

## CASE REPORT

DOI: 10.5336/caserep.2024-107525

# 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.<sup>1,2</sup> *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.<sup>3,4</sup>

Tetanus is a preventable disease with an appropriate vaccination program but still life threatening problem in developing countries.<sup>5</sup>

Increased cases of tetanus, especially after natural disasters such as earthquakes, floods and tsunamis, have been reported in the literature.<sup>1,2,6</sup> 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.<sup>7</sup>

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.

**TO CITE THIS ARTICLE:**

Uğuz M, Alptekinoğlu Mendil NÖ, Zafer Kırdag N, Çirkin Doruk B. A rare tetanus case seen after an earthquake. Türkiye Klinikleri J Case Rep. 2025;33(3):102-5.

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Peer review under responsibility of Türkiye Klinikleri Journal of Case Reports.

**Received:** 13 Dec 2024

**Accepted:** 25 Feb 2025

**Available online:** 10 Jul 2025

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## 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 a metal object 4 days earlier. He presented with trismus, opisthotonus, and generalized seizures. His family reported vaccination on the 4th day post-injury. No comorbidities or immunosuppression were noted.

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 ( $15.37 \times 10^3/\mu\text{L}$ ), neutrophils ( $11.27 \times 10^3/\mu\text{L}$ ), creatine kinase (11,223 U/L), urea (205 mg/dL), and creatinine (5.8 mg/dL). 500 IU human-derived tetanus immunoglobulin was administered to the patient at emergency room. Treatment with Ampicillin+Sulbactam 6 g/day and Metronidazole 2 g/day IV was started. The patient was intubated with 5 mg kg<sup>-1</sup> pentothal-thiopental and 0.1 mg kg<sup>-1</sup> vecuronium. Antibiotic therapy was continued as ampicillin sulbactam 6 g/day, metronidazole 2 g/day. IV magnesium sulfate infusion was started on the 6<sup>th</sup> day, 3 g/day. The patient, whose Glomerular Filtration Rate (GFR) was 26 and developed anuria, was taken to the dialysis program. In totally, the patient underwent dialysis 12 times. On the 12<sup>th</sup> 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 3<sup>rd</sup> week. The patient was extubated at 46<sup>th</sup> day. Antibiotherapy was discontinued after 14 days. The patient was transferred to the service at the end of the 55<sup>th</sup> 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.<sup>8</sup> Globally, approximately one million new cases occur annually, with an estimated 30,000-500,000 tetanus-related deaths.<sup>7,9</sup> 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.<sup>8</sup>

Tetanus prognosis depends on age, incubation period, immunization history, wound type, and medical care. Severe signs such as trismus, dysphagia, and spasms raise mortality to >50%, compared with 5-10% in moderate cases. Our patients had severe disease requiring early sedation, intubation, and tracheostomy.

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.<sup>7</sup> 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.<sup>10</sup>

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).<sup>1</sup> Similarly, Pascapurnama et al. documented 106 tetanus cases [Case Fatality Rate (CFR)=18.90%] following the 2004 Indonesia earthquake and 71 cases (CFR=36.60%) after the 2006 earthquake.<sup>10</sup> Furthermore, multiple cases of tetanus were reported following the 2010 Haiti earthquake.<sup>11</sup> 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 condi-

tions were lost to other reasons before the tetanus clinic was established and diagnosed in the hospital.<sup>12</sup>

Post-disaster tetanus mortality rates range from %19 to 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.<sup>13</sup>

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 immunization is a key component of disease prevention and mortality reduction. In Turkey, it is part of the Expanded Program on Immunization (EPI). Infants receive the pentavalent vaccine diphtheria-pertussis-tetanus-inactivated polio-haemophilus influenza type B (DaBT- IPA- Hib) at 2, 4, and 6 months, with boosters at 18 months and in primary school. An adolescent Td booster in the 8th grade ensures long-term immunity.

Adults with unknown vaccination status should receive a 3-dose Td series with booster doses every 10 years. Pregnant women need at least 2 doses, the second given  $\geq 2$  weeks before delivery to protect both the mother and the newborn.<sup>14</sup>

In Turkey, tetanus cases have declined markedly due to successful immunization programs, decreasing

from 110 in 1992 to only 25 in 2017. This highlights the effectiveness of vaccination strategies. However, natural disasters can disrupt health services and reduce vaccination coverage. Therefore, rapid assessments and outreach programs are essential in earthquake-affected areas to sustain immunity and prevent potential outbreaks.<sup>13</sup>

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.

#### Source of Finance

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

#### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

#### Authorship Contributions

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

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