

## RECURRENT TETANUS

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RECURRENT tetanus has been described infrequently. In a review of the literature up to 1940, Vener and Bower (1940) were able to find only six cases including one of their own. Mobius (1950) reviewed 54 cases from French and German literature. Garcia Palmieri and Raminez (1957) reported five cases of tetanus recurring after intervals varying from 5 months to 19 years. Patel, Mehta, Dhirwani and Mehta, (1961) reported 17 cases of tetanus recurring after intervals varying from 9 weeks to 7½ years. Martin and Fletcher (1954), Alhady (1961) and Gunaratna (1958) each have reported a case of recurrent tetanus. The literature suggests that a second attack of tetanus may occur within a few weeks to several years of the initial attack and the apparent portal of entry may be the same as or different from that of the first attack. Vener and Bower (1940) attempted to differentiate relapse from reinfection and defined a relapse as recurrence of symptoms within a month of recovery from the previous attack through persistence of the original infection. It seems futile to us to attempt to differentiate between a relapse and a recurrence, as in tetanus one can never be sure that the apparent wound is necessarily the portal of entry of the infection or that the original infection was persisting in the wound, or whether the wound is reinfected.

Recrudescence of symptoms after apparent recovery occasionally occurs and should not be mistaken for a second attack. Usually recrudescence occurs within a week of apparent recovery. We had 10 such cases in our series; six of them were cases treated in other hospitals and then admitted in our ward for supposed relapses. The obvious reason for this was premature discharge. It is essential that patients be kept under observation for at least 7 days after subsidence of spasms.

The purpose of this paper is to report 11 instances of recurrent tetanus treated in our ward. An attempt has been made to study the cause of recurrent tetanus by estimating toxin and antitoxin titres in blood of three cases and results are presented.

### Material

Between January 1954 and August 1963 inclusive, 2,130 cases of tetanus were treated in the tetanus ward of the J.J. Group of Hospitals, Bombay. Eleven of these cases had suffered from tetanus previously. Except one, who had three attacks of tetanus, the rest had two attacks. Initial and subsequent attacks were all treated in our ward except two cases whose initial attacks were treated elsewhere.

Six were females and five were males, their ages varied from 3 years to 45 years.

The injuries in these cases were: open wound, seven cases; punctured wound, one case; otorrhœa, two cases; one case had no injury (idiopathic). Except in two, in all the cases of recurrent tetanus the portal of entry of infection was different from that of the previous attack. In the other two, chronic eczema and chronic otorrhœa were respectively probable means of entry during both attacks. One patient had an initial attack of cephalic tetanus following a pin-prick of the gums; venepuncture was done to administer antitoxin. The venepuncture site became septic and was the probable source of the second attack which again manifested as cephalic tetanus.

The time interval between two attacks varied between 3 months to 5½ years. Five cases had no spasms (mild type), three had mild to moderate spasms (moderate type) and three had severe spasms (severe type). Three cases had an incubation period less than 36 hours, in the other three it was more than 36 hours. All recovered except one who died of Cardio-respiratory failure.

All patients with recurrent tetanus received the conventional therapy for tetanus namely antitoxin, penicillin and sedatives. The dose of antitoxin varied from 10,000 to 300,000 i.u. as various therapeutic trials were being conducted. Six cases of recurrent tetanus showed sensitivity to antitoxin. The striking feature is that all patients with recurrent attacks got admitted to the hospital on an average within 30 hours of the development of the first symptom as compared to patients in

initial attacks who on an average got admitted after a lapse of 48 hours from the development of the first symptom of tetanus.

### Toxin and Antitoxin Estimation in Serum in Recurrent Tetanus.

Westwater (1917) and Spæth (1949) have suggested that recurrent tetanus occurs because one attack does not confer immunity to subsequent attacks. Turner, Velasco-Joven and Prudovsky (1958) studied antitoxin levels in the blood of 5 patients within 3 months of the clinical attack. They also studied antitoxin levels 2 and 4 weeks after injection of 0.5 ml. of fluid toxoid in three patients, the toxoid being given with an idea that if there is any active immunity conferred by the attack, there would be a substantial rise in antitoxin levels. They found no detectable level (i.e. less than 0.0025 units per ml. of serum) of tetanus antitoxin either before or after toxoid injection in any of the five patients. Stafford (1960) reported that blood taken from patients who recovered did not show any antitoxin titer after an interval sufficient to permit the excretion of antitoxin given to the patient therapeutically.

Tests were made to study the presence of toxin and antitoxin in the serum of the last 3 cases of recurrent tetanus on admission before instituting any therapy. Toxin was estimated by injecting various amounts of patients' serum into susceptible mice weighing 20 g. to observe typical features of tetanus. Antitoxin was estimated by the method described in the Indian Pharmacopœia (1955). Serum was tested for antitoxin at three titers namely, equivalent to 0.1, 0.01 and 0.001 unit per ml. The results are shown below:—

No. Case	Amount of A.T.S. given at the time of initial attack	Time of giving A.T.S. prior to recurrent attack	Titres in Recurrence	
			Toxin	Antitoxin
9	10,000	3 months	nil	nil
10	200,000	1 year	nil	0.001 units/ml.
11	40,000	6 months	+	nil

In two cases who had 10,000 and 40,000 units A.T.S. 3 months and 6 months prior to the recurrent attack respectively, no antitoxin could be detected in the serum. Toxin was found to be present in the serum of only one case. In one case who was treated with 200,000 units of antitoxin during the initial attack one year before, the serum antitoxin was found to be 0.001 unit per ml., far below the minimum protective level of 0.01 unit/ml. (Edsal 1959). There are no data as to how far titrable antitoxin persists after injection of

200,000 units, although Cole and Spooer (1935) have stated that adequate blood levels of antitoxin persist 28 to 32 days after giving a single injection of 200,000 units and Spæth (1940) has reported that antitoxin titer persists for 6 weeks after a single intravenous injection of 60,000 units. It is quite likely that this small titer of antitoxin is the residuum of the antitoxin administered therapeutically during the first attack.

The antitoxin estimation in the three cases of recurrent tetanus show that there was no antitoxin in the blood or antitoxin far below the minimum protective level, at the time of the recurrent attack. The finding is in conformity with that of Turner and others (1957) that ordinarily little or no active immunity develops as a result of clinical tetanus.

### Discussion

The literature indicates that recurrent tetanus is uncommon. In our series 0.5 per cent patients with tetanus had suffered from it previously. Alhady (1961) and Patel (1961) have reported that the incidence of recurrent tetanus is less, and the risk of a second attack is small. However these conclusions seem unjustifiable when the incidence of tetanus in the general population in their countries is not known.

A recurrence of tetanus seems to behave in the same way as the initial attack. The death of one case out of 11 suggests that the mortality of recurrent tetanus is particularly low, though the number of cases is small. The low mortality of the present series can probably be explained by the fact that most patients with recurrent attacks sought admission on an average within 30 hrs. of the onset of the first symptom, obviously because of the previous experience, and thus had early treatment and hence better chance of recovery than the cases in the initial attack who got admitted on an average 48 hours after the onset of the symptoms. The high incidence of hypersensitivity reactions to anti-tetanus serum among cases of recurrent tetanus (6 out of 11 cases) is due to sensitization to serum used therapeutically during the initial attack.

A recurrence of tetanus in a patient who has previously suffered from it may be due to one of the two following factors:—

- Persistence and reactivation of infection in the original wound.
- A new infection of the original wound or entry of the organism through another site.

Alhady (1961) reported that recurrent tetanus due to persistence of a foreign body or a focus of infection is relatively common; a true second attack in the same patient is uncommon. A majority of the cases reported by other authors including ours show that the original wound had healed at the time of the recurrence suggesting that true second attacks are not uncommon in patients with recurrent tetanus. Again it is very difficult to prove, even when the original wound is present, whether it is the same infection which has persisted or a new infection of the original wound or of any other site.

The explanation of the curious fact that one clinical attack does not produce any immunity probably lies in the fact that those patients who survive have been exposed to so small an amount of toxin that it does not provide an adequate antigenic stimulus.

The need for active immunization of patients recovered from tetanus is the same, if not greater, as that of those who are exposed to this disease, if the fortunate patient is not to be a victim of this dreadful disease once again. The opportune time of immunizing

would be four to six weeks after the recovery, depending on the amount of therapeutic antitoxin administered, so that large amounts of passive immunity may not interfere with active immunization.

The development of recurrent tetanus in cases with chronic wounds illustrates the need for protecting such patients with periodic injections of antitoxin till the wound is healed or active immunity is produced.

### Summary

1. Out of 2130 cases of tetanus treated between January 1954 and August 1963, eleven cases had suffered from tetanus previously, an incidence of 0.5 per cent.
2. Details of these eleven cases of recurrent tetanus are presented.
3. Results of the estimation of toxin and antitoxin levels in three cases of recurrent tetanus are presented.
4. The pathogenesis and immunology of recurrent tetanus are briefly discussed.

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