

Clinical Profile, Management and Outcome in Paediatric Patients with Tetanus: A Case Series

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ABSTRACT

Tetanus is an acute infectious disease, caused by spores of the bacterium *Clostridium tetani*. The spores are found everywhere in the environment, particularly in soil, ash, intestinal tracts/faeces of animals and humans, on the surfaces of skin and rusty tools like nails, needles, barbed wires, etc. Being very resistant to heat and most antiseptics, the spores can survive for years. Anyone can get tetanus, but the disease is particularly common and serious in new born babies and pregnant women, who have not been sufficiently immunised with Tetanus Toxoid (TT) containing vaccines. The disease remains an important public health problem in many parts of the world, but especially in low income countries or districts, where immunisation coverage is low and unclean birth practices are common. There are no particular diagnostic tests for tetanus, the diagnosis is made clinically. Hence, early identification of cases of tetanus becomes important for early intervention. Herein, the authors reported four cases (1 male and 3 females) of tetanus, with varied clinical manifestations, management and outcome. The patients were diagnosed with severe generalised tetanus, otogenic tetanus, mild generalised tetanus and severe generalised tetanus respectively. The patients were treated with inj. diazepam, inj. tetanus toxoid, inj. methocarbamol. Two of them recovered completely and two could not be revived.

Keywords: *Clostridium tetani*, Tetanus, Vaccination

INTRODUCTION

Tetanus is an acute endemic infection, caused by *clostridium tetani* gram positive anaerobic spore forming bacteria. Tetanospasmin is an exotoxin produced by *clostridium tetani* is responsible for the clinical presentation of tetanus by blocking the release of the inhibitory neurotransmitters, Glycine and Gamma Aminobutyric Acid (GABA) thus, producing rigidity. The loss of inhibition of the preganglionic sympathetic neurons, may produce a sympathetic hyperactivity and high circulating levels of catecholamines [1]. The muscle tone is increased, thus, producing the characteristic trismus, risus sardonicus and the opisthotonos. Tetanus is a non communicable disease and it is not transmitted from person to person. According to World Health Organization (WHO), tetanus can be classified as neonatal and non neonatal tetanus. Any person older than 28 days with acute onset of atleast one of the following-trismus, risus sardonicus, generalised muscle spasm, generalised, localised, cephalic [2]; mild, moderate, severe, according to Ablett Classification [3]. Globally, since, 2010 vaccination coverage with three doses of Diphtheria, Tetanus and Pertussis (DTaP) 3 and one dose of measles vaccine has stalled around 86%. To protect against outbreak of vaccine preventable disease atleast 90% coverage needed [4]. In India, like in most of the developing countries in the world, tetanus is endemic and it remains a public health problem even today [5].

Case 1

An eight-year-old female patient, presented to the Department of Paediatrics, with the chief complaint of difficulty in opening mouth since five days, increased perspiration and tightening of limbs for four days. There was a history of injury by lodgement of a wooden piece over great toe of right foot, nine days ago. The patient had multiple spasms on slightest stimulation in the form of sound, light and touch. The patient was completely unvaccinated. Neither any prior treatment nor inj. TT was taken. The diagnosis of tetanus was clinically made. Inj. diazepam (20 mg/kg/day), Inj. lorazepam, Inj. magnesium sulphate, tetanus IG 2500 IU IM and Inj. tetanus toxoid were administered. Inj. methocarbamol (100 mg/kg/day),

Inj. acetaminophen, Inj. phenobarbitone were started. The dose of Inj. diazepam was increased up to 40 mg/kg/day as the spasms became more frequent. Final diagnosis of severe generalised tetanus was made. On 4th day of admission, the patient was not maintaining vitals stability and was intubated and put on ventilatory support. The patient went into cardiorespiratory arrest on 5th day of admission and could not be revived.

Case 2

A three-year-old male patient, presented to the Department of Paediatrics, with the chief complaint of inability to open mouth since six days, stiffening of limbs for four days, grinning of face, running fever of 101°F with excessive perspiration. The patient had history of bilateral ear discharge which started 10 days ago and lasted for three days, because of Chronic Suppurative Otitis Media (CSOM). The patient was completely unvaccinated. Tetanus Toxoid was not taken. Later on, the patient developed spasm. Inj. metronidazole, Inj. diazepam (20 mg/kg/day), inj. lorazepam (0.1 mg/kg/dose), inj. methocarbamol were started. Inj. Tetanus Immune Globulin (TIG) (3000 IU) and tetanus toxoid were given. Inj. diazepam drip was increased to 35 mg/kg/day on next day of admission as the spasms increased. After a week of admission, the patient started improving and was shifted to oral diazepam via Ryle's tube feeding. Hypertonia improved and the patient started ambulating by 9th day of admission. The patient was diagnosed as otogenic tetanus and discharged after catch-up vaccination on oral diazepam. The patient then regularly came for follow-up and oral diazepam tapered by 5 mg/kg/day on every weekly visit and stopped at 5 mg/kg/day and was stopped after three weeks.

Case 3

A seven-year-old completely unimmunised female patient, presented to the Department of Paediatrics, with the chief complaint of difficulty in opening mouth since one day followed by difficulty in walking since morning. The patient could take liquids orally but, could not take solid meal since one day. The patient was vitally stable without any signs of respiratory distress. She got injured (right great

toe) while playing barefoot three days ago. TT was not taken. The patient was admitted to Paediatric ICU under the clinical diagnosis of mild tetanus as per Ablett classification. Inj. diazepam (15 mg/kg/day), Inj. methocarbamol (100 mg/kg/day), Inj. ceftriaxone, Inj. metronidazole and Ryle's tube feeding, Inj. tetanus Igantet (IG) 250 IU and Inj. TT started on admission. Inj. diazepam was increased to 20 mg/kg/day as the patient developed spasm on 2nd day of admission. The patient showed signs of recovery and inj. diazepam tapered and stopped on 5th day of recovery. Sips of water were allowed orally and patient was later shifted to semisolid food. The patient was shifted to general ward and discharged on 9th day with the diagnosis of mild generalised tetanus. The patient came for follow-up after five days, she was on complete oral diet. Catch-up vaccination was done on 2nd visit after discharge.

Case 4

An eight-year-old female patient, presented to the Department of Paediatrics, with the chief complaint of fever since five days, difficulty in swallowing and stiffening of limbs for three days. The patient had multiple spasm since last one day. The patient had a history of injury over the heel of left foot, five days ago [Table/Fig-1]. Tetanus toxoid was not taken at the time of trauma. Inj. diazepam (20 mg/kg/day), inj. ceftriaxone, inj. metronidazole, inj. acetaminophen, inj. tetanus human IG (1500 IU) and inj. TT were given. On 2nd day of admission, frequency of spasm increased and dose of diazepam drip was increased upto 55 mg/kg/day. The patient was discharged against medical advice on 4th day of admission and died on the next day. The case was notified as very severe generalised tetanus and could not be revived.



[Table/Fig-1]: Wound on the heel.

The vaccination status, clinical profile, treatment and outcome all the four cases is presented in [Table/Fig-2].

Clinical presentation	Case 1	Case 2	Case 3	Case 4
Residence	Rural	Rural	Rural	Rural
Immunisation status	Completely unimmunised	Completely unimmunised	Completely unimmunised	Completely unimmunised
Predisposing factors	Penetrating wound	Bilateral ear discharge	Penetrating wound	Penetrating wound
Incubation period	5 days	6 days	3 days	5 days
Time for onset of spasm after first symptoms	4 days	5 days	3 days	3 days
Clinical manifestations	Trismus hypertonia short spasms fever dysphagia	Trismus hypertonia short spasms fever dysphagia	Hypertonia dysphagia	Trismus hypertonia prolonged spasms fever dysphagia
Complications	Autoimmune instability hypertension oliguria acute kidney injury	Sepsis	Sepsis	Autoimmune instability hypertension laryngospasm

Severity according to Ablett classification	Severe	Moderate	Mild	Very severe
Tetanus toxoid administration at time of injury	Not given	Not given	Not given	Not given
Tetanus immune globulin	Given	Given	Given	Given
Outcome	Died after 5 days	Recovered	Recovered	Died after 5 days

[Table/Fig-2]: The epidemiology, vaccination status, portal of entry, clinical features, complications and outcome of all the cases.

DISCUSSION

Tetanus has remained public health problem in developing countries [6]. It reflects the immunisation status, knowledge of the people about wound care, active and passive immunisation. Tetanus is still prevalent in developing countries, with high morbidity and mortality, despite the availability of tetanus vaccine [7]. Three out of four patients were females against male preponderance seen in other studies [8-10]. A study conducted by Reddy P et al., where, the subjects were completely unvaccinated reflecting the low vaccine coverage of the immunisation programme. Diphtheria Pertussis Tetanus (DPT)-3 vaccine coverage in India, in the year 2010 was 50%-79% [11]. As per National Family Health Survey (NFHS-4) 2015-2016. In India, the national average for full immunisation is 62%, DPT-3 coverage-78.4% [12]. Although, TT vaccine is offered at no cost to women, it is one of the least utilised vaccines in developing countries [13].

The most common mode of infection was post injury tetanus (75%), followed by otogenic tetanus. Most of the injuries occurred on the lower limb, which was in accordance with the findings of other studies [14-17]. The incidence of otogenic tetanus can be attributed to chronic suppurative otitis media, practice of local instillation of oil in the ear, introduction of unclean fingers or contaminated objects in the ear. The incidence of otogenic tetanus in a study by Adekanle O, and Mondal T, et al., is comparable to another study conducted in Nigeria (10.8%) and less compared to another study in India (55%) [17, 18]. Most common presenting features in a study by Sandford JP, were dysphagia, trismus, hypertonia, similar to many other studies [19-22]. These clinical manifestations should raise suspicion as diagnosis of tetanus is made clinically and laboratory investigation and culture have little diagnostic importance [23]. Complications like autoimmune instability, hypertension, sepsis, oliguria, acute kidney injury, lower respiratory tract infection and laryngospasm were seen. Complications seen in other studies include Gastrointestinal (GI) bleeding, hypoxaemia, vertebral fractures and decubitus ulcers [24]. One of four patients developed respiratory failure and required mechanical ventilation against 57% patients requiring ventilatory support in a study in Taiwan [25].

Two of four patients died in the present case series. This mortality rate is high as compared to other studies with mortality varied from 10% to 39% [17,18,24,26]. Late referral and development of complications at the time of presentation increased the mortality. Two of four patients recovered and were discharged after administration of tetanus vaccine.

CONCLUSION(S)

The present case series concludes that tetanus, though, with vaccine is preventable, but still exists. The most common portal of entry was a traumatic wound. Benzodiazepines were the drug of choice to control spasms. Magnesium sulphate was used for autonomic dysfunction and also, to decrease spasms. None of the patients were vaccinated since birth,

according to universal immunisation programme. It is necessary to improve the coverage of three doses of DPT vaccine and two doses of Tetanus and Diphtheria (Td) vaccine to counter the waning immunity in older children. Knowledge, attitude and practice of tetanus vaccination is of prime importance amongst healthcare workers.

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