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Poor Outcome in an Elderly Patient with Generalized Tetanus During Hospitalization: Identifying Contributing Factors - A Case Report

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ABSTRACT

Tetanus, caused by *Clostridium tetani*, remains a significant global health challenge despite the availability of vaccines. This case report discusses a 64-year-old male farmer diagnosed with Grade IV generalized tetanus following a puncture wound caused by a fish bone. The patient presented with stiffness, trismus, risus sardonicus, and opisthotonus, with symptoms progressively worsening. The diagnosis was established using Ablett's classification, and treatment included tetanus antitoxin, antibiotics, diazepam, and nutritional support. However, limited healthcare resources, inadequate isolation facilities, and a lack of essential medications contributed to a poor prognosis, culminating in the patient's death. This case emphasizes the critical need for improved healthcare infrastructure, early diagnosis, comprehensive management, and public health initiatives to prevent tetanus through vaccination and education. The findings highlight the importance of addressing systemic healthcare barriers to enhance outcomes in severe tetanus cases.

INTRODCUTION

Tetanus is a disease caused by the bacterium *Clostridium tetani* that produces tetanospasmin and attacks the neuromuscular system causing spasms and muscle rigidity.(Putri et al., 2024),(Khan et al., 2023) Globally, tetanus deaths can reach 1 million cases per year. Vaccines and health promotion about tetanus are reducing mortality.(Setiyandari et al., 2023)

In 2022 EU/EEA countries reported 53 cases of tetanus, 30% of cases were confirmed and 64% of cases were probable. Most tetanus cases were experienced by the age group 65 years and over (93%).(ASSESSMENT, 2024) A study by the Global Burden of Disease in 2017 found that 77% of the 38,000 deaths due to tetanus occurred in South Asia and Sub-Saharan Africa.(An et al., 2024) Tetanus cases in Indonesia were reported in 1994, the incidence of tetanus in Indonesia was 0.2 per 100,000 population. A study in 2015 by the Department of Neurology of Dr. Mohammad Hoesin General Hospital, Palembang found that tetanus cases for the period January 1, 2013 - December 31, 2014 at Dr. Mohammad Hoesin General Hospital, Palembang were 2.22%.(Theng et al., 2018),(Theng et al., 2018)

C. tetani, a gram-positive bacillus, forms spores and is anaerobic. Susceptible wounds include deep penetration injuries, abscesses, and wounds with foreign bodies. Spores can dormant in the wound under anaerobic conditions, producing tetanospasmin, a toxin that

causes tetanus.(Karnad & Gupta, 2021) The high mortality rate of tetanus can be influenced by various risk factors. In assessing the severity of tetanus patients can use the Ablett classification system, which starts from Grade I (mild) to Grade IV (very severe). In addition, prognostic score systems such as the Dakar score and Phillips score help assess prognosis.(Karunarathna et al., 2024)

On December 1, 2024, a 64-year-old man came to the ER of RSUD Buton with a chief complaint of stiffness throughout the body since 3 days before admission. The patient had a history of fish bone puncture on the middle finger of the left hand 4 weeks before admission. Information from the family showed that the wound was swollen to festering and around the finger was reddish in color. Complaints first appeared 2 weeks before admission, in the form of continuous fever and complaints of stiffness which was initially felt in the legs then spread to the muscles of the back, hands, neck and face and eventually to the whole body. The stiffness was accompanied by severe pain in the abdomen when pressed. 1 week before admission, the patient began to experience stiffness in opening the mouth so that food intake was reduced. According to the family, when the patient was exposed to bright light the patient seemed to moan in pain. The patient had no seizures, shortness of breath, toothache, or head trauma. The patient worked as a farmer.

The patient had no history of illness that required long-term treatment, surgery or hospitalization. The patient has never seen a doctor for a dental check-up. The patient does not consume any drugs or herbs. The patient has no history of drug or food allergies. The patient's tetanus vaccination history is unknown.

On admission the patient was compos mentis but had difficulty communicating and opening her mouth. The patient's vital signs were elevated blood pressure 150/80 mmHg and elevated body temperature 38° Celsius. The patient opened his mouth< 20mm, opsitotonus was not found, tonus of the face, neck, all extremities were increased, muscular defenses were found in the patient and when palpated on the abdomen the patient was seen moaning in pain.

Complete blood test, GDS, HBsAg, HIV test, electrolytes, abnormalities were found in the form of an increase in ureum 45.27mg/dL. At this time the patient was diagnosed with Suspected Tetanus Generalized with a differential diagnosis of Suspected Peritonitis.

The patient was treated with IVFD D10%: NaCl0.9% 1: 2, 1x40mg omeprazole injection, 1 gram paracetamol drips, 30mg ketorolac injection, and 2x1 gram ceftriaxone injection and NGT insertion. The patient's blood pressure was high and fluctuating and the body temperature did not decrease.

On the second day of treatment, the patient had full body seizures, trismus (+), risus sardonicus (+) and opsitotonus (+). The patient was given NRM oxygenation 7/lpm, 2 line IV, aminofluid infusion: NaCl 0.9%: D10% 1:1:1, diazepam 1 ampoule bolus slowly, tetagram 3000 units (12 vials @ 250IU), metronidazole injection 4x500mg, iv diazepam 6 ampoules in NaCl 0.9% 500cc discharged in 12 hours. The patient was transferred to a separate inpatient room from other patients. The patient's diagnosis became Tetanus Generalized grade IV with Ablett classification with Ad Malam prognosis.

During treatment the patient still had recurrent seizures, trismus & opsitotonus. The patient's consciousness continued to decline and there was no sign of improvement. The ICU

room was full and there was no isolation ICU with quiet and dark room conditions which are ideal for the treatment of patients with tetanus. The patient's inpatient room was inadequate, it could not be dark and free of noise from other patients and the patient's family did not stop coming to visit in large numbers. On the 5th day of treatment the patient no longer received diazepam iv because the stock of drugs in the hospital ran out and on the 7th day of treatment the patient died.

Figure 1. (A) The patient's left hand finger with a puncture wound 4 weeks before hospitalization (B) the patient's condition after the seizure (C) the examiner's hand checking the patient's opsitotonus condition.

Several studies have explored the clinical features, management, and outcomes of tetanus in various populations. Research by Karnad and Gupta (2021) emphasized the importance of intensive care in managing severe tetanus cases, highlighting the efficacy of high-dose sedatives and magnesium sulfate in reducing muscle spasms and autonomic instability. Similarly, Meena et al. (2023) documented the prolonged hospitalization and high mortality rates associated with generalized tetanus, particularly in older adults with unknown vaccination status. A study by Putri et al. (2024) demonstrated the effectiveness of early administration of tetanus antitoxin and antibiotics in preventing complications, underscoring the critical role of timely intervention. These findings collectively stress the significance of early diagnosis and comprehensive treatment in mitigating the severity of tetanus cases.

While existing studies have provided valuable insights into the management of tetanus, there remains a lack of research focusing on the impact of resource limitations in healthcare settings, particularly in rural and underdeveloped regions. Most studies have been conducted in well-equipped tertiary hospitals, leaving a gap in understanding the challenges faced by hospitals with inadequate facilities and medication shortages. Furthermore, there is limited exploration of how these systemic barriers influence patient outcomes and mortality

in severe tetanus cases. This study aims to address these gaps by investigating the role of healthcare infrastructure in the management and prognosis of severe tetanus.

The novelty of this research lies in its focus on the interplay between clinical management and systemic healthcare limitations in the context of severe tetanus cases. Unlike previous studies that primarily examine clinical interventions, this study integrates an analysis of healthcare resource availability and its direct impact on patient outcomes. By examining a case in a resource-limited setting, this research provides a unique perspective on the critical need for systemic improvements to enhance the management of severe tetanus.

The primary objective of this study is to analyze the clinical course and management challenges in a severe tetanus case treated in a resource-limited healthcare setting. Specifically, it aims to identify contributing factors to poor outcomes and propose actionable recommendations to address systemic barriers. The findings of this study will benefit healthcare providers, policymakers, and public health organizations by offering evidence-based insights to improve tetanus management, reduce mortality, and enhance healthcare infrastructure, particularly in under-resourced regions. This research also aims to raise awareness of the importance of vaccination and early intervention in preventing severe tetanus cases.

Case Report Methodology

This case report details the clinical course and management of a 64-year-old male patient diagnosed with Grade IV generalized tetanus, following a puncture wound caused by a fish bone. The methodology involves a comprehensive retrospective analysis of the patient’s medical history, clinical presentation, laboratory findings, and treatment interventions. Data were collected from hospital records, including initial symptoms, diagnostic procedures, and therapeutic approaches such as the administration of tetanus antitoxin, antibiotics, and sedatives. The case was classified using Ablett's classification system to determine severity and prognosis. Limitations in hospital resources, including inadequate isolation facilities and stock shortages of essential medications, were documented as contributing factors to the patient’s poor outcome. This methodology underscores the importance of a systematic approach in evaluating clinical management challenges and identifying areas for improvement in healthcare delivery for tetanus cases.

RESULT AND DISCUSSION

Tetanospasmin toxins produced by vegetative cells of *C. tetani* bind to receptors on the presynaptic membrane of motor neurons, traveling to the spinal cord and brain stem. This toxin inhibits the release of glycine and GABA, increasing motor neuron activity, leading to rigidity and seizures.(Karnad & Gupta, 2021)(Saputera & Sari, 2024)

The incubation period for tetanus between injury and the onset of symptoms can range from 1-21 days from the time of injury, and can even exceed this time. The earlier the incubation period correlates with the more severe the patient's condition. Another aggravating factor is that there is no history or unknown when the last tetanus vaccination was.(Putri et al., 2024),(Zhang et al., 2021)

In this patient, deep fish stab wounds and soil contamination containing *C. tetani* bacteria were suspected due to the patient's occupation as a farmer. *C. tetani* bacteria can be

introduced through minor scratches, animal bites, and infected needles.... Tetanus can be prevented by vaccination, proper wound cleansing and tetanus antitoxin by injection after a well-known wound.(Putri et al., 2024) Wounds susceptible to tetanus include wounds with deep penetrating injuries, abscesses, presence of foreign bodies in the wound, malignant tumors that fester, intravenous drug abuse, and pediatric middle ear infections.(Theng et al., 2018),(Karnad & Gupta, 2021)

Clinical symptoms of tetanus usually begin with trismus, followed by neck and muscle stiffness, sore throat, autonomic disorders and convulsions.(Putri et al., 2024),(Setiyandari et al., 2023) Severe muscle spasms can lead to tendon tears, dislocations or fractures. Muscle spasms in the facial region may cause the characteristic expression of *risus sardonicus*, while spasms in the trunk may cause *opisthotonus*. Autonomic disorders include rapid changes from hypertension and tachycardia to hypotension and bradycardia, followed by hypersalivation, excessive sweating, increased bronchial secretions, hyperthermia and gastric stasis. In prolonged seizures, severe hypoventilation and life-threatening apnea may occur.(Karunarathna et al., 2024),(Sanchez-Grillo et al., 2023),(Lanuza et al., 2024)

Triggering factors such as touch, pain, bright light, or sound can trigger seizures even with mild stimulation.(Akbar et al., 2022)Based on the site of inoculation and symptom manifestation, tetanus can be categorized into four types: (Putri et al., 2024),(Karunarathna et al., 2024)

1. Generalized tetanus, the most common form of tetanus, accounting for about 80% of cases, affects muscles throughout the body, primarily affecting the motor neurons of the central nervous system (CNS) and then the autonomic nervous system. Symptoms begin with dysphagia, muscle spasms and trismus in the head and neck, which then progress to stiffness in the entire muscle group and opisthotonus.
2. Localized tetanus, a rare type that involves persistent muscle contractions in the area where the injury occurred. Usually affecting the extremities and may precede the onset of generalized tetanus, the symptoms are generally milder, lasting for several weeks before subsiding.
3. *Cephalic* tetanus, a type of tetanus associated with contaminated wounds to the head or chronic otitis media where *C. tetani* is present in the flora of the middle ear and can affect cranial nerves, especially the facial nerve, causing facial nerve paralysis. Cephalic tetanus can progress to generalized tetanus.
4. Neonatal tetanus, usually occurs in newborns under one month old who have no passive immunity due to an unimmunized mother. It has a high mortality rate, often as a result of unsanitary delivery practices or unhygienic umbilical cord care. Symptoms usually appear 4 to 14 days after birth and include stiffness, trismus and difficulty breastfeeding.

A thorough physical examination is performed to assess the signs and symptoms of tetanus. Key indicators include muscle rigidity, muscle spasm and autonomic instability. The spatula test is a useful test to help confirm the diagnosis by touching the posterior pharyngeal wall with a spatula which will cause a gag reflex and ejection of the spatula. In

cases of tetanus, this triggers a spasm of the masseter muscle, making it difficult for the patient to bite the spatula and expel it. In severe cases, neurologic evaluation may be performed to assess the extent of nervous system involvement and monitor for complications.(Karnad & Gupta, 2021),(Karunarathna et al., 2024)

The Ablett classification is widely used because it shows the severity of the patient's symptoms and takes into account the prognosis. In addition, the Dakar and Phillips scores can also be used for prognosis.(Karunarathna et al., 2024)

Table 1. Ablett classification of tetanus severity

Level	Characteristics
I	Mild trismus, mild stiffness, no respiratory distress, no dysphagia, no spasm
II	Moderate trismus, rigidity, mild spasm, moderate dysphagia, moderate respiratory distress> 30x/min
III	Severe trismus complete rigidity, prolonged spasm, severe dysphagia pulse >120x, RR> 40x
IV	Grade III with severe autonomic disorders including cardiovascular system, hypertension and severe tachycardia, may occur alternate hypotension and later bradycardia, whichever persists

Tetanus is a disease based on clinical symptom finding, so it does not require laboratory tests to confirm the diagnosis. Tetanus can be diagnosed by excluding other diseases that may cause seizures and by the presence of a wound as an entry point for *Clostridium tetani* which produces a neurological toxin. (Utomo et al., 2023)

Although there are no specific laboratory tests to confirm a diagnosis of tetanus, blood tests can be performed to rule out other possible causes of symptoms, such as infection or metabolic disorders.(Karunarathna et al., 2024) Wound swabs for microscopic examination, culture, and sensitivity testing can be performed, but the results are not specific to the presence or absence of the organism.(Karnad & Gupta, 2021),(Akbar et al., 2022),(MohammadShahi et al., 2020)

Management of tetanus patients includes supportive care, cleansing of wounds suspected to be the focus of infection, eradication of *C. tetani* bacteria by administration of antibiotics and preventive management of complications such as acute respiratory failure, asphyxia, pneumonia, rhabdomyolysis, hemodynamic disturbances.(An et al., 2024)Patients with tetanus can stay in the hospital for treatment for up to months due to the complex management of generalized tetanus.(Meena et al., 2023)

Intravenous metronidazole at a dose of 500mg every 6 hours is the preferred antibiotic. Then administration of HTIG at a dose of 3000-6000 IU intramuscularly should be given as soon as possible.(Karnad & Gupta, 2021) In this patient, Tetagam, which is HTIG at a dose of 3000 IU as an initial dose (recommended dose of 3000-6000 IU) and intravenous administration of metronidazole antibiotics. Tetagam was given with the aim of HTIG working to bind tetanospasmin toxin that has not been bound to the central nervous system.(Putri et al., 2024)

The administration of diazepam to control the patient's muscle spasm is an option, but in this patient despite receiving a continuous infusion of diazepam, recurrent seizures still occur. This is in accordance with the findings obtained by Karnad & Gupta, despite receiving benzodiazepines in combination with morphine, propofol and thiopental, the patient still experienced refractory spasm.(Karnad & Gupta, 2021)

MgSO4 is widely used in tetanus patients because it is proven to reduce spasm, cause vasodilation, lower heart rate and blood pressure, and reduce autonomic fluctuations. Intravenous administration of 5 grams bolus followed by continuous infusion of 2-3 grams / hour until muscle spasm is controlled.(Putri et al., 2024),(Almas et al., 2021)

For spasm and muscle stiffness, a quiet and dark room should be provided and avoid oral suction, administration of benzodiazepines to relieve symptoms is needed at a dose of 0.2-1mg / kgBB with a maximum dose of 60mg / hour every hour. Spasm that makes tetanus a fatal disease so it must be treated immediately.(Ahmadi et al., 2023),(Castaneda et al., 2023)In this patient diazepam iv was no longer obtained since day 5 of treatment because the hospital stock had run out. Although diazepam iv was given, the patient still experienced recurrent seizures.

Insertion of NGT for high calorie enteral nutrition to manage muscle spasm and stiffness, preparation for tracheostomy and mechanical ventilation can help patients who have experienced severe tetanus.(Karnad & Gupta, 2021) Although vaccines are the best way to avoid tetanus, it is still a problem in public health. Men should be expected to get vaccinated as the incidence is higher in men than in women by 71% due to more physically demanding jobs.(Setiyandari et al., 2023),(Theng et al., 2018)

Tetanus is difficult to eradicate due to the wide spread of the spores, but can be prevented by immunization with 3 basic doses followed by a booster in adults, for now tetanus vaccine is only given to women who are pregnant.(Khan et al., 2023) The dose of tetanus toxoid is usually given on the first day of admission, but spaced out after the antitoxin injection. The second dose is given 4-6 weeks later, followed by the third dose 6 months later.(Karnad & Gupta, 2021)

Mortality is found in 6% of patients with mild to moderate grade, but in grade III to IV, the mortality rate rises to 60%. Patients aged> 60 years are more at risk of rapid deterioration due to physiologically decreased antibody resistance.(Theng et al., 2018) A better prognosis is obtained in patients who do have a history of tetanus vaccination, in addition to adequate health facilities in accordance with the management requires a separate room to be quiet and dark to help patient healing. The availability of an ICU room to treat severe tetanus patients can improve recovery rates and patient safety.(Khan et al., 2023)

In this patient, the prognosis leads to Night Ad because the patient is >60 years old, with wounds suspected of being contaminated, unknown tetanus immunization status, then inadequate room facilities ideally for patients who experience tetanus, as well as the availability of ICU rooms specifically for severe tetanus patients that are not available, incessant family visits and the exhaustion of the availability of anti-spasm drugs in the form of diazepam.

Literature review of published case reports of generalized tetanus disease based on Ablett's classification.

Reference	Country	Age	Clinical manifestations	Factors that aggravate recovery	Length of treatment and room	Results
Sah, et al.(Sah et al., 2022)	Nepal	76	External muscular defenses, severe abdominal pain, muscle spasm	Age, unknown vaccination status, acute renal failure up to 4x hemodialysis in a day and Hb drop to 3g/dL, financial problems resulting in	8 days, ICU (ventilator)	Died
Sahih, et al.(MohammadShahi et al., 2020)	Iran	45	Lock jaw, risus sardonicus, muscular defans, severe tachycardia, severe hypertension	Vaccination status unknown	51 days, ICU (ventilator)	Life, need physiotherapy due to prolonged immobilization, muscle atrophy, post
Castaneda, et al.(Castaneda et al., 2023)	El Salvador	63	Lock jaw, muscular defans, risus sardonicus, generalized muscle spasm	Elderly, unknown vaccination status, sepsis shock, acute renal failure, multiorgan system failure	15 days, ICU (ventilator)	Died
Menna, et al.(Meena et al., 2023)	India	35	Lock jaw, risus sardonicus, opsitotonus, muscle spasm generalized	Vaccination status unknown, ventilator-induced pnemunoia	33 days, ICU (ventilator)	Live
Menna, et al.(Meena et al., 2023)	India	20	Full body stiffness, dysphagia	Last tetanus vaccination> 10 years	24 days, ICU (ventilator)	Life, muscle atrophy
Menna, et al.(Meena et al., 2023)	India	50	Generalized muscle spasm, respiratory failure	Vaccination history unknown, initial HTIG of 500 IU, autonomic storm (tachycardia, hypertension, diaphoresis), agitation, spasm continuous)	60 days, ICU (ventilator)	Life, severe limb muscle atrophy, need physiotherapy
Grillo, et al.(Sanchez-Grillo et al., 2023)	Costa Rica	53	Tonic clonic seizures, opsitotonus, muscle pain lower limbs which is great, generalized muscle spasm	Hypertension, type 2 DM, electrolyte disturbances, limited availability of HTIG patients only gets 250 IU first time, pneumonia hospital-acquired, catheter-induced urinary tract infections	63 days, ICU (ventilator)	Life, need physiotherapy due to immobilization old, atrophic limb muscles

Arezoo, et al.(Ahmadi et al., 2023)	Iran	23	Lockjaw, limb muscle spasm, opsitotonus, risus	No history of tetanus vaccination	41 days, ICU (ventilator)	Live

CONCLUSION

Tetanus is an infection caused by *C. tetani* that produces tetanospasmin toxin and attacks the central nervous system, causing muscle rigidity, convulsions, and autonomic disorders. This report presents a case of generalized tetanus in an elderly patient with a history of contaminated stab wounds. The diagnosis was based on Ablett's classification. Management of the case involved administration of HTIG, metronidazole, diazepam, as well as nutritional support via NGT. However, challenges in treatment including inadequate facilities, such as the absence of a quiet, dark isolation room and a dedicated/isolation ICU room as well as diazepam stock worsened the patient's prognosis. This case highlights the importance of early treatment, comprehensive care and the need for supportive healthcare facilities to reduce mortality.

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