CASE REPORT

Neonatal tetanus

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Abstract

Objective: neonatal tetanus is an infection with high mortality, constituting a problem in underdeveloped countries, where there is faulty prenatal attendance. In spite of this and of the decreasing incidence of the disease in the state of Rio Grande do Sul, we report a case of neonatal tetanus identified in 1997.

Method: we interviewed the infant’s mother and verified her vaccination history. We conducted a clinical examination of the newborn, anaerobic culture of umbilical stump and review of medical records. We also reviewed the literature and verified the epidemic profile of neonatal tetanus in Rio Grande do Sul.

Results: healthy mother, with complete outline of tetanus vaccination 4 years ago, prenatal uncomplicated and hospital delivery. Family of good socioeconomic level, differing from the other cases notified in the State, in that most did not have prenatal care nor hospital delivery. The patient is a boy. In the 24th day of life he presented fever, cyanosis, lower and upper limbs muscle hypertonia and opisthotonos episodes. An anaerobic culture of the umbilical stump grew Clostridium tetani. He was treated with penicillin G, gentamicin, sedation and tetanus immunoglobulin. He left hospital in good conditions.

Conclusions: faulty prenatal care in underdeveloped countries is the largest risk factor for high incidence of this disease in these areas. However, in pregnant women with good socioeconomic level and prenatal care, as in the case described here, this diagnosis should not be excluded if there are suggestive signs of it.


Introduction

Tetanus is an important pathology, with a global annual incidence of 18:100,000.¹ Clinically speaking, it is divided in generalized, local, cephalic, and neonatal tetanus.² It presents a high mortality rate, mainly in developing countries: the highest rates are in African countries, while in Europe and in North America, we have the lowest rates. In São Paulo, tetanus incidence is approximately 0.41:100,000, and mortality rate is 44.36%.³ In developed countries, approximately 25% of the cases occur due to work-site accidents in rural areas.² In the United States, the incidence of adult and neonatal tetanus has been decreasing since 1940.⁴

Neonatal tetanus, just as tetanus in general, is an infection that presents a high mortality rate, and it constitutes a serious problem in developing countries. In places such as Africa and Asia, we have already estimated 750 deaths per year, affecting from 5 to more than 30:1,000 live births.⁵,⁶
The main entering door for the *Clostridium tetani* is the contamination of the umbilical stump by spores of this bacillus at birth or during the first days of life, with the clinical status beginning in 4 to 14 days after birth. It should be stressed that the shorter the incubation period is, the more serious the disease will be.\(^5^,^7\) In the state of Rio Grande do Sul, Brazil, the incidence of neonatal tetanus was estimated in 0.08:1,000 children below 1 year of age from 1985 to 1989.\(^8\)

*Clostridium tetani* is a gram-positive, anaerobic bacillus, with dimensions that range from 0.5 to 1.7 \(\mu\)m wide and from 2.1 to 18.1 \(\mu\)m long. The mature organism presents a flagellum and a spherical terminal spore, which gives it a racket-like shape. Spores resist to extreme temperatures, ethanol, phenol, and formalin, but glutaraldehyde and hydrogen peroxide destroy them; they germinate when they are introduced in wounds, proliferating if the potential redox of the tissue is low. They are found in the human gastrointestinal tract and in some animals’ feces, and they may be ubiquitous. They produce a potent neurotoxin - tetanospasmin -, which inhibits the neurotransmission in the pre-synaptic terminal, producing severe muscular pain and spasms.\(^3^,^9\)

For the neonatal tetanus prevention, the World Health Organization recommends two doses of tetanus toxoid during gestation, with a minimal interval of 4 weeks between them - the administration of the second dose should take place 4 to 6 weeks before birth, with an ideal total of five doses in a life time.\(^6^,^9\)

Neonatal tetanus has been presenting a decreasing tendency in its incidence and lethality. The easy access to health services, and the better quality of the assistance given to the population, among other factors, have contributed to this. The Departamento de Controle de Doenças Transmissíveis Agudas da Secretaria da Saúde e do Meio Ambiente do RS - SSMA-RS (Department of Infectious Diseases Control/Department of Health and Environment) has been seriously worrying about the disease, demanding its notification since 1974 and elaborating, based on the analysis of the incidence of neonatal tetanus in the period of 1985 to 1989, a plan aiming at the eradication of this disease and also at the control of other clinical presentations of tetanus.

Here we present one out of the three cases of neonatal tetanus assisted by the authors in 1997, state of Rio Grande do Sul, and we also alert as for the seriousness and easy prevention of this disease through public health programs.

**Case report**

**Identification:** K.M.R., white, male, 24 days of life.

**Main complaint:** cyanosis crises.

**HDA:** since birth, the child was weeping, slept little, presented coryza and nasal congestion; these symptoms were considered to be associated with a viral infection by the pediatrician. On the 2\(^{nd}\) week, he started to present more frequent weeping, and during more intense episodes, he got “purple”. With 15 days of life, he started feeding a little, and 3 days later, he did not suck anymore, with the appearance of coryza, elevated fever, and hypertonia at superior limbs and mandibular region. He was referred to the Intensive Care Unit in the maternity nursery of the Complexo Hospitalar Santa Casa.

**History:** third gestation and third delivery, 27-year old mother, healthy, artisan and garbage recycler. She had undergone a complete scheme of tetanus vaccine 4 years ago. The father is 30 years old, healthy, driver and garbage recycler. Prenatal period did not have clinical intercurrences, she denies traumas and the use of legal or illegal drug. Normal, hospital, term delivery, Apgar score at 9/10, dismissal on the 2nd day. During the 1st week of life, the mother took the child to a recyclable garbage storehouse, where they make the collection. At this place, his was breastfed and had his diapers changed several times. The other two children, 6 and 4 years old, both male, are normal.

**Socioeconomic profile:** middle-class family; they have their own house and car, telephone, cellular phone, microwave oven, other appliances, and a private health insurance.

**Physical examination:** distress facies; humid, reddish, anicteric mucosae, with cyanosis episodes; axillary temperature at 37.6°C; weight: 3,200g; cardiovascular and respiratory systems were normal.

**Neurological examination:** asymmetric attitude; rigid facies, with the contracture of the masseteric musculature; exaggerate and moaning cry. We did not observe paresis at voluntary moving, but he presented hypertonia in the flexion of the four limbs, and episodes of generalized muscular contracture of the abdomen and opisthotonos. Deep reflexes were present and symmetric; the sucking reflex and the voracity reflex were not assessed; Magnus-De Kleijn and Moro reflexes were present; automatic marching and the stair sign were hard to study. On sensibility examination, he reacted to tactile and sonorous stimuli, accentuating muscular contracture. Skin and muscles did not present particularities. Cephalic perimeter of 35 cm and normotensive 3 x 4 anterior fontanelle.

The patient was kept in an environment free of sensorial stimuli in the Intensive Care Unit, with assisted ventilation, parenteral hydration, and nutrition through nasogastric catheter. We performed culture of the secretion flowing from the umbilical stump, with the growth of *Clostridium tetani*. The patient was treated with penicillin G, 200,000 units every 6 hours, and gentamicin, 6.5 mg every 8 hours, for 11 days. Sedation was maintained with diazepam, in 0.08mg/kg IV doses every 4 hours, and midazolam, in 0.1 mg/kg/hour doses. Besides that, we administered 500 units of tetanus antitoxin IM, and twice a day we applied compresses of potassium permanganate solution on the umbilical stump, in a concentration of 1: 20,000. On the
17th day of hospitalization, we suspended total parenteral feeding, and on the 18th day, the child presented important improvement, already sucking well and allowing a longer period between sedative doses (12 hours). On the 19th day of hospitalization, he did not present hypertonia crises anymore, and we suspended sedatives. He was dismissed from hospital in good conditions.

Discussion

Neonatal tetanus should be one of the diagnostic hypotheses when the child cries very much in the first 2 days of life, presents fever between the 3rd and the 28th days, stiffness, seizures, difficulty or inability in sucking, feeble cry, and/or cyanosis crises.5 Soon there are generalized spasms provoked by auditory, visual, and tactile stimuli. Neonatal tetanus must be distinguished from other pathologies, such as neonatal convulsive crises, meningitis, and kernicterus.5 The prognosis is put aside if the child, at moment of admission, has less than 10 days of life and presents fever between the 3rd and the 28th days, or if he/she presents sardonic laughing, and fever.10 Some authors state that the weight at birth does not alter the prognosis,5,11 while others affirm that if the weight is inferior to 2,500 kg, the mortality rate is higher.11 Davies et al.11 state that there is a higher mortality rate if the incubation period is inferior to 6 days and in case of home delivery; these features coincide with the case described.

Tetanus handling involves the neutralization of toxins circulating in blood, antibiotics, and intensive support for the control of spasms and maintenance of respiration. Table 1 shows the handling of tetanus, according to its different degrees of severity.5,5

<table>
<thead>
<tr>
<th>Tetanus stage</th>
<th>Handling</th>
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<tbody>
<tr>
<td>Mild: no dysphagia or respiratory difficulty</td>
<td>Sedatives, diazepam, opioids</td>
</tr>
<tr>
<td>Moderate: spasticity and interference in deglutition and respiration</td>
<td>Sedatives, intubation, tracheostomy</td>
</tr>
<tr>
<td>Severe: great spasticity and severe spasms</td>
<td>Paralysis and artificial ventilation</td>
</tr>
<tr>
<td>Extremely severe: sympathetic hyperactivity, heavy sedation, and severe spasms</td>
<td>Paralysis, artificial ventilation, anesthesia, and adrenergic blocking agents</td>
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Maternal immunization with tetanus toxoid has proved efficient, reaching about 90%12 in the protection of the newborn against neonatal tetanus, whose elimination is among the World Health Organization’s priorities. We verified the efficiency of one or two doses of tetanus toxoid during gestation in the reduction of mortality of newborns who acquire neonatal tetanus,13 and in the protection, for up to 13 years, of children of immunized mothers, besides the numeric reduction of cases of neonatal tetanus.12 However, hygiene during delivery is also important, with the use of clean instruments to cut the umbilical cord.6 When the umbilical cord is manipulated with aseptic instruments, and the newborn does not present immunity to neonatal tetanus, the prophylaxis of the disease is indicated through the administration of 250 to 350 units of human antitetanus immunoglobulin.5

In a study elaborated by Secretaria da Saúde e do Meio Ambiente do Estado do Rio Grande do Sul, prenatal care was absent in most pregnant women whose newborns presented the disease; consequently, the immunization with tetanus vaccine was also absent.6 Based on these data, a plan was developed in order to eliminate neonatal tetanus and reduce other clinical presentations of the disease. This strategy consists of the performance of tetanus toxoid vaccine in all women in their fertile, of diphtheria-tetanus-pertussis vaccine in all children below 7 years of age, and of at least two doses of tetanus toxoid vaccine in all pregnant women, with an interval of 60 days, besides a sanitary education program.14

The antitoxin levels that can protect the newborn’s umbilical cord vary from 0.01 to 0.015 UI/ml of serum,15,16 and the pregnant women who received the two recommended doses of tetanus toxoid vaccine transfer to the fetus only G-class immunoglobulin (IgG).9,15 Dietz et al.16 suggest that the concentration of tetanus antitoxin is the same for maternal and fetal circulation systems, regardless of the fact that Singh et al.17 verified a dilution in fetal circulation and an increase in the multiparous titrations. Moraes-Pinto et al., in 1996,15 verified that the levels of specific IgG for tetanus toxoid are decreased in infants born to HIV-positive mothers, suggesting the decrease of IgG placental transference in this situation. Even so, they are above the minimal protective value.

Dietz et al.12 verified, in a literature review, cases of neonatal tetanus in infants born to immunized mothers - as our patient. In these cases, the probable causes of the vaccine inefficiency suggested were: error in the interval of administration between the first and the second dose, the administration of only one dose, which reduces the efficiency of the vaccine in 70%, or poor maternal immune response. Vitamin A deficiency and maternal infection by Plasmodium falciparum may reduce the immune response to tetanus toxoid in vaccinated pregnant women.11

Regarding the case described, we stress that the patient’s mother was vaccinated with tetanus toxoid; she underwent the complete scheme 4 years before the birth. In this period,
the vaccine is still considered effective; therefore, the mother was not advised to submit to a new scheme.

According to data from the Secretaria da Saúde e do Meio Ambiente do Estado do Rio Grande do Sul, great part of the notified cases of neonatal tetanus occurs in children whose mothers had not had prenatal care, had not received tetanus vaccine, and had delivery at home. This shows that these children were exposed to the risk of tetanus, confirming what is seen in literature. Yet, our patient does not fit this reality, since his family has a good socioeconomic level, his mother received a reasonable prenatal care and was vaccinated, in a period still considered effective for the vaccine efficiency, though at the end of such period.

The probable source of contamination of our patient was the contact with the garbage at the storehouse to which he was taken some days after birth. As there was still umbilical stump, and the newborn was intensively manipulated at the place, this hypothesis becomes rather viable. Yet, the fact that the contamination did not occur soon after delivery, but some days later, leads us to believe that this was a good prognostic factor, since the disease had a favorable evolution.

Literature demonstrates that only vaccination, though indispensable, may not be enough for the prevention of neonatal tetanus, with the need of hygiene care on the umbilical stump. Nevertheless, atypical cases, such as the one described here, should not delay treatment; neonatal tetanus should be always considered among the prognostic hypotheses, due to the high mortality associated with this pathology.

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References