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Severe Generalized Tetanus in a Child with a History of a Nail Puncture Wound and Chronic Dental Infection: A Case Report

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Abstract

Tetanus is an acute infectious disease caused by the toxin of Clostridium tetani, which affects the nervous system and results in progressive muscle rigidity and spasms. Although immunisation is available and effective, tetanus cases continue to occur in developing countries, often associated with inadequately treated open wounds and incomplete immunisation. This case report describes a rare presentation of severe generalised tetanus in a 13-year-old boy with suspected multiple portals of entry. The patient presented with progressive stiffness and pain in the abdomen, back, neck, and jaw. He had a history of a nail puncture wound one month prior to admission, without having received post-exposure tetanus immunisation. Oral examination revealed chronic apical periodontitis of tooth 16 and a habit of self-inflicted needle trauma to the teeth. The patient was admitted to the intensive care unit under isolation and received antitetanus serum, combination antibiotic therapy, and prolonged sedation. This case highlights the importance of clinical vigilance for tetanus, the critical role of immunisation, and the need for adequate wound management and treatment of chronic infections to prevent severe complications. The possibility of more than one portal of entry — including chronic oral cavity infections — should be considered in the clinical evaluation of tetanus patients, particularly in paediatric populations with incomplete immunisation status.

INTRODUCTION

Tetanus is an acute infectious disease caused by Clostridium tetani, a gram-positive anaerobic bacterium that forms spores and can survive for prolonged periods in the environment (Kiron et al., 2024; Sudarshan et al., 2025; Swink & Gilsenan, 2022; Tejan et al., 2024). This bacterium produces the tetanospasmin toxin, which disrupts the balance of neurotransmitters in the central nervous system, causing persistent and uncontrollable muscle spasms (Cook, Protheroe & Handel, 2019; Hassel, 2021).

Although tetanus immunisation has been available and proven effective, tetanus cases continue to be widely reported, particularly in developing countries (Johns et al., 2023; Kıratlı et al., 2024; Slifka et al., 2025; Vitale et al., 2024). This is often attributable to suboptimal immunisation coverage, delays in wound treatment, and low public awareness of the importance of tetanus prevention (WHO, 2023). Global epidemiological data indicate that tetanus continues to contribute to morbidity and mortality, especially among children and adolescents with incomplete immunisation status (Kyu et al., 2021).

Classically, the portal of entry for C. tetani is an open or puncture wound contaminated with soil or foreign objects (Shalaby et al., 2024; Shibah & Rashid, 2025; Williams, 2023). Nail puncture wounds are among the most frequently reported risk factors, as they create an anaerobic environment conducive to bacterial growth (Rhee et al., 2020). In addition, some

recent reports suggest that chronic infections of the oral cavity and recurrent dental trauma may also serve as portals of entry for tetanus bacteria, although such occurrences are relatively rare (Afshar et al., 2020). Against this background, this case report was compiled to describe a case of severe generalised tetanus in a child with the possibility of multiple portals of entry (Boer et al., 2024; Liu et al., 2026; Nakubulwa et al., 2022; Onyeje & Onyeje, 2025; Slifka et al., 2025). The aim of this study is to report a rare case of severe generalised tetanus in a 13-year-old boy with suspected multiple portals of entry — including a nail puncture wound and chronic dental infection — and to highlight the importance of clinical vigilance, the role of immunisation, and the need for adequate wound management and treatment of chronic infections to prevent severe complications.

This case report is expected to yield both theoretical and practical benefits. Theoretically, the study contributes to the advancement of medical knowledge in the field of infectious diseases, particularly regarding the pathophysiology, clinical presentation, and management of tetanus in paediatric populations with atypical or multiple portals of entry. By documenting a rare case involving both a puncture wound and chronic dental infection, this report enriches the existing literature on uncommon sources of tetanus infection and underscores the importance of comprehensive clinical evaluation. Practically, this case report serves as an educational resource for healthcare professionals — including general practitioners, paediatricians, and emergency physicians — in recognising the early signs of tetanus and implementing appropriate management strategies. Furthermore, it provides valuable insights for public health policymakers regarding the importance of maintaining routine immunisation coverage, promoting wound care education, and integrating dental health assessments into tetanus prevention programmes. The findings also emphasise the critical role of multidisciplinary collaboration between medical and dental professionals in the management of tetanus cases involving oral cavity involvement.

METHOD

The writing of this article uses a descriptive case report design. Data were collected through anamnesis, physical examination, clinical evaluation, and review of patients' medical records during treatment in the intensive care room. All information is presented narratively without revealing the patient's identity.

RESULT AND DISCUSSION

A 13-year-old boy came to the emergency department of the Bima Regional General Hospital with complaints of stiffness and muscle pain felt in the abdomen, back, neck, and jaw. The complaints became more serious in the last two days before the patient was taken to the hospital.

From the anamnesis, a history of stab wounds due to nails on the sole of the right foot was obtained about a month earlier. The patient did not immediately check the stab wound with the local health care facility, so the wound did not receive medical care and the patient did not receive post-traumatic tetanus immunization. Previous immunization history cannot be clearly ascertained. Physical examination obtained Composmentis consciousness with E4V5M6 using Glasgow coma scale, blood pressure 92/61 mmHg, pulse 110 x/min, respiratory rate 22 x/min, temperature 36.8'C, oxygen saturation 98% without oxygen, and Visual analog scale (VAS)

8/10. The presence of trismus, rigidity of the abdominal and paraspinal muscles was found. Examination of the oral cavity found chronic apical periodontitis in 16 teeth. The patient's family revealed the patient's habit of pricking teeth using needles to reduce toothache, which is suspected to be a source of trauma and recurrent infections. On the right leg, the stab wound was found to have dried and there were no signs of secondary infection. Blood tests showed neutrophilia (83.6%) and lymphopenia (13.1%). While electrolytes and blood sugar are normal.

Based on the clinical picture, the patient was diagnosed with severe generalisata tetanus. The patient is treated in the Intensive Care Unit (ICU) room for monitoring in the isolation room with minimal sound and light stimulation. The patient was given a dose of 1000 IU antitetanus serum intramuscularly to neutralize the circulating toxins. In addition, a combination of intravenous antibiotics in the form of ceftriaxone and metronidazole was given for bacterial eradication. Muscle spasms were controlled using diazepam with an initial bolus of 0.3 mg/kgBB followed by continuous pure diazepam drip using a syringe pump (0.8 mL/h-1.0 mL/h) for more than ten days. Nutrition is given through a nasogastric tube, and oral surgery consultation is carried out to address the source of dental infection. Patients are recommended to maintain the cleanliness of the oral cavity by gargling using 0.9% NaCl liquid and perhydrol.

Table 1. Clinical Timeline and Management

Time	Clinical and Management
One month before admission to the hospital	Puncture wounds due to nails; There is no tetanus prophylaxis.
A few weeks before admission to the hospital	Chronic apical periodontitis; the habit of pricking teeth with a needle.
A few days before admission to the hospital	Progressive stiffness in the abdomen, back, neck, and jaw.
Day 0 (Hospital Admission)	Treated in an isolation ICU; administered ATS 1000 IU, the antibiotics ceftriaxone and metronidazole; diazepam IV bolus 0.3 mg/kg; followed by continuous infusion of pure diazepam 0.8 mL/hour.
Days 1–10	Diazepam is titrated to 1 mL/hour; nutrition is provided through NGT; oral surgery consultation.
After 10 days	Spasms decrease gradually, clinical conditions improve.
Return time	Patients are stable, symptoms are minimal; outpatient follow-up.

Source: Primary data, patient's medical record and clinical observation at Bima Regional General Hospital (2025)

In cases of severe generalised tetanus, comprehensive management is essential to reduce the risk of complications and mortality. Clinical management encompasses the neutralisation of circulating toxins, elimination of the causative bacteria, control of muscle spasms, and intensive physiological support. Neutralising toxins remains the priority first step; although evidence regarding the optimal dose varies, a single dose of human tetanus immunoglobulin (TIG) of at least 250–500 IU is generally recommended as early as possible after diagnosis is established, in order to bind free toxins in circulation (CDC, 2025; Farrar & Yen, 2020; Nishizawa et al., 2020). Administration of antitetanus serum (ATS) may be considered if TIG is unavailable at local facilities, with appropriate assessment of allergy risk (WHO, 2021).

Eradication of the causative bacteria is carried out using antibiotics with a spectrum effective against anaerobes, with metronidazole remaining the first-line choice due to its efficacy and its clinical benefit in inhibiting toxin production (MSF Medical Guidelines, 2026). A common regimen for children is intravenous metronidazole at a dose of 10 mg/kg every eight hours, administered for 7–10 days and adjusted according to clinical response and case severity. Wound management — including debridement and removal of necrotic tissue — is also important to accelerate the elimination of bacterial sources that may continue to produce toxins.

Control of muscle spasms is a major challenge in severe tetanus, as the toxin impairs GABA transmission and causes rigidity and spasms that may compromise the airway. Benzodiazepines, specifically diazepam, remain the primary modality due to their sedative, muscle relaxant, and anticonvulsant properties. In children, an initial dose of diazepam 0.1–0.3 mg/kg IV may be administered to manage acute spasms, then titrated according to clinical requirements by continuous infusion during the acute phase of the disease, often reaching high doses depending on the patient's spasm response and tolerance to respiratory depression (MSF Medical Guidelines, 2026).

In cases of severe spasms, or where diazepam alone is insufficient, additional options may be considered, including supplementary sedative agents such as midazolam or neuromuscular blocking agents with full ventilatory support in the ICU. Some guidelines also highlight the benefits of magnesium sulfate as an adjuvant therapy to reduce the requirement for muscle relaxants and assist in stabilising autonomic dysfunction (Nishizawa et al., 2020; Thwaites et al., 2015).

In patients where oral cavity infection is identified as an additional portal of entry, a multidisciplinary approach involving collaboration with a dentist or oral surgeon to manage such chronic infections can help reduce local anaerobic bacterial colonisation, accelerate tissue healing, and diminish sources of ongoing toxin production. Enteral nutrition via nasogastric tube (NGT) is essential in patients with trismus to ensure adequate caloric and protein intake, thereby supporting the healing process and restoration of muscle function (MSF Medical Guidelines, 2026).

Overall, an appropriate management strategy encompasses comprehensive clinical steps ranging from toxin neutralisation and early passive antitoxin administration, through effective antibiotic therapy, intensive muscle spasm control, and nutritional and respiratory support, to a multidisciplinary approach for additional complications. This approach has been shown to improve clinical outcomes and reduce the risk of mortality in severe generalised tetanus, particularly in paediatric populations with incomplete or unknown immunisation status.

CONCLUSION

This case shows that severe generalized tetanus can still occur in children with inadequate immunization status. The possibility of more than one entrance portal, i.e. nail puncture wounds and chronic oral cavity infections, needs to be considered in the clinical evaluation of tetanus patients. Early detection, tetanus immunization as recommended, proper wound management, and optimal intensive care are key factors in the successful management and prevention of fatal complications. To improve tetanus prevention and management, healthcare providers should maintain clinical vigilance for tetanus in patients with trismus and muscle rigidity, even without clear trauma history, and consider chronic dental infections as potential entry portals. Primary

healthcare facilities must strengthen immunization coverage and provide post-exposure tetanus prophylaxis for all penetrating wounds. Public health authorities should enhance community education on wound care, tetanus prevention, and early symptom recognition. Hospitals should establish multidisciplinary protocols involving emergency medicine, pediatrics, intensive care, and dentistry for comprehensive tetanus management. Finally, further research is needed to explore underrecognized sources of tetanus and evaluate the effectiveness of integrated prevention programs in reducing tetanus incidence.

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