

Diagnosis and management of tetanus outside the intensive care unit: a case report

T E Bravo^{1*}, M L Siregar² and K F Jamil²

¹Department of Internal Medicine, Medical Faculty of Syiah Kuala University, dr. Zainoel Abidin Hospital, Banda Aceh 23126, Indonesia

²Division of Tropical and Infectious Diseases, Department of Internal Medicine, Medical Faculty of Syiah Kuala University, dr. Zainoel Abidin Hospital, Banda Aceh 23126, Indonesia

*Corresponding author: eb_teuku@yahoo.com

Abstract. Tetanus is an acute, toxin-mediated disease caused by *Clostridium tetani* infection. Under favorable anaerobic conditions, such as in the unclean environment, necrotic wounds, this ubiquitous bacillus may produce tetanospasmin, an extremely potent neurotoxin. A 38-year-old man was admitted to an emergency room, at Zainoel Abidin General Hospital, with the main complaint of back-muscle stiffness. Based on physical examination, he was fully alert with a slightly rapid breathing, trismus with the maximum oral cavity opening was only about one finger width, but risus sardonicus was not evident. Ten days before admission, while gardening, his left foot accidentally stabbed by wooden tree stake. We immediately started a single dose of tetanus immunoglobulin followed by intravenous metronidazole, penicillin G, and intravenous diazepam. Tetanus diagnosed by physical clinical finding. The management of tetanus patients including the use of immunoglobulin and antibiotic therapy, analgesia, sedation and neuromuscular blockade management and mechanical ventilation, the care was delivered outside the Intensive care unit.

1. Introduction

Tetanus is an acute, toxin-mediated disease caused by *Clostridium tetani* (*C. tetani*) infection. Under favorable anaerobic conditions, such as in the unclean environment, necrotic wounds, this ubiquitous bacillus may produce tetanospasmin, an extremely potent neurotoxin.[1]

In 1890, the poison was found as strychnine, then known as tetanospasmin, isolated from soil containing anaerobic bacteria. According to World Health Organization (WHO) in 2003, about 9600 cases of tetanus reported, 31 countries have achieved the status of elimination of tetanus.[2]

There are more than 800,000 deaths due to tetanus each year in the world. The incidence of tetanus is between 500,000 to one million cases per year worldwide. The majority of cases of tetanus occur in developing countries, happened in older adults. Reliable epidemiological data of tetanus incidence in Indonesia is lacking.[3]

Tetanus toxin blocks inhibitory neurotransmitters in the central nervous system, resulting in muscular stiffness and spasms that are typical of tetanus. No natural immunity developed after tetanus infection; protection can be provided by active immunization.[1]



The severity of tetanus depends on the distribution of muscle spasms, with a local case involving a part of muscle groups and the general with the entire skeletal muscle. The management of tetanus patients conducted in the intensive care unit (ICU), including the use of immunoglobulin and antibiotic therapy, analgesia, sedation and neuromuscular blockade, and mechanical ventilation and physiotherapy problems in patients with tetanus.[4]

2. Case

A 38-year-old man was admitted to our emergency room, at Zainoel Abidin General Hospital (RSUZA), with the main complaint of back-muscle stiffness from the previous 8 hours. Starting from 2 days earlier, he had experienced jaw stiffness and subsequent difficulty to open his mouth fully. He did not report any generalized seizure.

The vital sign was stable. On physical examination, he was fully alert with a slightly rapid breathing a trismus was apparent, with the maximum oral cavity opening was only about one finger width, but 'risus sardonius' was not evident. Occasional opisthotonus was elicited, probably, by some possible external triggers (light, touch or noise). The time interval between each seizure episode was short progressively. Laboratory findings showed normal range. Ten days before admission, while gardening, he had his left foot accidentally stabbed with wooden tree stake. He had then gone to the nearest health facility where an official midwife had applied an antiseptic on his wound. He had been sent home with oral antibiotics and analgesic.

Grade 2 tetanus (moderate tetanus) was established based on history, physical examination and laboratory findings. We immediately started a single dose of 500 IU TIG followed by intravenous 500 mg metronidazole every 6 hours, 3.000.000 IU penicillin G every 12 hours and regular intravenous diazepam. After re-incision (employing standard cross incision technique) and a wound toilet was performed on his pedal stab wound, we sent him to an isolated room in a non-intensive ward. The ICU beds had been fully occupied at the time. Enteral and parenteral nutrition was administered through the nasogastric tube.

Twice to three times a day episodes of seizure was observed on day 2nd until 10th. Before, during and after each seizure episode, which mostly lasted for 2-4 minutes, he remained awake and fully alert. Other symptoms included moderate trismus and mild dysphagia. Average respiratory and heart rate observed during those days, when not currently in seizure episode, were 24 breaths per minute and 78 beats per minute respectively.

The apparent clinical improvement was observed starting on day 14th by the complete absence of seizure episode. Other symptoms, including jaw stiffness and dysphagia, was gradually diminished and completely disappeared on day 19th. He was eventually discharged that day and was asked to visit our outpatient clinic on regular basis start from the upcoming seven days.

3. Discussion

In generalized tetanus (the most common form), stiffness and pain often begin in the jaw muscles (trismus or "lock jaw"). Spasms are triggered by sensory stimuli. As the disease progresses, muscle groups throughout the body are affected, and spontaneous generalized seizure-like tetanospasmin develop. Death is usually due to respiratory failure. Autonomic dysfunction, including hypertension and tachycardia alternating with bradycardia and hypotension, can be present in more severe tetanus cases and associated with a poorer prognosis[1].

Tetanus diagnosis is based on the clinical ground. Laboratory examination does not help much.[1] Blood and cerebrospinal fluid examination are usually normal. *C. tetani* culture of the wound is very difficult (only 30% positive), and positive culture results support the diagnosis, not confirmed.[4] There are several grading systems, the scale proposed by Ablett is the most widely used (table 1). This categorizes patients into four grades depending upon the intensity of spasm respiratory and autonomic involvement.[5]

Table 1. Ablett classification of tetanus severity[5].

Grade 1	Mild trismus, general spasticity, no respiratory compromise, no spasms, no dysphagia
----------------	--

(mild)	
Grade 2	Moderate trismus, rigidity, short spasms, mild dysphagia, moderate respiratory involvement, ventilatory frequency >30
(moderate)	
Grade 3	Severe trismus, generalized rigidity, prolonged spasms, severe dysphagia, apnoeic spells, pulse >120, ventilatory frequency >40
(severe)	
Grade 4	Grade 3 with severe autonomic instability
(very severe)	

Antitoxin should be given to neutralize toxins that have not bonded. After the initial evaluation, human tetanus immunoglobulin (HTIG) as soon as possible given or anti tetanus serum (ATS). HTIG injected intramuscularly with a total dose of 500 IU to 5000 IU single dose or 20,000-30,000 IU ATS. To prevent production of toxin, antibiotics are recommended. Penicillin is the standard therapy for tetanus in most countries. Its dose is 100,000-200,000 IU/kg/day intramuscularly or intravenously for 7 to 10 days, given in 2-4 divided doses. The 'routine' practice in treating patients with tetanus includes heavy sedation and paralysis with neuromuscular blockade by muscle relaxants supported by artificial ventilation. Sedatives used vary from benzodiazepines such as midazolam and diazepam to anesthetic agents such as propofol.[6]

4. Conclusion

Reported a case of 38-year-old man with grade 2 tetanus that diagnosed by physical clinical finding. Immediately started a single dose of tetanus immunoglobulin followed by intravenous metronidazole, penicillin G and intravenous diazepam, the treatment was successful despite the care was delivered outside the ICU.

References

- [1] World Health Organization 2010 WHO Technical Note: *Current recommendations for treatment of tetanus during humanitarian emergencies*
- [2] Hassel B 2013 Tetanus: pathophysiology, treatment, and the possibility of using botulinum toxin against tetanus-induced rigidity and spasms *Toxins* **5** 73-83
- [3] Ismanoe G 2014 Tetanus *Buku ajar ilmu penyakit dalam edisi VI* pp 639-42
- [4] Lisboa T, Ho Y L, Henriques Filho G T, Brauner J S, Valiatti J L, Verdeal J C and Machado F R 2011 Guideline for the management of accidental tetanus in adult patients *Rev. Bras. Ter.* **23(4)** 394-409
- [5] Taylor A M 2006 Tetanus-continuing education in anesthesia *Crit. Care Pain* **3**
- [6] Rodrigo C, Fernando D and Rajapakse S 2014 Pharmacological management of tetanus: an evidence-based review *Crit. Care* 1-10
- [7] Chun P, Ying-Zi H, Yi Y and Hai-Bo Q 2009 Titration of high dose sedation is effective in severe tetanus: a case report *Cases J.* **2** 6865
- [8] Firth P G, Solomon J B, Roberts L L and Gleeson T D 2011 Airway management of tetanus after the Haitian earthquake: new aspects of old observations *Anesth. Analg.* **113** 545-7
- [9] Petitjeans F, Turc J, Coulet O, Puidupin M, Eve O and Benois A 2009 The use of boluses of propofol for the management of severe tetanus in a child *Trop. Doct.* **39** 52-3