CASE REPORT

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A Rare Tetanus Case Seen After an Earthquake

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ABSTRACT Increased tetanus cases, particularly after natural disasters such as earthquakes, have been documented in the literature. Factors like multiple injuries, poor environmental hygiene, and delayed medical interventions create favorable conditions for tetanus. We present a case of tetanus in a 55-year-old male earthquake victim injured by a metal object on his foot. Upon admission, he exhibited trismus, opisthotonus, generalized tonic-clonic contractions, and a low Glasgow Coma Scale. Laboratory findings revealed markers of infection, kidney dysfunction, and muscle damage. Treatment included tetanus immunoglobulin, antibiotics (ampicillin-sulbactam and metronidazole), mechanical ventilation, magnesium sulfate infusion, and dialysis. After 55 days of intensive care, including physical therapy and tracheostomy, the patient was discharged. This case underscores that despite vaccination programs, tetanus remains a significant public health threat. Early vaccination, immune globulin administration, wound debridement, and cleaning are critical in managing tetanus, especially in post-disaster settings.

Keywords: Tetanus; earthquake; trismus; disaster; vaccination

Tetanus is an infectious disease with an acute onset and high mortality, characterized by muscle spasms and it still remains a public health problem, especially in developing countries.[1,2] *Clostridium tetani* are obligate anaerobic, gram-positive, spore-forming bacilli found ubiquitously in the environment, persisting in soil, domestic animal and human feces, dust, and the gastrointestinal tract. The infection, causes a high mortality rate characterized by muscle spasms.[3,4]

Tetanus is a preventable disease with an appropriate vaccination program but still life threatening problem in developing countries.[5]

Increased cases of tetanus, especially after natural disasters such as earthquakes, floods and tsunamis, have been reported in the literature.[1,2,6] Multiple injuries after natural disasters, deterioration of environmental hygiene, failure to maintain personal hygiene, and failure to provide the necessary early intervention create suitable environments for tetanus.[7]

In this presentation, we aimed to review the literature by examining a tetanus case in an earthquake victim who was referred to our hospital from the earthquake area.

CASE REPORT

A 55-year-old male with mild mental retardation and congenital hearing loss was referred with a suspected diagnosis of tetanus after a foot injury from an

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unidentified metal object 4 days prior. He lives in an earthquake zone, which may have contributed to the injury. On admission, he exhibited trismus, opisthotonus, and generalized tonic-clonic seizures upon stimulation. The patient's family reported that he received a tetanus vaccination on the 4th day after the injury. No comorbidities or immunosuppression were detected.

Upon admission, his Glasgow Coma Scale score was 5, and he was conscious but unable to speak meaningfully. Vital signs were stable. There was no fever. Physical examination confirmed trismus and opisthotonus. Laboratory results showed elevated white blood cells ($15.37\times10^3/\mu L$), neutrophils ($11.27\times10^3/\mu L$), creatine kinase (11,223 U/L), urea (205 mg/dL), and creatinine (5.8 mg/dL), with a GFR of 26 mL/min. 500 IU human-derived tetanus immunoglobulin was administered to the patient under emergency room conditions. Treatment with Ampicillin+Sulbactam 6 g/day IV and Metronidazole 2 g/day IV was started. The patient was intubated with 5 mg kg-1 pentothal-thiopental and 0.1 mg kg-1 vecuronium. Antibiotic therapy was continued as ampicillin sulbactam 6 g/day, metronidazole 2 g/day. IV magnesium sulfate infusion was started on the 6th day, 3 g/day. The patient, whose GFR was 26 and developed anuria, was taken to the dialysis program. In totally, the patient underwent dialysis 12 times. On the 12th day of intensive care follow-up, tracheostomy was performed on the patient. The patient's tonic-clonic contractions began to decrease at the end of the 3rd week. The patient was extubated at 46th day. Antibiotherapy was discontinued after 14 days. The patient was transferred to the service at the end of the 55th day, with a good general condition and a Glasgow score of 15. He was taken to a physical therapy program and discharged with full recovery without any motor loss.

Informed consent was obtained from the patient for participation in this study and for the publication of their medical data.

DISCUSSION

Tetanus is a life-threatening infectious disease caused by *Clostridium tetani*, characterized by neurotoxin-mediated symptoms.[8] Globally, approximately one million new cases occur annually, with an estimated 30,000-500,000 tetanus-related deaths.[7,9] Generalized tetanus accounts for 80% of reported cases, with mortality rates significantly influenced by clinical severity. Vaccination remains the most effective preventive strategy. However, individuals who do not receive booster doses every 10 years may become susceptible to tetanus infection.[8]

The prognosis of tetanus is determined by multiple factors, including age, incubation period, immunization history, wound characteristics, and adequacy of medical intervention. Clinical indicators of severe prognosis include trismus, dysphagia, rigidity, and intermittent muscle spasms.[5] While the mortality rate in moderate cases ranges from 5-10%, it exceeds 50% in severe cases.[10] Our patient exhibited severe disease requiring early sedation, intubation, and tracheostomy due to prolonged respiratory failure.

Natural disasters such as earthquakes and tsunamis increase the incidence of tetanus due to widespread traumatic injuries and contamination risks. However, accurately determining post-disaster tetanus case numbers is challenging due to underreporting.[7] Consequently, For this reason, vaccinating the population against tetanus as soon as possible after natural disasters has an important place in the control of the disease.[11]

Sutiono et al. reported 26 tetanus cases following an earthquake in Indonesia, with 8 fatalities. Their study identified key mortality determinants, including the distance of the earthquake epicenter from medical facilities [odds ratio (OR)=1.740, 95% confidence interval (CI)=1.068-2.835] and the type of hospital initially accessed (OR=0.067, 95% CI=0.001-3.520).[1] Similarly, Pascapurnama et al. documented 106 tetanus cases (CFR =18.90%) following the 2004 Indonesia earthquake and 71 cases (CFR=36.60%) after the 2006 earthquake.[11] Furthermore, multiple cases of tetanus were reported following the 2010 Haiti earthquake the World Health Organization stated that there were more tetanus cases than expected despite the possibility of underreporting after the 2010 Haiti earthquake.[12,13] Jeremijenko et al. detected 106 tetanus cases in the 1-month

period after the tsunami. The mortality rate of the cases was reported as 19%. However, the authors stated that the estimated number of cases was higher, with the prediction that some of the cases were lost to the tetanus clinic before reaching the hospital, or that cases with more severe general conditions were lost to other reasons before the tetanus clinic was established and diagnosed in the hospital.[14]

Post-disaster tetanus mortality rates range from 19-31%. Beyond direct injuries, factors such as healthcare disruptions, inadequate ventilatory support, and limited surgical accessibility further exacerbate mortality risks. Kouadio et al. emphasized the importance of early risk mitigation, the organization of primary preventive healthcare services, and rapid implementation of control measures to prevent not only tetanus but also other infectious diseases, including diarrheal diseases, acute respiratory infections, malaria, leptospirosis, measles, dengue fever, viral hepatitis, typhoid fever, and meningitis.[15]

Despite appropriate vaccination programs, tetanus persists as a global health concern. Diagnosis relies primarily on clinical findings, supported by comprehensive physical examination and medical history. In addition to tetanus-specific treatment, multidisciplinary supportive care is essential, particularly in intensive care settings. Post-disaster conditions exacerbate contamination risks, necessitating prompt wound debridement, vaccination, and immune globulin administration, regardless of prior immunization status. For protection, a healthy vaccination program and appropriate prophylaxis after injury must be implemented in accordance with current guidelines.

TETANUS VACCİNATİON COVERAGE AND ITS IMPORTANCE

Tetanus immunization plays a fundamental role in disease prevention and mortality reduction. In Türkiye, tetanus vaccination is incorporated into the Expanded Program on Immunization and is systematically administered. Infants receive the pentavalent vaccine (DaBT-IPA-Hib) at 2, 4, and 6 months, with booster doses at 18 months and in the first grade of primary school. Additionally, an adult-type diphtheria-tetanus (Td) vaccine is administered in the 8th grade to ensure prolonged immunity.

For adults with unknown vaccination status, a 3-dose Td vaccine series is recommended, followed by booster doses every 10 years. Pregnant women should receive at least 2 doses of the Td vaccine, with the second dose administered at least 2 weeks before delivery. If the 2nd dose is not administered within this timeframe, both the mother and the newborn remain at risk of tetanus infection.[16]

Over the past decades, tetanus cases in Türkiye have significantly declined due to widespread immunization initiatives. In 1992, 110 cases were reported, whereas by 2017, the number had decreased to 25, demonstrating the efficacy of vaccination programs. However, post-disaster scenarios present unique challenges in maintaining vaccination coverage. Rapid vaccination assessments and outreach efforts are crucial in earthquake-affected regions to mitigate the risk of tetanus outbreaks.[17]

CONCLUSION

Tetanus vaccination remains the most effective preventive measure in reducing morbidity and mortality associated with the disease. Sustained booster doses are essential for long-term immunity, particularly in high-risk scenarios such as natural disasters. Future public health policies should prioritize maintaining high vaccination coverage, promptly assessing immunization status following disasters, and ensuring immediate administration of tetanus prophylaxis to injured individuals. Strengthening these measures will significantly contribute to the prevention and control of tetanus outbreaks in disaster-prone regions.

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Conflict of Interest

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Authorship Contributions

Idea/Concept: *Mustafa Uğuz, Berfin Çirkin Doruk;* ***Design:*** *Nur Zafer Kırdağ;* ***Control/Supervision:*** *Mustafa Uğuz;* ***Data Collection and/or Processing:*** *Mustafa Uğuz, Berfin Çirkin Doruk, Nur Zafer Kırdağ;* ***Analysis and/or Interpretation:*** *Mustafa Uğuz, Nur Zafer Kırdağ;* ***Literature Review:*** *Mustafa Uğuz, Berfin Çirkin Doruk;* ***Writing the Article:*** *Mustafa Uğuz;* ***Critical Review:*** *Nur Zafer Kırdağ, Berfin Çirkin Doruk;* ***References and Fundings:*** *Nur Zafer Kırdağ;* ***Materials:*** *Mustafa Uğuz, Berfin Çirkin Doruk.*

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