



Case report

Obstetric tetanus in an immunized patient

Junior Principe-Collazos^a, Anthony Ramos-Yataco^{b,*}, Antony Gonzalo Gonzáles Uribe^c,
Lizbeth Cahuayme-Zuniga^d, Iracema Arevalo^e, Frank Milton Delgado-Cáceres^f

^a Universidad Nacional Mayor de San Marcos, Escuela de Medicina de San Fernando, Av. Miguel Grau 755, Cercado de Lima 15001, Peru

^b Ricardo Cruzado Rivarola Hospital, Ignacio Morsesky 329, Nasca, 11401 Ica, Peru

^c Universidad Peruana la Union, Carretera Central Km 19.5 Naña, Chosica, Lima, Peru

^d Division of Infectious Disease, Department of Internal Medicine Baylor Scott & White Health, Temple, Texas, 2401 S 31st St, Temple, TX 76508, United States

^e Division of Pediatric Infectious Disease, Promedica Memorial Hospital, 715 S Taft Ave, Fremont, OH 43420, United States

^f Universidad Peruana de Ciencias Aplicadas, Prolongación Primavera 2390, Lima 15023, Peru



ARTICLE INFO

Keywords:

Obstetric tetanus

Postpartum hemorrhage

Immunization

ABSTRACT

Obstetric tetanus is defined as a *C. tetani* infection that occurs during pregnancy or within six weeks of delivery. In Peru, there are no reports of obstetric tetanus cases. Here we report a sixth case of obstetric tetanus in a puerperal woman who underwent curettage for postpartum hemorrhage, despite immunization against tetanus.

Introduction

Tetanus is a disease caused by the gram-positive anaerobic bacterium *Clostridium tetani*. The disease is mediated by spores that enter the human body on contact with broken skin or mucosa. Once in an anaerobic environment within the body, the spores produce tetanospasmin, the tetanus neurotoxin responsible for the associated symptoms: muscle spasms, stiffness, fever, muscle aches, and dysphagia, among others [1].

Tetanus continues to be a common disease within developing countries. It is associated with a high mortality rate, as evidenced by approximately 1 million deaths per year, especially within pregnant women and neonates, whose mortality rates are between 80 % and 100 % [2]. Obstetric tetanus is defined as tetanus occurring during pregnancy or within six weeks of delivery [1]. Cases are associated with poor hygiene during obstetric–gynecological procedures, contaminated tools during labor care, and abortions [3]. By 1993, yearly tetanus-associated deaths in women were estimated to be 15,000–30,000. Presently, it is estimated that the incidence has decreased by about 50–75 %. According to the Pan American Health Organization, in 2017, obstetric tetanus was considered to be eliminated from the Americas [4]. In Peru, no cases of obstetric tetanus have been reported in the last 20 years [5].

Globally, there are only five published reports of obstetric tetanus

available in Pubmed; of those patients, only one had been immunized (Table 1). As such, we present a sixth case of obstetric tetanus, related to curettage performed as treatment for postpartum hemorrhage in a Peruvian patient, despite having prior tetanus immunization.

Case presentation

A 26-year-old woman from a rural area of Peru, with a past medical history of two vaginal deliveries without complications and complete prenatal care during her current pregnancy. She received three doses of tetanus, diphtheria, and pertussis (DTaP) during childhood and one dose of tetanus and diphtheria (Tdap) vaccine during each pregnancy. The last dose of Tdap was given on June 14, 2020 at 27 weeks of gestation. She presented to our hospital in the active phase of labor at 38 weeks of gestation and gave birth to a child weighing 3.7 kg by vaginal delivery. Two days after delivery, the patient presented with postpartum hemorrhage with resultant hypotension, tachycardia, and altered sensorium. Physical examination revealed a flaccid uterus. Pelvic ultrasound demonstrated retention of placental tissue; therefore, uterine curettage was performed. The patient progressed favorably after uterine curettage and was discharged four days later.

Fourteen days after discharge, the patient reported headache, nausea, general malaise, and fever. Her vital signs were within the

* Correspondence to: Ricardo Cruzado Rivarola Hospital, Nasca, Peru.

E-mail addresses: Junior.medicinahumana@gmail.com (J. Principe-Collazos), aj96@outlook.es (A. Ramos-Yataco), antonyuri139613@gmail.com (A.G.G. Uribe), Lizbeth.cahuaymezuniga@bswhealth.org (L. Cahuayme-Zuniga), iracema.arevalo@gmail.com (I. Arevalo), frankdelgadocaceres@gmail.com (F.M. Delgado-Cáceres).

<https://doi.org/10.1016/j.idcr.2022.e01568>

Received 17 April 2022; Received in revised form 11 July 2022; Accepted 11 July 2022

Available online 12 July 2022

2214-2509/© 2022 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

normal ranges. She was noted to have scant lochia without bad odor and absence of vaginal bleeding. Laboratory tests demonstrated hematocrit 24 %, hemoglobin 7.3 g/dL, white blood cells 14,000 m/mm³, creatinine 104 μmol/L; urinalysis: 12 white blood cell and eight epithelial cells per high power field and positive urine culture for *E. coli* sensitive to ceftriaxone. Subsequently, the patient was hospitalized with a presumptive diagnosis of urinary tract infection and severe anemia. Treatment with ceftriaxone 2 g IV daily, iron saccharate, and hydration was started immediately. On day two of hospitalization, the patient was found to have altered mental status, no response to external stimuli, a Glasgow Coma Scale score of seven. Nuchal stiffness and limb stiffness were noted, and intubation was performed for airway protection. The patient was then transferred to a more equipped hospital. On admission, laboratory exam and non-contrast cerebral computed tomography were unremarkable, so a lumbar puncture was performed (white cell count: 30/mm³, glucose: 42 mg/dl, proteins: 70 g/L, CSF culture showed no growth), blood cultures showed no growth. The patient was admitted to the intensive care unit (ICU) and started on empiric treatment for meningitis with ceftriaxone, vancomycin, and acyclovir. On the second day of hospitalization in the ICU, severe trismus, increased respiratory rate, and spasms of the upper and lower extremities and trunk were evident. Passive motion of the limbs caused diffuse spasms. A clinical diagnosis of severe tetanus was made and vaginal cultures were

obtained. However, it did not show growth. Treatment with penicillin G four million units IV every four hours for seven days and two doses of 500 units of IM anti-tetanus immunoglobulin was started. On the sixth day of hospitalization, the patient was extubated, and clinical improvement was observed. On the 27th day of hospitalization, she was discharged with gait disorder and mild long-term memory impairment.

Discussion

We report a case of obstetric tetanus in a patient with complete immunization after uterine curettage due to postpartum hemorrhage. The patient presented with muscle spasms and nuchal rigidity. To our knowledge, this is the sixth case report of obstetric tetanus.

The incubation time of *Clostridium tetani* is 3–21 days; this corresponds to the time elapsed from the gynecological–obstetric procedure performed on the patient until the presentation of symptoms. In 2016, Propotnik et al. reported on a female patient without complete immunization with obstetric tetanus in the United States [3]. Incomplete immunization is considered to be one of the main risk factors associated with mortality in patients with tetanus [1,2].

There are four clinical forms in which *C. tetani* infection can manifest: generalized, localized, cephalic, and neonatal. In the generalized form, the toxin produces the abolition of spinal inhibitory reflexes with

Table 1
Cases reported of obstetric tetanus.

Author	Year	Age	Vaccination status	Risk factors and exposure	Clinical Features	Initial Management	Outcome
Januszkiewicz et al. [6]	1973	21	NIF	Left leg injury	Dysphagia, trismus, generalized spasm, respiratory failure	Pepsin-refined equine tetanus antitoxin (ATS), 80,000 IU, aluminum hydroxide-adsorbed tetanus toxoid, antibiotics and sedatives.	Fully recovered
Orr et al. [7]	1969	27	NIF	Foul vaginal discharge	Generalized muscle spasm, risus sardonius, clenching of the jaw, opisthotonos, respiratory insufficiency	Diazepam, in a dosage of 10 mg, endotracheal intubation, penicillin, 80,000 units of antitetanic serum by an intravenous route, phenobarbitone sodium, 300 mg, and antitetanic serum, 80,000 units, by intramuscular injection.	Tracheostomy carrier Distal muscle weakness
Holmdahl and Thorén [8]	1962	36	NIF	Infected scratches on both hands	Spasm in throat muscles and long back muscles, respiratory insufficiency	Antitetanic serum, antibiotics, phenobarbitone, and tribromoethanol per rectum.	Fully recovered
Shin et al. [9]	2002	29	No 10-yr boosters after the initial series of tetanus-toxoid-containing vaccine	Absence of trauma	Cold sweats, neck pain, difficulty in opening her mouth, dysphagia, stiff neck, jaw muscle spasms, shortness of breath with accompanying back spasms	Human tetanus immunoglobulin 3000 IU, diphtheria-tetanus toxoid (DT) 0.5 mL subcutaneously and intravenous metronidazole (500 mg)	Fully recovered
Dare et al. [10]	1989	31	NIF	Septic ulcer on the upper one third of the medial aspect of the thigh	Neck stiffness, backache, inability to open the mouth widely, spasms of the facial, back and limb muscles, trismus, opisthotonos,	Diazepam 20 mg intravenously, and then maintained on intravenous infusion of 40 mg diazepam in 1 l of 4.3010 dextrose in 1: 5 normal saline, antitetanic serum (20,000 units) and crystalline penicillin intravenously.	Fully recovered
Principe et al.	2020	26	Three doses of tetanus, diphtheria, and pertussis (Tdap) during childhood and one dose of tetanus and diphtheria (Td) vaccine during each pregnancy	Uterine curettage	nuchal stiffness and upper limb stiffness, severe trismus, hyperextension of the upper limbs, trunk and lower limbs	Penicillin G sodium for seven days and two doses of 500 units of tetanus immunoglobulin intramuscularly	Fully recovered

*No information was found.

resultant increased excitatory impulses, which is characterized by generalized muscle spasms [11]. Clinical scores have been developed to measure the severity of tetanus, the most important of which is the Ablett Classification of Tetanus Severity which includes four grades of severity: mild and moderate (trismus with no spasms); severe and very severe with violent autonomic disturbance (severe hypertension and tachycardia alternating with relative hypotension and bradycardia) [12]. This patient would be classified as grade III severity because of severe trismus, generalized spasticity, increased respiratory rate, apneic spells, severe dysphagia, and tachycardia that led to ventilatory compromise requiring mechanical ventilation.

The diagnosis of tetanus is clinical; there are currently no diagnostic tests available. In our patient, the diagnosis was made by the appearance of muscle spasms of the upper and lower extremities. Early and timely treatment is crucial; it is recommended to base management on the pillars of neutralizing the toxin, reducing toxin release, and treating any associated complications [13]. Our patient received a course of penicillin G for seven days and two doses of anti-tetanus immunoglobulins with marked improvement.

The global prevalence of tetanus has decreased mainly because of population vaccination [2]. A recommended vaccination schedule is comprised of three doses of Tdap or Td vaccines in childhood, at two, four and six months of age, with a booster every 10 years or as part of wound management. During pregnancy, one dose of tetanus and diphtheria (Td) or Tdap vaccine is recommended, preferably during weeks 27–36 of pregnancy [6].

There is no exact information on the duration of antibodies in pregnant women after vaccination against tetanus. The Advisory Committee on Immunization Practices has noted that tetanus antibodies disappear quickly; for this reason, one should be vaccinated with Tdap during each pregnancy, regardless of vaccination history [14] (Halperin et al., stated that IgG and IgA antibodies against tetanus begin to notably increase between five and seven days post-vaccination, reaching their maximum level on day 14 with subsequent decreases over time [15]. Our patient received a complete vaccination schedule during infancy and pregnancy; tetanus antibody level was measured and non-protective levels of IgG were identified, i.e., less than 0.1 IU/mL, thus she developed the disease. This could be due to an abnormal immune response, which could have caused the absence of specific antibodies against tetanus. More studies are required to understand why some people do not display a specific immune response against tetanus despite immunization.

Cases of tetanus due to surgical procedures have been reported. Aba et al. developed a descriptive cross-sectional study to identify cases related to post-operative tetanus in a hospital in the Ivory Coast, between 2003 and 2008. The authors found that of all patients hospitalized for tetanus, only 11 % were a result of surgery. The most frequent forms of tetanus were of a generalized type. The authors mentioned skin burns, uterine curettage, hernioplasties, skin sutures, and open fractures, as well as medical procedures where sterilization protocols were broken as risk factors [16]. Furthermore, it has been reported that tetanus related to surgical procedures may be linked to medical equipment such as bandages, surgical materials, sutures, clips, and dust contaminated with spores in the operating room [17]. Our patient denied environmental contamination from wounds, and stated that she had proper wound care. As such, the source of infection in our patient remains unknown.

The types of surgeries implicated in post-operative tetanus are mainly abdominal and gynecological, where there may be contact with the gastrointestinal tract, since 1–10 % of the population expresses the toxin in the feces [17]. Strypstein et al. reported the case of a 79-year-old woman who developed tetanus two days after gastrointestinal surgery, even though amoxicillin and clavulanic acid were administered prophylactically [18]. Among published reports, none of the patients ended in fatal outcome and only one patient had sequelae such as motor and respiratory dysfunction. Regarding our patient, she was followed in an outpatient clinic and did not have motor or cognitive sequelae during

her final appointment six months after discharge from the ICU.

Conclusion

Obstetric tetanus is a rare entity that presents with classic symptoms. However, the source of infection may not readily be identifiable. Furthermore, complete immunization against tetanus should not be reason alone to rule out a diagnosis of obstetric tetanus. More studies are required to understand the factors related to the development of tetanus despite correct immunization.

Sources of funding

The authors have no funding to declare.

Ethical approval

The article was approved by Ricardo Cruzado Rivarola hospital ethics committee.

Consent

“Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request”.

CRediT authorship contribution statement

Junior Principe-Collazos: Conceptualization, Resources, Writing – review & editing. **Anthony Ramos-Yataco:** Conceptualization, Resources, Supervision, Writing – review & editing. **Antony Gonzales Uribe:** Writing – review & editing. **Lizbeth Cahuayme-Zuniga:** Writing – review & editing. **Iracema Arevalo:** Writing – review & editing. **Frank Milton Delgado:** Writing – review & editing.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

- [1] Wang X, Yu R, Shang X, Li J, Gu L, Rao R, et al. Multicenter study of tetanus patients in Fujian Province of China: a retrospective review of 95 cases. *Biomed Res Int* 2020;2020.
- [2] Nowshin I, Tarafdar MA, Begum N, Salim F, Ahmed M. Study on tetanus toxoid vaccination coverage among female garment workers in two selected factories. *J ZHSWMC* 2019;1(1):23–5.
- [3] Propotnik T, Schaffner A, Lalonde J, Elliott L, Kuhvicki C, Moore S, et al. Obstetric tetanus in an unvaccinated woman after a home birth delivery — Kentucky, 2016. *Nurs Manag* 1993;24(10):61–3.
- [4] Thwaites CL, Beeching NJ, Newton CR. Maternal and neonatal tetanus. *Lancet [Internet]* 2015;385(9965):362–70 [Available from: ([https://doi.org/10.1016/S0140-6736\(14\)60236-1](https://doi.org/10.1016/S0140-6736(14)60236-1))].
- [5] Ministerio de Salud. Situación del Tétanos Neonatal, Perú, Se 31, 2020. 2020.
- [6] Januszkiewicz J, Galazka A, Adamczyk J, Sporzyńska Z. Severe tetanus in late pregnancy. *Scand J Infect Dis* 1973;5(3):233–5.
- [7] Orr KB, Coffey R. A case of puerperal tetanus with recovery. *Med J Aust* 1969;2(11):557–60.
- [8] Holmdahl MHS, Thorén L. Tetanus in pregnancy. Report of a case of severe tetanus with survival of mother and child following tracheotomy and artificial respiration. *Am J Obstet Gynecol* 1962;84(3):339–41.
- [9] Shin DH, Park JH, Jung PJ, Lee SR, Shin JH, Kim SJ. A case of maternal tetanus in Korea. *J Korean Med Sci* 2002;17(2):260–2.
- [10] Dare FO, Makinde OO. Tetanus in pregnancy in a Nigerian woman—a case report. *Trop Doct* 1989;19(2):81.
- [11] Bae C, Bourget D. Tetanus. [Updated 2020 May 28]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021. Available from: (<https://www.ncbi.nlm.nih.gov/books/NBK459217/>).
- [12] Ablett JLL. Analysis and main experiences in 82 patients treated in the Leeds Tetanus Unit. In: Ellis M, editor. Symposium on tetanus in Great Britain. Boston Spa (UK): National Lending Library; 1967. p. 1–10.

- [13] Fan Z, Zhao Y, Wang S, Zhang F, Zhuang C. Clinical features and outcomes of tetanus: a retrospective study. *Infect Drug Resist* 2019;12:1289–93.
- [14] Havers FP, Moro PL, Hunter P, Hariri S, Bernstein H. Use of tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccines: updated recommendations of the advisory committee on immunization practices — United States, 2019. *MMWR Morb Mortal Wkly Rep* 2020;69(3):77–83.
- [15] Halperin BA, Morris A, MacKinnon-Cameron D, Mutch J, Langley JM, McNeil SA, et al. Kinetics of the antibody response to tetanus-diphtheria-acellular pertussis vaccine in women of childbearing age and postpartum women. *Clin Infect Dis* 2011;53(9):885–92.
- [16] Aba YT, et al. Surgical Tetanus in Abidjan, Cote D'Ivoire. *Med Sante Trop* 2012;22(3):279–82 [PubMed PMID: 23164795.14].
- [17] Sharma S, Attri A K. Post-operative tetanus following recto-sigmoidal carcinoma surgery: a case report. *Int J Case Rep Images* 2019;10:1.
- [18] Strypstein S, Claeys S, Smet B, Pattyn P. Forgotten pathogen: tetanus after gastrointestinal surgery. *BMJ Case Rep* 2019;12(8):10–2.