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VACCINE VANITY OR WANING IMMUNITY? TWELVE-YEAR EXPERIENCE ON TETANUS AT A TERTIARY CARE CENTRE. FROM SOUTH

INDIA

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ABSTRACT Tetanus, a vaccine-preventable disease, is still a disease of concern for public health considering the high morbidity and mortality. Even though the vaccine against tetanus infection is universally available and cheap, the immunization levels among adults are low. Tetanus continues to cater to the pool of new cases in India. The rarity of presentation poses diagnostic challenges to the clinicians. The case series is one among the few recent reports from India on tetanus. The series describes the clinical characteristics, immunization status, diagnostic challenges, treatment outcomes, and complications of tetanus patients presented to tertiary care hospital in Kerala from 2008 to 2019. Total of six patients were diagnosed with tetanus during the 12 years. The age of patients ranged from 32 years to 64 years, pre-dating the initiation of a universal immunization program in India. Most of the initial symptoms were related to the musculoskeletal system and problems with the mouth and pharynx. The classical feature of trismus was not primarily evident in these cases. The average time taken for diagnosis varied from 4 to 8 days and mortality rate was 33%. The cold spatula test was positive in all six cases and can be used as a clinical test in the early diagnosis of Tetanus. The disease persistence indicate the need of robust measures for improving public awareness, effective wound management and vaccination programs.

KEYWORDS : Clostridium tetani, cold spatula test, immunization, India, Kerala, neurotoxin, Tetanus

INTRODUCTION:

Tetanus, a vaccine-preventable disease is still a disease of concern for public health considering the high morbidity and mortality.^{1, 2}In developed countries, due to the decline in protective antibodies at old age, the disease occurs mainly in the elderly^{3, 4} and in developing countries, due to the inappropriate treatment of injuries and ineffective immunization program, the disease is more in the young.^{5,6}

Tetanus continues to cater to the pool of new cases in India.^{1:2}The high prevalence in India is attributed to various factors. Lack of primary health education, poor environmental hygiene, inadequate vaccination, unhygienic ritual practices, improper would care following injuries, contamination of roads and fields with animal excreta are few factors.^{1,7}

Kerala, the southern-most state of India with a high literacy rate, is often considered superior compared to other states concerning health statistics.⁸Despite these gain, Tetanus is still prevailing in the state. The case series is one among the few recent reports from India on tetanus. The series describes the clinical characteristics, immunization status, diagnostic challenges, treatment outcomes, and complications of tetanus patients presented to tertiary care hospital in Kerala from January 2008 to December 2019.

Case Series

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These were the patients who had a clinical diagnosis of tetanus admitted at Pushpagiri medical college, a tertiary care hospital, situated in central part of Kerala.Demographic data, tetanus immunization history, the suspected portal of entry of infection, incubation time, clinical presentations, reasons for delayed diagnosis, management duration of hospital stay, and related complications were obtained from medical records.

The presence of one or more of the following was considered for clinical diagnosis of tetanus. Trismus, the rigidity of neck or/ and

abdomen, reflex spasms. Incubation time is defined as the interval between injuries to the onset of symptoms. The time from the onset of the first symptom to the onset of the first spasm is defined as the period of onset.

Table 1 and table 2 depict the demographic and clinical profile of patients. Total of six patients were diagnosed with tetanus during the 12 years. The age of patients ranged from 32 years to 64 years, predating the initiation of a universal immunization program in India. Males equaled females. The incubation period ranged from two days to 14 days, but that of 2 patients was unknown as their mode of the infection itself was uncertain. The average time taken for diagnosis varied from 4 to 8 days. Three among them were unvaccinated, while for two vaccinations status was unknown. One among them had received tetanus toxoid one week prior to surgery.

Most of the initial symptoms were related to the musculoskeletal system and problems with the mouth and pharynx. The classical feature of trismus was not primarily evident in these cases. For some cases, a complicated diagnosis was considered initially necessitating extensive investigative procedures. In two cases, the injuries went unnoticed; hence, active management of the injury was not performed. The cold spatula test was performed on all patients. The basis of the test is that when the oropharynx of a tetanus patient is touched with a spatula tongue blade, it causes a reflex spasm of the masseter, and the patient bites the spatula.¹²

Table 3 depicts the clinical course. All patients received antibiotics and immunization but due to delayed presentation they received on varied days after illness. One of them developed deep vein thrombosis. Two among the six diagnosed cases succumbed to illness, with an average mortality of 33.3 %. Both of them had developed respiratory failure.

 Table I - Demographic data, Immunization status, and initial clinical presentation of patients.

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Patie nt no:	Age and Sex	Mode of infection	Entry wound	Immuni zation status	Incubat ion period	Time delay for seeking medical attention	Time delay for diagnosis
1	54/ Male	Injury to foot	Lower limb	No	14 days	2 days	3 days
2	62/ Male	Unknow n	Not identifi ed	No	Unkno wn	3 days	1 day
3	32/M ale	Hemorrh oidectom y surgery	Rectu m	Receive d one dose of tetanus toxoid one week before surgery	2 days	3 days	No delay
4	68/Fe male	Injury to scalp	Head	Unknow n	3 days	3 days	1 day
5	64/Fe male	Indigeno us treatmen t to hemorrh oids	Rectu m	Unknow n	3 days	3 days	3 days
6	36/Fe male	Unknow n	Not identifi ed	No	Unkno wn	1 week	7 days

Table II- Clinical profile of patients with tetanus

Patie nt No	Initial symptoms	Classical signs if any	Other symptoms	Cold spatula test	Differential diagnosis considered
1	Dysphagia	Lockjaw	Nil	Positive	Cerebrovascular accident, Stiffman syndrome,
2	Myalgia,ne ck stiffness	Nil	Cough	Positive	Tempro- mandibularjoint arthritis, Respiratory infection
3	back pain	Lockjaw, Opisthoto nus	Nil	Positive	Nil
4	Myalgia, neck stiffness, back pain	Opisthoto nus	Nil	Positive	Parkinsonism, Multisystem atrophy
5	Throat pain, Dysphagia, abdominal spasm	Nil	Abdomina l pain, Breathless ness	Positive	Peritonitis, Pulmonary edema
6	Pain in the right side of the face, Jaw stiffness.	Nil	Nil	Positive	Tempro- mandibular joint arthritis

Table III-Treatment details, clinical outcome, and post tetanus sequelae

Pati ent no:	Antibiotics and im	Outcome	Complicati ons during hospital	
				stay
1	Inj metronidazole	Inj tetanus	Deep	Cured
	500 mg iv q 8	immunoglobin 500	vein	
	hrly for 7 days	IU IM Inj tetanus	thrombo	
		toxoid 0.5 ml IM	sis	

2	Inj metronidazole 500 mg iv q 8 hrly for 7 days	Inj tetanus immunoglobin 500 IU IM Inj tetanus toxoid 0.5 ml IM	Respiratory failure sepsis.	Died
3	Inj Crystalline Penicillin 15 lakhs q 6 hourly for 7 days	Inj tetanus immunoglobin 500 IU IM Inj tetanus toxoid 0.5 ml IM	Nil	Cured
4	Inj metronidazole 500 mg iv q 8 hrly for 7 days	Inj tetanus immunoglobin 500 IU IM Inj tetanus toxoid 0.5 ml IM	Nil	Cured
5	Inj Crystalline Penicillin 20 lakhs q 6 hourly for 7 days	Inj tetanus immunoglobin 500 IU IM Inj tetanus toxoid 0.5 ml IM	Respiratory failure	Died
6	Inj Crystalline Penicillin 20 lakhs q 6 hourly for 7 days	Inj tetanus immunoglobin 500 IU IM Inj tetanus toxoid 0.5 ml IM	Nil	Cured

DISCUSSION:

The first description of tetanus dates 3000 years back in Egypt and was a prevalent disease of ancient world. Passive immunization against tetanus was introduced in 1893 and effective active immunization came into existence since 1923. Despite these achievements, tetanus remains a major health hazard in the developing nations.⁹

The incubation period varied from 2-14 days and for two cases entry wound was not identifiable. Most studies describe foot as the common site of wound.^{1, 2} In contrast in this study, two of them developed following indigenous treatment of hemorrhoids. The average onset time varied from 1 to 4 days.

A retrospective study on tetanus revealed trismus, lock jaw, limb stiffness, dysphagia and autonomic dysfunction as the common presenting symptoms.¹ However, this series suggest that the clinical course and symptoms could easily be daunting and confusing to suggest other causes for the condition. Dysphagia, neck stiffness, back pain, and jaw pain were the common presenting symptoms which were similar to the findings of other studies.^{10, 11} However, the classical presentations like lock jaw, opisthotonus were evident only in fifty percent of cases.

Tetanus is essentially a clinical diagnosis where laboratory tests and cultures have little diagnostic value. High index of clinical suspicion is needed for an early diagnosis. The disease has a varied prognosis. In this study, the average time taken for diagnosis varied from 4 to 8 days. Delay in diagnosis has a negative impact on prognosis as it delays the initiation of specific treatment.⁹The cold spatula test was positive in all six cases. This can be used as a clinical test in the early diagnosis of Tetanus as same usefulness was not in other studies.^{12,13}

The mortality rate was 33% in this study, and the cause of death in both cases was attributed to respiratory failure and sudden cardiac arrest. This is one of the most common described causes of death in tetanus.^{11,} ^{11,} The mortality rate is comparable to the rate described in other studies. Retrospective study done in India on 58 tetanus patients had described the mortality as18%¹ whereas mortality rate was 43.1% in another study done in Tanzania on 102 patients.¹⁴ Mortality rate may vary depending on various factors like the vaccination status, delayed presentation ,development of complications, and underlying comorbidities.¹⁴

Studies have highlighted the importance of basic health education, increased in immunization coverage, environmental hygiene, and proper wound care - even following minor injuries for reducing the incidence mortality following the disease. ⁷Persistence of tetanus, the vaccine preventable disease indicates the need for increasing the public awareness, effective wound management and vaccination programs. Primary prevention is the only way to eradicate the disease. ¹⁴The disease persistence indicates a lack of awareness about vaccination schedules and the importance of booster doses with advancing age as all patients who had infections were unvaccinated.

CONCLUSION

The series is a reminder of the rare infectious diseases for which effective vaccination is available. Tetanus persists in Kerala despite the

improved health indices. The disease carries high morbidity and mortality and a high index of clinical suspicion in needed to prevent the delay in diagnosis. Most of the initial symptoms were related to the musculoskeletal system and problems with the mouth and pharynx. The classical feature of trismus was not primarily evident in most of the cases. The cold spatula test, an aid for clinical diagnosis was positive in all six cases. The incidence of the disease can be reduced through effective immunization programs and proper wound care. Health authorities should take urgent measures to ensure administration of tetanus toxoid booster every five years.

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