumonia (30%) due to aspiration and laryngospasm, rhabdomyolysis (13%), upper gastrointestinal bleeding (9%), and cardiovascular instability (9%) (Transient cardiac arrest, tachy/bradycardia, arrhythmias and hypertension) due to stimulation of the autonomic nervous system. Acute renal failure (4%) and secondary wound infection (4%) are other reported complications; mortality usually results from respiratory failure, cardiovascular collapse, or associated autonomic dysfunctions [14-16].

Treatment start with halting toxin production through wound debridement to eradicate spores and necrotic tissue and appropriate antimicrobial therapy (penicillin and metronidazole). Neutralization of unbound toxin through the use of Human Tetanus Immune Globulin (HTIG) is important and in countries in which HTIG is not readily available, the use of pooled Intravenous Immune Globulin (IVIG) has been proposed as a possible alternative [17].

Generalized muscle spasms are life threatening since they can cause respiratory failure. Attention to placement of the patient and control of light or noise in the room in an effort to avoid provoking muscle spasms is an important component of care for patients with tetanus; using benzodiazepines are generally effective in controlling the rigidity and spasms associated with tetanus.

Baclofen, which stimulates postsynaptic GABA beta receptors, has been used in a few small studies to control spasticity [18-20]. Management of autonomic dysfunction treatment with magnesium sulfate has been studied in a randomized clinical trial in tetanus [21-23] because of its use in clinical series for the management of autonomic dysfunction and as adjunctive treatment for controlling spasms [24-26].

Morphine sulfate is also commonly used to control autonomic dysfunction as well as to induce sedation.

Since tetanus toxin cannot be displaced from the nervous system once bound to neurons, supportive care is the main treatment for tetanus. In patients with severe tetanus, prolonged immobility in the intensive care unit is common, much of which is on mechanical ventilation and may last for weeks. Such patients are predisposed to nosocomial infections, decubitus ulcers, tracheal stenosis, gastrointestinal hemorrhage, and thromboembolic disease. Case-fatality rates for non-neonatal tetanus in developing countries range from 8 to 50%, whereas the majority of patients with tetanus recover when modern supportive care is available.

Since tetanus does not confer immunity following recovery from acute illness, all patients with tetanus should receive vaccination with age appropriate tetanus containing vaccines. Number of doses required depends on previous vaccination history, accordingly completion of tetanus vaccination is recommended as soon as possible to provide longer lasting immunity [27].

Tetanus elimination requires effective national immunization coverage with establishment and implementation of post exposure

protocols for traumatic wounds, vigorous asepsis in medical and surgical care, as well as population education and sensitization on risky ritual practices with early hospital referral for a life-saving purpose.

Clinical Message

This case report signifies the existence of a rare infectious disease (tetanus) and emphasizes the importance of early recognition and prompt management to prevent life-threatening complications, particularly in countries with high vaccine coverage and low disease incidence where the diagnosis might be challenging!

In addition, particular attention to tetanus prophylaxis for populations at high risk such as foreign workforce without documented or uncertain vaccination status [11]. It would also be prudent to concentrate on medical education to emphasize the role of tetanus immunization, concentrating on the high risk group of foreign laborers to be prioritized and targeted in such programs, as this group are especially vulnerable, because of their incomplete immunization and high risk of infected injuries. This might raise a question of whether a tetanus vaccination booster should be ensured to expatriates with high risk jobs such as laborers based on their occupational hazards to prevent even a minimum unexpected risk of infection.

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