

Tetanus in War Victims in Afghanistan

Lesson from the Field

by Ornella Spagnolello, Mir Abdul Azim Shahir, Gina Portella, Giancarlo Ceccarelli, Martina Baiardo Redaelli*

Abstract

Tetanus represents a significant emergency in low-resource countries involved in crisis scenarios. The management of the disease requires strategies that take into account the lack of health facilities and the necessary tools. This field lesson taken from the experience of the NGO Emergency seeks to clarify the aspects connected with the management of tetanus cases in the setting of Afghanistan.

Keywords

tetanus, low-income countries, Afghanistan, infection, vaccination, surgery.

Tetanus is an acute, potentially fatal non-communicable infection characterized by generalized skeletal muscles spasm that can progress toward respiratory failure¹. The causative pathogen, the spore-forming bacterium *Clostridium tetani*, is commonly found in contaminated soil and can enter the body through cut or abrasion. Wounds with

a significant amount of tissue injury are more likely to promote spore germination. Tetanus bacilli release tetanospasmin, a potent toxin which binds gangliosides within local nerves terminals and proceed to the ventral horns of the spinal cord or motor horns of the cranial nerves. The net effect is inactivation of the inhibitory neurotransmission of these neuronal pathways which re-

sults in increased muscle tone and widespread autonomic instability. The clinical syndrome that follows includes generalized body spasms, acute respiratory failure and hemodynamic instability and might last 4 to 6 weeks. The management of severe cases require intensive care support and the mortality rate is highly impacted by geographic variability^{2,3}.

* Ornella Spagnolello: Emergency'NGO Kabul Hospital, Emergency ONG ONLUS, Kabul, Afghanistan; Department of Public Health and Infectious Diseases, University of Rome "La Sapienza", Rome, Italy. Mir Abdul Azim Shahir: Emergency'NGO Kabul Hospital, Emergency ONG ONLUS, Kabul, Afghanistan; Gina Portella: Emergency'NGO Kabul Hospital, Emergency ONG ONLUS, Kabul, Afghanistan. Giancarlo Ceccarelli: Department of Public Health and Infectious Diseases, University of Rome "La Sapienza", Rome, Italy; Migrant and Global Health Organization (Mi-HeRO), Rome, Italy. Martina Baiardo Redaelli: Emergency'NGO Kabul Hospital, Emergency ONG ONLUS, Kabul, Afghanistan; Department of Anesthesiology and Intensive Care, IRCCS San Raffaele Scientific Institute, Milan, Italy.

Tetanus is rarely occurring in developed countries thanks to widespread vaccination programs and prophylaxis recommendations. In war-torn countries such as Afghanistan, on the contrary, tetanus represents still a threat for the population. On one side, despite the availability of an effective and inexpensive vaccination since 1930s, vaccinations programs are still sparse in the country, especially in remote areas. On the other side, sadly Afghan civilians are constantly exposed to a major risk of getting involved in explosions, landmines and other tetanus-prone injuries considering the not-deescalating violent scenario. According to the United Nations Children's Fund (UNICEF) and the World Health Organization (WHO), the estimated immunization coverage with Diphtheria-Peritussis-Tetanus (DPT) vaccine in Afghanistan in 2016 was only 73% with the first dose, while coverage with the third dose was just 65%⁴⁵.

After decades of war, Afghan public health care system still has consistent gaps, and a large part of the population does not have access to this service. Moreover, health care facilities are limited in

number and in the level of care offered. Intensive Care Units (ICU) provided by mechanical ventilation are rare also in main cities of the country. Finally, the lack of an adequate health education among the vast majority of the population, prevents people from accessing basic health-care services even where available. Emergency is an Italian Non-Governmental Organization (NGO) which provides free, high-quality healthcare to victims of war, poverty and landmines without any gender, political or religious discrimination, alongside training local medical staff. EMERGENCY'NGO has been running three hospitals in the Country (Kabul, Lashkar Gah and Anabah) and a network of 42 first aid posts since 1999. The Kabul Hospital is a 100-bed facility with a 6-bed ICU provided by mechanical ventilation. As a war surgery center, criteria for admission include penetrating trauma and all trauma patients in life-threatening conditions⁶.

In the last 6 months, a total of 4 tetanus patients (n° 1 adults, n° 3 children) were recorded around all projects run by Emergency'NGO in Afghanistan. Median age was

15 years (min 10, max 30). All patients had no history of known prior vaccination for tetanus. Of them, 3 were initially admitted in Lashkar Gah and 1 in Kabul due to leg war injuries including 3 lacerated bruised shrapnel and 1 penetrating bullet wounds. All diagnoses were suggested by the recent history of exposure to conditions favoring tetanus and by the current clinical picture characterized by signs and symptoms of muscle spasms, muscle rigidity and pain. No confirmatory laboratory tests were performed.

The adopted management strategies consisted in:

1. A prompt wound care to remove debris or foreign objects that may be harboring bacteria in anaerobiosis condition.
2. Antibiotic treatment active against *Clostridium tetani*.
3. Other supportive therapies including treatments to provide breathing assistance and reduce muscle spasms.
4. Antitoxin therapy administration for passive immunization and vaccination with a standard tetanus vaccination to help im-

mune system in fighting the toxins.

Considering the difficulties of transferring critical patients along the country in a war scenario, only 1 patient with severe tetanus managed to be transferred from Lashkar Gah to the Kabul ICU. At the end, 2 patients of 4 finally got access to our ICU. Mortality rate was 25% (1 death in Lashkar Gah).

Some interesting points about tetanus management araised from our experience in the field.

First of all, despite our large volume of patients with tetanus prone wounds, this condition remains rather rare if an aggressive soft tissues debridement is immediately performed and if the patient receive standard prophylactic antibiotics according with our local protocol (Ampicillin plus/minus Chloramphenicol plus/minus Metronidazole). However, considering the lack of an out of hospital emergency care system and the unsafe scenario for transport especially from remote areas, most of our patients are presenting at the hospital way below the “golden hour”. Indeed, our recent 6-month case series of tetanus underlies that the time from injury is a relevant

risk factor for this condition. This could be explained not only by the chance of spore germination over time, but also by the patient’s general conditions that can somehow promote this process. Tissue hypoperfusion in bleeding patients undergoing a long journey to our facilities can furtherly facilitate a local anaerobic environment that might stimulate spore germination.

Another consideration regards the general management of the most severe tetanus cases. ICU is essential as soon as clinical conditions deteriorates, and little can be done without mechanical ventilation and a continue full-parameter monitoring. Therefore, the early identification of these cases and the prompt transfer to an ICU-provided hospital is the first step in the chain of survival. Unfortunately, in Afghanistan this operation does not come without risks (lack of adequate ambulance services and trained personnel, the safety concerns both related to the infrastructures of the Country and the chance of going through active war zones) and most of the times the balance between benefits and risks is weighing towards the latter. Exposing a severely critical tetanus patient to a

transfer in poor security and safety conditions is not evident at all, especially considering the low-resource setting and the expected limited outcome of these patients. In one case, our team decided to take the risk to transfer from Lashkar Gah to Kabul (more than 700 km distance) a 10-year boy that presented in our facilities following 5 days from tetanus symptoms onset. After 1 week of hospitalization in Lashkar Gah Hospital the child conditions rapidly deteriorated despite the full medical treatment was ongoing and a tracheostomy was already performed. The consent from the father was collected before the transfer, explain very well that this was a compassionate attempt and that the patients would have not survived without a further upgrade of the level of care (paralysis and mechanical ventilation) and that the son might have died during the journey. Air ambulance service with pressurized aircrafts notably is not available in the country. As expected, during the 14-hour journey by ambulance the team faced multiple challenges. Finally, the patient was admitted in Kabul Hospital and following more than 30 days of ICU care was discharged alive.

The natural history of the disease is often very long: 4 to 6 weeks. Not considering this could lead to excessively quick and abrupt changes in the treatment plan (which should be avoided) and deep frustration from the medical team.

The medical plan should be mainly tailored to respiratory and hemodynamic support together with prevention and treatment of complications of a long ICU stay. Indeed, the plan should not be deescalated to fast and prematurely despite staff natural expectations⁷. This point is particularly relevant

in a hospital provided by only 6 ICU beds which is regularly managing Mass Casualties⁸.

In conclusion, tetanus is a preventable disease which unfortunately represents a threat in Afghanistan both for the lack of an effective preventive strategy and the lack of ventilated and free of charge ICU beds in the country. A broad program of vaccination should be strongly supported, regardless the decrease of financial support and interest towards the country by the international community after august 2021. At the current stage, an

aggressive surgical approach for tetanus prone wounds, together with empirical preventive antibiotic therapy are the main prophylactic measures to be taken on a regular basis⁹. Considering the challenges and the costs of managing severe tetanus cases in a low resource setting, early vaccination and immunoglobulin when feasible and sustainable should be administered to all patients¹⁰. but especially in those with additional risk factors (presenting following 24 hours from injury, in poor conditions).

Notes

1. Alagappan K., McGowan J., DeClaro D., Ng D., Silverman R. (2008), *Tetanus antibody protection among HIV-infected US-born patients and immigrants*, in «Int J Emerg Med», 1 (2), pp. 123-126.

2. Fan Z., Zhao Y., Wang S., Zhang F., Zhuang C. (2019), *Clinical features and outcomes of tetanus: a retrospective study*, in «Inf Drug Res», 12, p. 1289.

3. Finkelstein P., Teisch L., Allen C.J., Ruiz G. (2017), *Tetanus: A Potential Public Health Threat in Times of Disaster*, in «Prehosp Disaster Med.», 32 (3), June 2017, pp. 339-342, doi: 10.1017/S1049023X17000012. Epub 2017 Feb. 20, PMID: 28215195.

4. Akseer N., Rizvi A., Bhatti Z., Das J.K., Everett K., Arur A. et al. (2019), *Association of exposure to civil conflict with maternal resilience and maternal and child health and health system performance in Afghanistan*, in «JAMA Network Open», 2 (11), e1914819-e1914819.

5. World Health Organization (WHO) (2018), *Immunization, monitoring surveillance* [available at https://www.who.int/immunization/monitoring_surveillance/burden/vpd/WHO_SurveillanceVaccinePreventable_15_Non-neonatalTetanus_R2.pdf?ua].

6. Emergency (2022), *Surgical centre for war victims in Kabul Afghanistan* [available at <https://en.emergency.it/projects/afghanistan-kabul-surgical-centre/>], last accessed 28/5/2022].

7. Oleum S., Eyul J., Lukwiya D.O., Scolding N. (2021), *Tetanus in a rural low-income intensive care unit setting*, in «Brain Commun.», 3 (1), 2021 Feb. 16, fcabo13, doi: 10.1093/braincomms/fcabo13, PMID: 33824951, PMCID: PMC8010432.

8. Spagnolello O., Gatti S., Esmati S. et al. (2022), *Kabul airport suicide attack: report of a mass casualty*, in «Eur J Trauma Emerg Surg» [available at <https://doi.org/10.1007/s00068-022-01898-y>].

9. Yen L.M., Thwaites C.L. (2019), *Tetanus*, in «Lancet», 393 (10181), 2019 Apr. 20, pp. 1657-1668, doi: 10.1016/S0140-6736(18)33131-3, Epub 2019 Mar 29, Erratum in: «Lancet», 393 (10182), 2019 Apr. 27, p. 1698, PMID: 30935736.

10. World Health Organization (2010), *Current recommendations for treatment of tetanus during humanitarian emergencies: WHO technical note. World Health Organization* [available at <https://apps.who.int/iris/handle/10665/70219>], last accessed on 28/5/2022].