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A NEW TREATMENT FOR NEONATAL TETANUS *

Antitetanic Serum and Prednisolone Given Together Intrathecally

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All over the world, particularly in tropical and subtropical countries and in the rural areas of Turkey, tetanus is quite frequently encountered. During the decade 1951 - 1960, more than 500,000 persons may have died from tetanus all over the world.¹ In some areas the mortality may be as high as 10 per cent of births, making tetanus the most frequent cause of death and a preponderant health problem. In spite of intensive care and specific treatment, the death rate in neonatal tetanus is quite high : according to reports, 69 to 78.9 per cent in different parts of the world. At Hacettepe Medical School in Ankara during the last ten years the death rate from neonatal tetanus has been 87.6 per cent.³

It is the purpose of this paper to report a new treatment for neonatal tetanus. Although the number of cases is not large, all six of our neonatal tetanus patients and one 11-month-old baby survived after this treatment. Because of this, we feel justified in presenting this preliminary report of our experience.

Materials and Methods

Since January 1967 only seven patients with tetanus have been admitted to the Pediatrics Department of Atatürk University

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Medical School in Erzurum. Six of these patients were 9 to 13 days old, with the mean age 10.6 days, and one of them was 11 months old. Incubation periods ranged from 7 to 11 days with an average of 8.8 days. The weights of the babies were between 2,950 and 3,700 gm with a mean of 3,078 gm. All the babies were delivered under the most unacceptable conditions except one, which was delivered in the hospital. According to the mothers, all the newborn babies cried and sucked normally following birth. Later they stopped sucking and started to squeeze the nipple. In all cases external stimulus caused typical spasm of the infant (flexion of the arms, clenched fists, extension of the legs, plantar flexion of the toes), trismus and risus sardonicus (Figures 1 and 2).

In all cases cerebrospinal fluid (C.S.F.) was examined routinely. Calcium in C.S.F. was also checked in four cases and serum cal-



Figure 1. Opisthotonus, flexion of the arms, clenched fists and plantar flexion of the toes are seen.



Figure 2. Typical tetanus face, trismus and risus sardonicus, and clenched fists are seen.

cium in two. Cultures from the umbilicus were taken and all patients were fed through nasogastric tubes with S.M.A. In no case was tracheostomy performed or intravenous feeding used. In treating these cases, 10,000 I.U. of antitetanic horse serum 6 cc and 25 mg prednisolone 1 cc (Solu-Dacortin^R) mixture were given very slowly intrathecally. Lumbar punctures were performed after 20 mg phenobarbital administration and the mixture was injected after withdrawal of 6 to 7 cc C.S.F. except in one case (Number 5). In this case, lumbar puncture could not be done, but the same mixture was given intravenously. Intrathecal administration of prednisolone and antitetanic horse serum was done only once. Corticosteroid treatment was continued with 2 x 5 mg prednisolone (Deltacortril^R) tablet taken orally. In all six cases the umbilicus was frequently cleaned with hydrogen peroxide. In addition to this therapy, we

administered 10,000 I.U. antitetanic horse serum around the umbilicus, 10,000 I.U. intravenously, and 20,000 I.U. intramuscularly as we had routinely done in all previous cases of neonatal tetanus. These injections were given once and not repeated. Generally we also gave daily 120 mg phenobarbital (15 mg every three hours) except in two cases. In these two cases, because of frequent spasms, 150 mg chloral hydrate was given rectally only once. Penicillin procaine 800,000 U. and streptomycin 125 mg I.M. were also administered daily.

Results

All patients survived. In five cases (Numbers 2, 3, 4, 6, 7) there were no observed side or untoward reactions except for elevation of temperatures up to 40° C. which was immediately controlled with aspirin. Routine C.S.F. examinations were normal and calcium values were within normal limits. In all cultures coagulase positive staphylococci were found. In one case (Number 6) bronchopneumonia was also seen. In all cases after the first 24 hours there was obvious clinical improvement and after 48 hours only very strong external stimulus (shaking) could produce typical spasm. The 11-month-old baby had a burn on the leg which was the apparent source of tetanus. A culture from the lesion also yielded coagulase positive staphylococcus. This patient was given 25 mg prednisolone orally as maintenance therapy. Complete recovery was obtained in 5 to 15 days (mean 8.3 days). Clinical and other features of the cases are shown in Table 1.

Discussion

Opinions concerning intrathecal administration of antitoxin are various. It is believed that intrathecal antitoxin injections in the human can produce severe and at times fatal reactions.^{4, 5, 6} In animal experiments it has been shown that one needs 100 fold more antitoxin I.V. to obtain the same results as antitoxin given intracerebrally.⁷ Also, experiments on cats and dogs have shown that antitoxin given by the intracisternal route is 20 times more effective than that given by the intravenous route.⁸ There are also differing opinions about the usage of corticosteroids in tetanus. For instance, as a result of an animal experiment, it was reported that desoxycorticosterone and cortisone do not favorably affect the course of illness or the prognosis after the administration of the tetanus toxin.⁹ Others have stated that intravenous and oral

TABLE 1
VARIOUS FEATURES OF NEONATAL TETANUS CASES

No.	Name	Sex	Protocol	Weight in Grams	Age (Days)	Incubation Period (Days)	Cultures (Umbilicus)	Calcium	Classification*	Complete Recovery (Days)
1	O.S.	F	574	3400	10	9	Staph. Coag.: +, Beta- Hem. Strept	?	Severe	15
2	Y.A.	F	1601	3700	10	8	Staph. Coag.: + Difteroids	?	Moderate	7
3	S.A.	M	2447	3170	13	11	Staph. Coag.: +	7.5 mg % (C.S.F.)	Severe	9
4	O.M.	M	2669	3300	11	10	Staph. Coag.: +, pseudomonas aeruginosa	6.5 mg % (C.S.F.)	Severe	7
5	Y.H.	M	2769	2950	11	8	Staph. Coag.: -+ enterococci	9.4 mg % (serum)	Moderate	5
6	L.I.	M	3107	3150	9	7	Staph. Coag.: +, Beta-Hem. Streptococ.	10.0 mg % (C.S.F.)	Severe	7
7	S.I.	M	1074	8300	11 mo.	8	Staph. Coag.: +,	4.5 mg % (C.S.F.) 8.8 mg % (serum)	Moderate	13

- * Mild: Patients without convulsions.
 Moderate: Patients without cyanosis during tetanic spasm.
 Severe: Patients with cyanosis as an integral phase of the convulsions.

administrations of corticosteroids in humans have given favorable results. However, I.M. injections of corticosteroids seem to aggravate muscular spasm.^{10, 11} In a published report on two adult tetanus cases, intrathecal administration of prednisolone and hydrocortisone has given good results.¹² Because of the good results seen after corticosteroids were administered orally, parenterally and intrathecally, we decided to administer steroid and antitoxin together intrathecally. To the best of our knowledge, only one published report exists on the subject of intrathecal administration of corticosteroids in which the corticosteroids were given alone in two adult tetanus cases. It is our opinion that corticosteroids given with the antitoxin should suppress any irritation of the meninges or medulla and general cerebral edema caused by antitoxin in the central nervous system. Our first case was a 10-day-old baby (Number 1) with a very severe neonatal tetanus. In our opinion, clinically this was a case that had a very slim chance of survival. Twenty-four hours after the initiation of this therapy there was clinical improvement. This improvement continued and the baby survived. The excellent result obtained in this case was very promising. Since that time we have applied the same therapy to six more cases. The probability of having six consecutive neonatal cases which could survive with the usual treatment is 0.00015. This figure is reached as a result of comparing our cases with 26 neonatal tetanus cases which had similar incubation periods (mean 9.5 days), similar body weights (mean 3077 gm) and a death rate of 76.9 per cent. Because the number of cases is small, it is impossible to reach any statistical conclusion. We intend to report our continuing work on the subject and the results in the future. It is our belief that this form of therapy, a combination of antitoxin and corticosteroids administered by the intrathecal route, is very promising.

Summary

Antitoxin and corticosteroids given in combination intrathecally have produced excellent results in six neonatal and one child tetanus. All patients survived and the time necessary for recovery was shortened.

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