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TETANUS - A RUSTED NAIL INJURY :REPORT OF A CASE AND REVIEW

General Medicine

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ABSTRACT

Tetanus is rare diagnosis in the post vaccination era ,although it continues to have significant morbidity and mortality worldwide. High risk population groups carpenters, mechanics, laborer's and soldiers with unknown history of tetanus vaccination. This is a report of a 40 year male, laborer by occupation with an incomplete immunization history who presented to the emergency department with classical triad of trismus, risus sardonicus and opisthotonos and was diagnosed as tetanus. This report highlights the importance of prompt diagnosis, treatment, and prevention of tetanus. It also points out the importance of booster vaccination, as tetanus still remains an important cause of morbidity and mortality in the post vaccination era.

KEYWORDS

Tetanus, Post Vaccination Era, Booster Dose

INTRODUCTION

Tetanus is a nervous system disorder characterized by muscle spasms that is caused by the toxin-producing anaerobe *Clostridium tetani*, which is found in the soil. The clinical features of tetanus and its relationship to traumatic injuries were well known among the ancient Greeks and Egyptians and to many clinicians before the introduction of vaccination with tetanus toxoid in the 1940s. The term "lockjaw" (or trismus) lives in modern parlance as a reminder of one of the cardinal features of tetanus: intense, painful spasms of the masseter muscles, and an inability to open the mouth.

Tetanus can present in one of four clinical patterns: Generalized, Local ,cephalic, Neonatal Although tetanus is now rare in resource-rich settings, the disease remains a threat to all unvaccinated people, particularly in resource-limited countries. Since *C. tetani* spores cannot be eliminated from the environment, immunization and proper treatment of wounds and traumatic injuries are crucial for tetanus prevention .

Majority of the cases described in clinical practice involve the classical generalized form of the disease with disabling and fatal sequel, mandating ventilator support. However, the atypical forms of this entity, i.e., neonatal, cephalic, and even rarer subtype; localized tetanus is seldom reported. The unfamiliarity surrounding this subtype of tetanus further strengthens the necessity of reporting this case which highlights the unusual manner of clinical presentation as in our case which would have otherwise gone unnoticed, had the patient not have had the wound explored following the admission.

Case Report

A 40 year old male , presented to the casualty with inability to open his mouth his last night associated with severe neck stiffness . he also gave history of a rusted nail injury over sole of the foot , just below the little toe while he was working at a construction site at dharavi in mid afternoon around 4 days back. The nail had penetrated deeply into the skin and even though the wound started bleeding, he did not seek any medical attention . Around 4 days after the original insult, he woke up in the middle of the night to drink water and experienced an inability to open his mouth and turn his head. On presentation to the hospital, patient had the classical triad of trismus, risus sardonicus and opisthotonos posturing , and spatula test was positive based on which a clinical diagnosis of tetanus was made . The patient had no history of dental procedures in the recent past , had no known allergies, had no history of exposure to radiotherapy and was not on any medications. There was no history of carpopedal spasms , tingling in extremities .He had received his primary tetanus series in childhood, and his last booster was dose for tetanus vaccine was more than 10 years ago . Under immediate care , he was given a dose of tD vaccine in the right buttock and IM tetanus immunoglobulin 3000 IU in the left buttock .

His blood pressure was 125/70 mm Hg and his temperature was 98.5°F. When examined, he was unable to open his jaw wider than 1 inch, spatula test was positive. Findings from a head and neck examination revealed a lock jaw and severe neck stiffness, his lung sounds were clear, and heart sounds were normal with no murmurs .The most striking feature on examination was opisthotonos posturing with arching of the entire back, associated with spasm of muscles all over the body. Evaluation of his extremities showed a cut wound of 0.2x0.1 cm in the plantar aspect of the right foot just proximal to 4 th toe, the wound was epidermis deep only, and no foreign body was seen, and there was no induration around the wound. Hydrogen peroxide was applied to the area and, 2 mL of 1% lidocaine was injected around the lesion and copiously irrigated with normal saline.

The patient was then shifted to ICU, in a dark and quite room , and the following evening patient had went into sudden hypoxic brady arrest, was revived after CPCR, and was intubated. Post intubation patient was started on complete sedation and paralysis with use of intravenous midazolam and intravenous atracurium infusion and intravenous fentanyl. Two days into admission he developed wide fluctuations in blood pressure which was associated with sinus tachycardia of upto 140 bpm and profuse sweating , which were managed with intravenous magnesium sulphate .

Table 1: Autonomic Fluctuations

	Pulse	Blood pressure	Temperature
DAY 1			Fahrenheit
8 am	120	130/80 mm hg	98.5
3 pm	122	120/80 mm hg	99.0
8 pm	115	120/90 mm hg	98.9
DAY 3			
8 am	132	130/80 mm hg	99.0
3 pm	128	180/100 mm hg	98.9
8 am	125	160/90 mm hg	101.5
DAY 5			
8 am	140	200/110 mm hg	104.5
3 pm	130	150/100 mm hg	99.0
8 pm	65	90 / 60 mm hg	101.2
DAY 7		110/80 mm hg	99.0
8 am	130	80/60 mm hg –	
3 pm	85	IONOTROPES STARTED	98.5
8 pm	108	100/60 mm hg – ON	
		IONOTROPIC SUPPORT	102.5

Apart from these hemodynamic disturbances other issues included , intermittent muscle fasciculations managed with T.baclofen 20 mg TID, repeated high grade fever, leucocytosis and hypernatremia. Blood , urine and Endotracheal tube cultures were sent and intravenous

clindamycin 600 mg BD , intravenous Metronidazole 500 mg TID was added to his regimen and antibiotics were stepped upto intravenous meropenem 1 g TID . Patient was started on all dilutions in DNS and free water was started through Ryles tube to combat hypernatremia . Throughout the course of his admission patient was adequately hydrated through IV fluids at 100 ml/hr . Patient was started on ionotropic support , intravenous noradrenaline and intravenous vasopressin in view of persistent hypotension one day before his demise . On the 7 th day of admission patient eventually succumbed to his illness .

Table 2 : Investigations

Hb	12.5 g/dl
WBC	20.2 /micro L
CRP	160 mg/L
PCT	2.20 ng/ml
Sputum routine	Gram negative bacilli seen
Sputum culture	Pseudomonas aeruginosa
Blood, wound and urine culture	No growth
Serum creatinine	1.99 mg/dl
Sodium	154 meq/L
Calcium	9.2 mg/dl
Phosphorous	3.4 mg/dl

DISCUSSION

Tetanus - a clinical diagnosis defined by hypertonia with painful muscle contractions or spasm. Generalized tetanus is a disease characterized as a progression from trismus to stiffness of neck muscles with difficulty swallowing. Patients may develop generalized muscle spasms including spasms of the abdominal musculature that can present as a rigid abdomen. The differential diagnosis for those presenting with trismus and muscle spasm as seen in tetanus includes dystonia, strychnine poisoning, dental infection, seizure, or hypocalcemic tetany. Patients with tetanus may also initially present with non-specific symptoms including weakness, dysphagia, facial pain, and trismus.

Clostridium tetani releases a toxin that interferes with the inhibitory neurotransmitters, causing the trismus, which this patient was experiencing. Although antibiotics probably play a relatively minor role in the management of tetanus, they are universally recommended. However, it is important to emphasize that appropriate antimicrobial therapy may fail to eradicate *C. tetani* unless adequate wound debridement is performed. Metronidazole (500 mg intravenously [IV] every six to eight hours) is the preferred treatment for tetanus, but penicillin G (2 to 4 million units IV every four to six hours) is a safe and effective alternative [13]. We suggest a treatment duration of 7 to 10 days. The first study to compare penicillin and metronidazole found a greater reduction in mortality in the metronidazole group (7 versus 24 percent) [37]. However, in three subsequent studies, there was no difference in mortality in patients treated with penicillin and those treated with metronidazole [38-40]. In one of the former studies, patients receiving metronidazole required fewer muscle relaxants and sedatives [38]. It is possible that the observed difference in outcomes may not be due to differences in the antimicrobial activity of the two agents but rather may be explained by the GABA antagonist effect of penicillins and third-generation cephalosporins, which may lead to central nervous system (CNS) excitability. Human tetanus immune globulin (HTIG) is the antitoxin of choice to neutralize unbound toxin. The United States Centers for Disease Control and Prevention (CDC) recommends a single dose of 500 units intramuscularly (IM) . There are studies in which the recommended dose range was 3000 to 6000 units.All patients with tetanus should receive active immunization with a full series (eg, three doses in adults and children >7 years old) of tetanus and diphtheria toxoid-containing vaccines, commencing immediately upon diagnosis. Such vaccines should be administered at a different site than tetanus immune globulin. Generalized muscle spasms are life threatening since they can cause respiratory failure, lead to aspiration, and induce generalized exhaustion in the patient. Several drugs may be used to control these spasms. Attention to placement of the patient and control of light or noise in the room in an effort to avoid provoking muscle spasms was an important component of care for patients with tetanus in the past before the availability of drugs to prevent spasms. Benzodiazepines have been used traditionally and are generally effective in controlling the rigidity and spasms associated with tetanus. They also provide a sedative effect. Several drugs have been used to produce adrenergic blockade and suppress autonomic hyperactivity; only treatment with magnesium sulfate has been studied in a randomized clinical trial in tetanus because of its use in clinical series for the management of autonomic dysfunction and as adjunctive treatment for controlling spasm.

Case-fatality rates for non-neonatal tetanus in resource-limited countries range from 5 to 50 percent, whereas the majority of patients with tetanus recover when modern supportive care is available.

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