

A SURVEY OF TETANUS IN SINGAPORE

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As a clinical entity, tetanus is well known because of its clear cut picture and of the extreme suffering it occasions. Few can mistake the typical facies of risus sardonicus; and the repeated spasm, trismus, and rigidity of muscles constitute a syndrome that is easily appreciated, learnt and remembered. The suffering patient retains his consciousness in the midst of the severe and painful spasms as if he were a victim of the cruel mediaeval torture — the rack. In general, the picture can only be confused by strychnine poisoning, a rare event in the practice of a doctor. Although meningitides, and encephalitis may on occasion produce generalised tetanic convulsions, the picture of tetanus is generally quite distinct, and no confusion need arise if sufficient care is taken. Its aetiology, too, has been found early to be due to *B. tetani* which infects wounds, and its toxin is said to travel along nerve trunks to be fixed to the motor cells resulting in repeated painful spasms.

The standard treatment for a case of tetanus has for long been along two lines: (a) Antitoxin (b) Sedation. The use of antitoxin has been generally accepted although there still appears to be some dispute whether it is preferable to administer it intramuscularly, intravenously or intraspinally. In some clinics, all three routes are employed in the same case. Whichever the route, it should be remembered that the administration of antitoxin is not free from danger as there is a risk inherent in the giving of a large quantity of serum, and serum shock and sensitivity must indubitably be responsible for some of the fatalities in tetanus. On the other hand, there seems little doubt that the use of antitoxin diminishes mortality, and if used early enough may even be completely protective.

In sedation, the standard drug of choice has been paraldehyde, and the aim is to narcotise the patient so that he is oblivious to pain, and his spasms are suppressed. This aim has frequently to be achieved by pushing sedatives to the limit of the safety threshold, and again there seems little doubt that some of the deaths in tetanus are due to excessive sedation, although again it has to be accepted that sedation when effective has produced significant beneficial effects in reducing mortality.

Nevertheless, the overall mortality is high

in all series both locally and in other parts of the world. This poor result has led to trials of other techniques, especially in the adoption of muscle relaxants, medically induced hibernation, and artificial respiration after tracheotomy. Practically all the antibiotics have been employed as an adjunct, and on the whole, the doctor's attitude towards the management of tetanus is an aggressive one with the tendency to heroic doses of antitoxins and medicine, and equally heroic effort in inducing respiratory muscle paralysis to rely on tracheotomy and artificial respiration. Although many claims were made of benefit, the cold fact that emerges is that tetanus has remained a disease of high mortality varying from 20% to 90% with any method. In this respect, two local reports may be of interest (Yeoh 1960, Syed Alhady et al 1959).

Considered in this light, it is obvious that present day therapeutics are unsatisfactory as far as the treatment of tetanus is concerned. It would appear that the most logical conclusion would be that the way to deal with tetanus should be by prevention. In this respect, the value of toxoid has been amply proven during the war when immunised soldiers had very little risk of tetanus in spite of the many opportunities of injury, and therefore possibilities of infection by *B. tetani*. It was thought by one of us (Gwee) that if a survey of the distribution of tetanus cases was made for Singapore, it might be possible to pick out black areas where the disease was rampant, and limited campaign could be carried out with the maximum effect. Of course, the ideal would be to immunise everybody, but immunisation in Singapore when given via the needle had not been very successful as shown by our experience in campaign for diphtheria and typhoid. To introduce yet another island wide campaign of a similar type is to court failure, and waste of personnel which we can ill afford. On the other hand, if genuine pockets of ill repute are detected, a selective area campaign would be much easier and more economical to execute, and the chance of success would be higher.

Method: A search was made of all the records of the year 1957, 1958 and 1959 in the General Hospital Singapore for tetanus cases. All the cases were traced to the locality and marked on the map, and in this search ready to hand information was also gathered such

as number of cases admitted, case fatality, and number of neonatal cases. All the cases were in-patients of the General Hospital. In the hospital, cases under ten would be admitted to the Paediatric Unit under the care of several well trained paediatricians; cases over ten with no obvious injury would be admitted to either one of the two Medical Units, both Professorial Units with many qualified physicians, and cases with obvious injury to either of the two Surgical Units, one Professorial and one Governmental, but both with well qualified surgeons in the team. It was noted also that the treatment had, like in other countries, become more and more aggressive in all units.

RESULTS

Table I. Tetanus (except Neonatal).

Year	Total Cases admitted	Deaths	Fatality-rate per cent
1957	81	21	25.9
1958	77	30	38.9
1959	87	38	43.7

Table II. Tetanus Neonatal.

Year	Total Cases admitted	Deaths	Fatality-rate per cent
1957	7	4	57.1
1958	11	8	72.7
1959	9	8	88.9

As the General Hospital alone served the whole of Singapore for the period under investigation, the case incidence would represent the incidence for the entire island excepting for the cases which might have died at home. The dramatic nature of tetanus made the latter an unlikely possibility. For neonatal cases, however, this possibility was not unlikely in view of the tendency to treat new-born babies at home till the moribund stage. The annual return of tetanus death (Annual Report 1958) was 33 for 1958 as against 30 in the series and 18 for 1957 as against 21 in the series for non-neonatal cases, and 8 for 1958 as against 8 in the series and 3 for 1958 as against 4 in the series. This discrepancy is accounted for by the fact that cases in the series are followed up till discharged where as the return for the year would close at a specified time.

The results showed that the incidence has remained at a steady level for the three years in both forms of tetanus. The neonatal form has a mortality exactly twice that of other forms (Tables I and II). It shows also that there is a progressive rise of case fatality from 1957 to 1959 being 25.9% in 1957 and 43.7% in 1959 for other forms; and 57.1% in 1957 and 88.9% in 1959 for neonatal cases.

As regards distribution, apart from the abnormally high figure of 8.67 per 100,000 in 1957 for other areas, the rest of figures are near each other suggesting that the incidence is independent of the urban or rural nature of the area, although one may expect a higher incidence in rural areas, where there are more

Table III. Distribution of cases admitted under Table I above.

Area	Population			No. of Cases admitted			No. of Cases per 100,000 population		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
City	912,343	953,100	992,500	48	51	64	5.26	5.35	6.45
Katong (Urban area)	198,680	208,200	217,500	13	13	8	6.54	6.24	3.68
Serangoon (Rural & Urban)	208,021	218,900	229,200	9	5	9	4.33	2.28	3.93
Others (Mostly rural)	126,885	133,800	140,400	11	8	6	8.67	5.98	4.27
All Areas	1,445,929	1,514,000	1,579,600	81	77	87	5.60	5.08	5.51

animals and more chance of contamination of injuries by the soil. The apparent concentration of cases in the city area is amply explained by the concentration of population.

The population figure for 1957 is derived from census and that for 1958 and 1959 are derived by assuming an annual increase of 4.5% approximate per year.

Discussion: The diagnosis of tetanus is such an easy one that it is unlikely to be missed. On the other hand, it is not impossible that an occasional encephalitis or meningitis may be mistakenly labelled. Hence the case occurrence rate is likely to be biased towards excess if any. However, this bias is not likely to be significant as the simulating conditions are rare, and also a large number of these cases had necropsy examination because tetanus was made coroner's cases locally.

What surprises us is the fact that there appear to be a rise of mortality over the years in the overall figure. This tendency seems to be most marked in neonatal cases. Two obvious explanations come to mind. Firstly, tetanus bacil-

lus is getting more lethal or human beings in Singapore getting more susceptible. This, we regard, as being most improbable as there has been no experimental or direct evidence anywhere to warrant the conclusion. Secondly, it may be that the aggressive attitude resulting in more heroic treatment and dosage is really having an adverse result on the recovery chances. It should be noted that the death rate in 1957 as an overall figure is comparable to that in the most successful period of a local series (Yeoh 1960) and decidedly better than a scheme of management said to be of some promise in another local series (Alhady 1959). Are we getting too scientific and too brave for the good of tetanus cases? This would seem a very pressing question indeed.

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