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## A FATAL CASE OF TETANUS TREATED WITH TRACHEOTOMY AND HYPOTHERMIA

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The modern management of tetanus has aroused recent interest.<sup>1-4</sup> There are, however, few reports in the English literature on the use of hypothermia in tetanus in children. The following case, despite the unsuccessful outcome, is considered worthy of comment, as an illustration of the present-day approach, and the problems that arise in the treatment of tetanus.

### CASE REPORT

A 4½-year-old boy fell down a few steps and sustained an open wound over the occiput, which was treated by the mother. Ten days later, the child fell ill, refusing to open his mouth, and complained of a stiff neck. During the night, he had a convulsion, and was admitted to hospital the following morning.

On admission the classical features of tetanus were present, viz. trismus, meningismus and opisthotonus, with a septic wound over the occiput. The patient was fully conscious. Soon after admission a tetanic convulsion occurred. For the 1st day treatment consisted of sedation, nursing in a darkened room, intravenous fluids and large doses of antitoxin and penicillin. The following day the patient had a severe convulsion with pharyngospasm, cessation of breathing, cyanosis, and temporary loss of consciousness. As these convulsions were repeated and swallowing became impossible, tracheotomy was performed, gastric contents were sucked out, the wound was excised, further sedation was given, and fluids were administered intravenously.

To induce hypothermia, treatment with Largactil (chlorpromazine) was commenced on the 2nd hospital day, with an intravenous dose of 25 mg., and was continued with 25 mg. intramuscularly every 4 hours. Within 24 hours, the body temperature (rectal) dropped from 38°C (101°F) to 31°C (82°F) and then down to 27°C (71·8°F) remaining at this point during the last 2 days of life.

On the 3rd day, diminished air-entry was noted on the left side, while a chest X-ray suggested a possible atelectasis at the left base. Despite the hypothermia and the state of unconsciousness, severe convulsions occurred on the 3rd evening. Curare was administered intravenously (7 mg.), resulting in complete muscular

paralysis. Intermittent positive-pressure respiration (manual method) was carried out for about 6 hours.

The following day (4th day) the patient's condition deteriorated, with occasional convulsions and an increase of tracheo-bronchial secretion. Blood-electrolyte studies gave normal results.

On the 5th day disturbances in respiration made further curarization (7 mg. intravenously) and intermittent positive-pressure respiration necessary to maintain life. Urinary retention required catheterization.

An electro-encephalogram was attempted but, owing to technical reasons, it was not successful.

An electrocardiogram done 18 hours before death (body temperature 28°C) showed normal sinus rhythm with a rate of 80 per minute. A prolongation of the Q-T interval to 0·48 seconds was present in all leads. The pattern suggested hypocalcaemia (?).

The patient's condition gradually deteriorated, with poor air entry over the left chest, and death occurred on the morning of the 6th day in hospital.

Post-mortem examination revealed emphysema with patchy atelectasis of the right lung, and an almost complete collapse of the left lung. Thick purulent secretions were present in the trachea and bronchi, blocking the left main bronchus.

### COMMENT

Any analysis of the result in a case of tetanus requires a careful assessment of the prognosis, since the severity of the condition may vary to a great degree from patient to patient. The factors to be considered are:

1. *Incubation Period.* If this is less than 7 days, the prognosis is bad; if more than 14 days, the prognosis is usually good. With an incubation period of 10 days, as in this case, the prognosis is equivocal.

2. *Period of Onset* (i.e. between first symptom and first convulsion). This is considered a more accurate index of severity than the incubation period.<sup>1,7</sup> A period of less than 48 hours (in this patient the period of onset was 20 hours) carries a bad prognosis.

3. *Clinical Severity.* With severe and frequent spasms, involving the laryngeal and respiratory muscles, prognosis is poor. In this patient, the severity of the reflex spasms, causing cyanosis, and the temporary cessation of breathing, made radical treatment a necessity.

#### TREATMENT

Treatment was instituted along the following lines:

1. Rest, dark-room nursing, sedatives (chloral hydrate, 30 c.c. per day).
2. Excision of the septic wound.
3. Anti-tetanus antitoxin, a total of 300,000 units, of which one-half was given intravenously.
4. Antibiotics (penicillin and streptomycin) to prevent secondary infection).
5. Feeding by intravenous drip and then by an indwelling gastric tube.
6. Tracheotomy, carried out within 24 hours of admission, because of laryngospasm, difficulty in swallowing, and comatose condition of patient.
7. *Chlorpromazine* (Largactil) is considered to have a specific action on the neuromuscular endings.<sup>5, 6</sup> In addition, there is a sedative central effect occurring at a different level from that of the narcotics.<sup>1</sup> The atropine-like action helps in diminishing bronchial secretions, which is important in tracheotomized cases. Finally the hypothermia, probably due to peripheral vasodilatation, is considered to aid in treatment by diminishing metabolic needs.

Kelly and Laurence<sup>6</sup> used chlorpromazine alone in the successful treatment of a 2½-year-old boy, with severe spasms, an incubation period of 11 days, and a period of onset of 3 days. Over 16 days a total of 3,145 mg. was given (intravenously), as much as 330 mg. being given over one 24-hour period. Cyanotic episodes occurred, but tracheotomy was not performed. No mention is made of hypothermia resulting with these doses of chlorpromazine.

In our patient, aged 4½, a daily dose of 150 mg. of chlorpromazine combined with 30 c.c. of chloral hydrate resulted in a state of hypothermia and stupor which was maintained for 3 days, until death. It is doubtful whether the hypothermia

was caused solely by the chlorpromazine, or whether other factors, such as central involvement, were concerned. In view of the rapid development of the state of hypothermia, we are inclined to consider that perhaps other factors (e.g. toxic or anoxic damage to the brain) contributed to the hypothermia.

8. Complete relaxation was not achieved with this therapy alone; on 2 occasions frequent spasms called for curarization with intermittent positive-pressure respiration, carried out manually for periods of 6-8 hours. Despite this therapy, our patient died of a massive atelectasis. We are, however, convinced that without this active form of treatment respiratory complications would not have allowed this patient to survive 5 days.

Was it possible to save this patient? In the light of further experience with respiratory problems in poliomyelitis, we believe the answer is probably in the affirmative. Success in critical cases of tetanus depends on the management of this difficult method of treatment.

#### SUMMARY

A fatal case of severe tetanus in a 4½-year-old boy, treated with tracheotomy, hypothermia, curarization, and intermittent positive-pressure respiration, is described. Death on the 6th day was due to pulmonary atelectasis. Despite the difficulty in treatment, it is considered that the way to better results lies along the methods attempted.

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