

Interesting Cases

Paediatric Tetanus: Are We Letting Our Guard Down?

Gordon P Martins¹, Rishva Keny², Shilpa Joglekar³, Maria P Silveira⁴

¹Junior Resident, ²Senior Resident, ³Associate Professor, ⁴Professor and Head of Department, Department of Paediatrics, Goa Medical College, Bambolim, Goa, India.

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Corresponding Author:

Gordon P Martins, Department of Paediatrics, Goa Medical College, Bambolim, Goa, India.

E-mail Id:

gordonmartins_105@yahoo.com

Orcid Id:

<https://orcid.org/0000-0002-3630-8248>

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ABSTRACT

Tetanus is a vaccine-preventable, life-threatening disease, which is seldom seen in states of India like Goa with good vaccine coverage. We report a 9-year-old, partially immunised male, who presented as a case of generalised tetanus, secondary to a leg wound. The case was graded as severe (> 10) on Modified Patel & Joag criteria. Management was challenging as spasms were difficult to control despite high doses of sedatives. On further research, an alarming falling trend in immunisation coverage was also noted. This case report serves as a reminder that vaccine-preventable diseases may still be seen in today's world and as well as a guide on grading the severity of tetanus and how to control the spasms effectively.

Keywords: Case Report, Tetanus, Generalised, Modified Patel and Joag

Introduction

Tetanus is a life-threatening, but vaccine-preventable bacterial infection. The global incidence of tetanus has drastically reduced as compared to the mid-20th century. However, it still remains to be a major cause of death in the developing world, with majority of the cases being due to neonatal tetanus.¹ Almost 38,000 people died from tetanus in 2017, with around 49% below the age of 5 years.² In India, the incidence of tetanus was 1.49 per lakh population in 2017, with 8,963 deaths. The age-wise incidence of tetanus cases in India for 2017 was pegged at 5,751 and 177 for those under-5 years and 5-14 years, respectively.³ India has DTP-3rd dose vaccine coverage of 1-year-olds of 91% as per the data of 2019.⁴ A 9-year-old boy, who was partially immunised, presented to us with generalised tetanus.

Case Description

A nine-year-old male child, resident of Goa, was referred

to our tertiary care hospital as a probable case of retropharyngeal abscess. The patient was apparently well 4 days ago when he had complains of difficulty in opening his mouth, and inability to eat food. The illness gradually increased to only being able to take liquids, as the trismus progressed. The next day, the patient also had gradual difficulty in chewing and swallowing, which increased to being unable to swallow his own saliva. Two days later, the patient experienced arching of the neck intermittently, with an initial frequency of 1 per hour which gradually increased to 5 to 6 episodes per hour, on the day of admission along with the onset of fever. There was no preceding history of fever, photophobia, vomiting, loose motion, drooling of saliva, abnormal breathing, cyanosis, seizures, rash, altered sensorium or neurological deficits. There was a history of trauma to the right foot 13 days prior, for which the child received TT injection and wound care with suturing. Thereafter the wound was dressed daily and sutures were removed after seven days. The patient also received oral

amoxicillin-clavulanic acid for five days. Immunisation history revealed that the child has only received birth doses (BCG, HepB, OPV) of vaccination.

At admission, the patient was noted to be irritable with intermittent arching of the back and neck. He was febrile with a temperature of 102 °F. He had tachycardia which was out of proportion to the temperature rise. He also had BP above the 99th centile (improved after sedation) and was noted to have trismus (<3 finger opening) and intermittent risussardonicus. The patient was oriented in time, place and person with a GCS of 15/15. There was no cranial nerve deficit. However, rigidity of the trunk and mildly increased tone in the upper limbs were noted. The tone in the lower limbs was normal. Deep tendon reflexes were brisk with positive Babinski's sign. He was noted to have neck stiffness but no other signs of meningeal irritation. No cerebellar signs could be elicited. Other systems were normal except for the rigidity of the abdominal wall. On local examination of the wound on the right foot, it was noted to be unhealthy with slough and mucopurulent discharge (Figure 1).



Figure 1. Infected Wound of the Right Foot

Hence, the patient was diagnosed clinically to be a case of tetanus graded as severe (> 10) by Modified Patel and Joag criteria.⁸

Treatment

The patient was given tetanus immunoglobulin 2000 IU intramuscular and 500 IU locally around the wound. He was also administered a dose of tetanus toxoid 0.5 ml IM at a separate site. The patient was immediately shifted to the PICU and put on oxygen via face mask and was kept in a quiet and dark environment to avoid sensory stimulation that could trigger the spasms.

The patient was given a bolus of diazepam but as the spasms did not subside, an infusion of diazepam (@ 0.1 mg/kg/hour) & phenobarbitone (@ 5 mg/kg/day divided twice a day) was started. With this, the patient was sedated and the frequency of spasms reduced markedly and abated after 12 hours.

The phenobarbitone dose was gradually reduced to 3 mg/kg/day divided twice a day by day 5 of admission and made oral by day 11 of admission. It was omitted prior to discharge after adequate tapering by day 16 of admission.

Diazepam was made bolus by day 6 of admission, but the patient then started having spasms again, hence the patient was restarted on diazepam infusion. By day 10 of admission, the patient was spasm-free, so diazepam was tapered again.

The patient was also started on antibiotics vancomycin, meropenem, and metronidazole. Later on, piperacillin-tazobactam was added (3 days) as the fever spikes did not subside.

The wound was subsequently dressed, and later reviewed by a plastic surgeon and was found to be healthy and healing. A plan of skin grafting was decided on.

After a protracted course of 2 weeks, the patient was successfully discharged. The patient did not have any neuropsychological deficits at the time of discharge, despite the severity of the disease. A catch-up immunisation for the patient was planned at the follow-up.

Discussion

Tetanus is an acute disease caused by a toxin-producing organism, *Clostridium tetani*, an obligate anaerobic bacillus, which is gram-positive, unencapsulated, heat, drying and disinfectant resistant, and spore-forming. The disease is caused by the production of a toxin, tetanospasmin, which in the central nervous system blocks inhibitory neurotransmitters, producing stiffness and muscle spasms, the classical symptoms of tetanus.⁵

Infection begins when these spores are introduced in wounds from trauma, surgeries and injections, or chronic skin infections and lesions. Cases have arisen from wounds that were thought as trivial to warrant medical attention.⁶ Infections are usually grouped as secondary to otogenic, post-injury or from an unknown primary focus. Post-injury tetanus is more often seen in older children and amongst boys and is due to increased outdoor activities.⁷

The incubation period could be between 3 and 21 days, with an average of 7 and 10 days, which hinges on the distance of the injury from the CNS.⁵ A short incubation period and severe attack could be caused by toxic generation in high quantity by a highly toxigenic strain in a favourable tissue environment. However, there are instances of moderate to severe attacks after a longer incubation period as well.⁷

The four clinical presentations of tetanus are: neonatal, localised, cephalic, and generalised. Generalised tetanus is the classic presentation and accounts for almost 80% of cases. It is seen to have a gradual onset, and entailing symptoms that generally worsen over a week. Symptoms

begin as masseter muscle spasms, causing lockjaw and trismus. They are then seen to progress cephalocaudally from the head and neck onwards to the trunk and may persist for many weeks. Classical scenarios include grimace due to contraction of facial muscles, risussardonicus, and opisthotonus, a backward, spastic arching of the head, neck, and spine. Sensory stimuli may lead to reflex spasms. Death may result due to diaphragmatic or laryngeal spasms. Autonomic dysfunction can occur as unstable body temperature, labile blood pressure as well as arrhythmias, and complications such as rhabdomyolysis can also occur.¹

Tetanus may never be eradicated as the bacteria continue to have natural reservoirs in soil, animals as well as humans. Moreover, no naturally acquired immunity is seen. The minimal quantity of toxin needed does not cause antibody production. Also, as there is no person-to-person transmission, herd immunity does not occur which is seen with vaccines against communicable diseases.¹

The modified Patel and Joag criteria⁷ is an objective method to assess the severity of the disease and guide treatment. Sedative doses were followed as per the recommendations of Tullu et al.⁸

It is also noticed that a continuous infusion of benzodiazepine (diazepam) is more effective in controlling spasms when compared to bolus doses. Diazepam can cause hypotension and respiratory depression in the case of children as well as elderly patients. Hence, the patient's oxygen saturation (SpO_2) has to be closely monitored along with Respiratory Rate (RR), with the availability of resuscitation equipment. Treatment should never be stopped abruptly, as this can cause a return of spasms.

The data of the Universal Immunisation Programme coverage for Goa was reviewed and is presented as follows⁹ (Table 1):

Table 1. Data of UIP for Goa

Year	TT Coverage (%)	DPT Coverage (%)
2011-2012 (year of patient's birth)	89.7	118
2012-2013	75	110
Year	TT Coverage (%)	DPT Coverage (%)
2013-2014	62.5	92.6
2014-2015	58.7	91.4

From the above data, it can be noted that there has been an alarming and steady decline in vaccination coverage for TT and DPT in the state of Goa. This could explain why vaccine-preventable diseases are still making their presence

felt. This issue needs to be looked into with a dynamic approach to ensure that no child is missed.

Conclusion

In conclusion, through our case report, we aim to remind medical practitioners that vaccine-preventable diseases are still very much prevalent in society, despite a robust vaccination coverage in the state and they should always be at the back of one's mind when patients present with both typical as well as atypical clinical features. It cannot be emphasised enough that a good history along with proper examination constitutes the foundation for making an accurate diagnosis and hence ensuring early treatment

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